Animals

Acquired inhibitors to factors V and X after exposure to topical thrombin: interference with monitoring of low molecular weight heparin and warfarin.

Authors: Israels SJ, Leaker MT

Publication Date: 1997

Abstract:

Repeated surgical exposure to topical bovine thrombin is known to be associated with the development of antibodies to bovine and human thrombin and factor V. This is demonstrated by abnormalities of in vitro coagulation assays and, rarely, postoperative bleeding. We describe a 4-year-old child in whom an antibody to bovine factor X developed after cardiac surgery; this antibody interfered with the heparin anti-Xa assay, thereby complicating the monitoring of heparin therapy.

Full Text:

Not Available

Comparative study of biological glues: cryoprecipitate glue, two-component fibrin sealant, and "French" glue.

Authors: Basu S, Marini CP, Bauman FG, Shirazian D, Damiani P, Robertazzi R, Jacobowitz IJ, Acinapura A, Cunningham JN Jr

Publication Date: 1995

Abstract:

BACKGROUND: Although biological glues have been used clinically in cardiovascular operations, there are no comprehensive comparative studies to help clinicians select one glue over another. In this study we determined the efficacy in controlling suture line and surface bleeding and the biophysical properties of cryoprecipitate glue, two-component fibrin sealant, and "French" glue containing gelatin-resorcinol-formaldehyde-glutaraldehyde (GRFG). METHODS: Twenty-four dogs underwent a standardized atriotomy and aortotomy; the incisions were closed with interrupted 3-0 polypropylene sutures placed 3 mm apart. All dogs had a 3- by 3-cm area of the anterior wall of the right ventricle abraded until bleeding occurred. The animals were randomly allocated into four groups: in group 1 (n = 6) bleeding from the suture lines and from the epicardium was treated with cryoprecipitate glue; in group 2 (n = 6) bleeding was treated with two-component fibrin sealant; group 3 (n = 6) was treated with

GRFG glue; group 4 (n = 6) was the untreated control group. The glues were also evaluated with regard to histomorphology, tensile strength, and virology. RESULTS: The cryoprecipitate glue and the two-component fibrin sealant glue were equally effective in controlling bleeding from the aortic and atrial suture lines. Although the GRFG glue slowed bleeding significantly at both sites compared to baseline, it did not provide total control. The control group required additional sutures to control bleeding. The cryoprecipitate glue and the two-component fibrin sealant provided a satisfactory clot in 3 to 4 seconds on the epicardium, whereas the GRFG glue generated a poor clot. There were minimal adhesions in the subpericardial space in the cryoprecipitate and the two-component fibrin sealant groups, whereas moderate-to-dense adhesions were present in the GRFG glue group at 6 weeks. The two-component fibrin sealant was completely reabsorbed by 10 days, but cryoprecipitate and GRFG glues were still present. On histologic examination, both fibrin glues exhibited minimal tissue reaction; in contrast, extensive fibroblastic proliferation was caused by the GRFG glue. The two-component and GRFG glues had outstanding adhesive property; in contrast, the cryoprecipitate glue did not show any adhesive power. The GRFG glue had a significantly greater tensile strength than the two-component fibrin sealant. Random samples from both cryoprecipitate and the two-component fibrin glue were free of hepatitis and retrovirus. CONCLUSIONS: The GRFG glue should be used as a tissue reinforcer; the two-component fibrin sealer is preferable when hemostatic action must be accompanied with mechanical barrier; and finally, the cryoprecipitate glue can be used when hemostatic action is the only requirement.

Full Text:

Not Available

The use of surgical sealants in the repair of dural tears during non-instrumented spinal surgery.

Authors: Miscusi M, Polli FM, Forcato S, Coman MA, Ricciardi L, Ramieri A, Raco A

Publication Date: 2014

Abstract:

PURPOSE: To compare the success in repair of dural tears (DTs) using two different surgical sealants in non-instrumented lumbar spinal surgery and evaluate the incidence of associated short- and long-term complications. METHODS: Twenty-three patients undergoing non-instrumented spinal surgery with intraoperative DTs were included both retrospectively and prospectively in this study. External signs of CSF leakage, neurological deficits, and infection-related complications were investigated postoperatively. The persistence of low-back pain was also evaluated and postoperative MRI was performed in all patients. DTs were repaired intraoperatively using suture with or without a dural patch. Eleven patients received an application of fibrin glue (Tissucol(); Baxter, Inc., IL, USA) and 12 patients received an application of bovine serum albumin glutaraldehyde surgical adhesive (BioGlue() Surgical Adhesive; CryoLife, GA, USA). These patients were followed up at 3 months and 1 year postoperatively. RESULTS: Successful intraoperative DT repair was obtained in all cases. Three patients in the Tissucol group presented with CSF leakage in the early postoperative period. There were no complications observed in the patients treated with BioGlue. At 3-month follow-up, no incidences of neurological or infection-related complications were observed in either group. There was no statistically significant difference in VAS between the two treatment groups. CONCLUSIONS: Intraoperative DTs can be easily repaired by many effective techniques. However, in our experience,

the use of BioGlue is an effective adjunct to immediate dural repair, being comparable in terms of efficacy and safety to the use of fibrin glue, potentially decreasing the incidence of associated short- and long-term complications.

Full Text:

Not Available

Motor recovery and synaptic preservation after ventral root avulsion and repair with a fibrin sealant derived from snake venom.

Authors: Barbizan R, Castro MV, Rodrigues AC, Barraviera B, Ferreira RS, Oliveira AL

Publication Date: 2013

Abstract:

BACKGROUND: Ventral root avulsion is an experimental model of proximal axonal injury at the central/peripheral nervous system interface that results in paralysis and poor clinical outcome after restorative surgery. Root reimplantation may decrease neuronal degeneration in such cases. We describe the use of a snake venom-derived fibrin sealant during surgical reconnection of avulsed roots at the spinal cord surface. The present work investigates the effects of this fibrin sealant on functional recovery, neuronal survival, synaptic plasticity, and glial reaction in the spinal motoneuron microenvironment after ventral root reimplantation. METHODOLOGY/PRINCIPAL FINDINGS: Female Lewis rats (7 weeks old) were subjected to VRA and root replantation. The animals were divided into two groups: 1) avulsion only and 2) replanted roots with fibrin sealant derived from snake venom. Post-surgical motor performance was evaluated using the CatWalk system twice a week for 12 weeks. The rats were sacrificed 12 weeks after surgery, and their lumbar intumescences were processed for motoneuron counting and immunohistochemistry (GFAP, Iba-1 and synaptophysin antisera). Array based qRT-PCR was used to evaluate gene regulation of several neurotrophic factors and receptors as well as inflammatory related molecules. The results indicated that the root reimplantation with fibrin sealant enhanced motor recovery, preserved the synaptic covering of the motoneurons and improved neuronal survival. The replanted group did not show significant changes in microglial response compared to VRA-only. However, the astroglial reaction was significantly reduced in this group. CONCLUSIONS/SIGNIFICANCE: In conclusion, the present data suggest that the repair of avulsed roots with snake venom fibrin glue at the exact point of detachment results in neuroprotection and preservation of the synaptic network at the microenvironment of the lesioned motoneurons. Also such procedure reduced the astroglial reaction and increased mRNA levels to neurotrophins and anti-inflammatory cytokines that may in turn, contribute to improving recovery of motor function.

Full Text:

Not Available

Overall assessment of regeneration in peripheral nerve lesion repair using fibrin glue, suture, or a combination of the 2 techniques in a rat model. Which is the ideal choice?.

Authors: Martins RS, Siqueira MG, Da Silva CF, Plese JP

Publication Date: 2005

Abstract:

BACKGROUND: Nerve repair with fibrin glue is an alternative to conventional suture technique, although there is no definitive experimental evaluation of the 2 techniques. This experimental study was undertaken to evaluate nerve regeneration after sciatic nerve repair with fibrin glue and to compare it with repair performed with suture and a combination of both techniques. METHODS: Eighty-six male Wistar rats were subjected to right sciatic nerve transection and immediate repair with 4-stitch nylon suture (group A), fibrin glue (group B), or a combination of both techniques (group C). Walking track analysis to access functional recovery was performed preoperatively and 12 weeks postoperatively. Before nerve section and after a 24-week interval, the nerve and motor action potentials (MAPs) were evaluated. Histomorphometric evaluation was carried out 24 weeks after nerve section. Differences between groups were evaluated for significance using the Kruskal-Wallis or analysis of variance methods. RESULTS: Animals of group B presented better results than those of group A when the functional evaluation was applied ($P < .05$). When nerve conduction velocity was evaluated at reoperation and the ratio between conduction velocity at reoperation and before the nerve section in MAP evaluation were measured and compared in the 3 groups, the rats of group B presented better results than those of group A ($P < .05$). Animals of group C presented better results than those of group A when the ratio between nerve conduction velocities was considered. There was no difference between the nerve repair methods when histomorphometric evaluation was performed. CONCLUSION: In a rat model, nerve repair using fibrin glue provided better conditions for regeneration than suture after sciatic nerve transection.

Full Text:

Not Available

The effect of fibrin adhesive (Tisseel) on interbody allograft fusion: an experimental study with cats.

Authors: Turgut M, Erkus M, Tavus N

Publication Date: 1999

Abstract:

Fibrin glue has been promoted for use in many neuro- and orthopaedic surgical procedures. At present, some surgeons make routine use of the adhesive in augmentation of bone grafting operations. However, there is controversy about its effectiveness in augmenting bone graft healing. This study investigated the use of two-component fibrin sealant (Tisseel, Immuno AG, Vienna, Austria) as an adjunct to graft material in fusion surgery. Twenty-four cats were fused with corticocancellous bone graft, which was taken from a separate cat, across the disc space in the anterior cervical region. In the present experiment, the authors carried out cervical interbody fusions in 24 cats, divided into two groups, to test the usefulness of fibrin glue in fixation of allograft fusions. At surgery, a piece of corticocancellous allograft was placed into the intervertebral disc space at the C5-C6 region, either untreated or locally treated with fibrin adhesive (Tisseel). Fusion mass formation was examined 6 months after the experimental fusion procedure by radiography and computed tomography (CT) scanning and the new bone formed was evaluated histologically. The authors observed that the allograft fusion mass area is more voluminous in the untreated animals in Group I than in the ones augmented with Tisseel, as illustrated by CT measurement (section area and bone density) ($p = 0.038$). Accordingly, histopathological studies demonstrated a reduced vascularization of the graft as well as diminished new bone formation in the animals treated with Tisseel in Group II. The present investigation demonstrates that local fibrin sealing significantly retards the osteogenic fusion in a model of corticocancellous bone grafting in cats. In view of our results it seems that fibrin sealant is not suitable for fixation of bone fragments in anterior cervical fusion.

Full Text:

Not Available

A new aneurysm wrapping material: polyglactin 910 + fibrin sealant.

Authors: Uzan M, Hanci M, Kuday C, Akar Z, Shamsi AA, Ozlen F, Oz B, Deniz E

Publication Date: 1996

Abstract:

Aneurysms experimentally induced by using the silver nitrate coagulation method in 10 Wistar Albino rats are wrapped with Polyglactin 910 and Fibrin Sealant. 6 weeks later the rats are sacrificed and compared with the control group. In the group in which Polyglactin 910 and Fibrin Sealant were used as the wrapping material, non-specific inflammatory granulation tissue development around the aneurysms is observed. We suggest that a Polyglactin 910 and Fibrin Sealant combination can be used as a wrapping material in the treatment of aneurysms where clipping is not possible.

Full Text:

Not Available

Quantification of leakage pressures after durotomy repairs in the canine.

Authors: Cain JE Jr, Rosenthal HG, Broom MJ, Jauch EC, Borek DA, Jacobs RR

Publication Date: 1990

Abstract:

This study was undertaken to investigate the relative strengths of dural repair using standard suture techniques, suture supplemented with tissue adhesive, and tissue adhesive alone. Uniform 2 mm dural defects were created in adult beagles, repaired, and then subjected to pressurization testing. Defects repaired with suture alone initially leaked within the range of physiologic pressurization, while those supplemented with tissue adhesive or repaired with tissue adhesive alone failed at higher pressurization levels. Histologic sections obtained from the dura treated with fibrin adhesive sealant demonstrated minimal inflammatory response not significantly different than those sections examined at sites repaired by suture alone. A new substance, fibrin adhesive sealant, appears to be useful in effecting dural repair due to its ability to withstand pressures greater than those obtained with suture alone.

Full Text:

Not Available

The efficacy of fibrin sealant in prevention of anastomotic leak after laparoscopic gastric bypass.

Authors: Nguyen NT, Nguyen CT, Stevens CM, Steward E, Paya M

Publication Date: 2004

Abstract:

BACKGROUND: Anastomotic leak after laparoscopic gastric bypass (GBP) can result in significant morbidity, mortality, and consumption of healthcare resources. Fibrin sealant has been used clinically in the prevention of leak; however, its efficacy has not been clearly demonstrated. The aims of this study were to (1) develop an iatrogenic leak model in swine, (2) examine the efficacy of fibrin sealant in sealing iatrogenic anastomotic leak, and (3) review our experience with the use of fibrin sealant in 66 patients who underwent laparoscopic GBP. METHODS: This study was performed in three phases. In phase 1, laparoscopic gastrojejunostomy was performed in adult swine with iatrogenic disruption of the anastomotic staple line. The size of disruption was sequentially increased (6- to 12-F opening) until a leak model was developed. In phase 2, 16 animals underwent laparoscopic gastrojejunostomy with a 12-F disruption of the anastomosis; 10 animals (study group) had fibrin sealant (Tisseel VH) applied on the disrupted anastomosis and 6 animals (control group) did not receive fibrin sealant. Animals were sacrificed on postoperative day 5 or earlier if peritonitis developed and were examined for sealing of the anastomotic disruption and the presence of intraabdominal abscess. In phase 3, the outcome of 66 consecutive patients who underwent laparoscopic GBP with fibrin sealant applied at the gastrojejunostomy was reviewed. RESULTS: In phase 1, an anastomotic leak model was developed with a 12-F disruption of the staple line. In phase 2, two control animals required early sacrifice for bile peritonitis; three control animals had intraabdominal abscess discovered at sacrifice and one animal did

not have any evidence of intraabdominal abscess or leak. Of the 10 animals in the study group, all survived until sacrifice and none of these animals had evidence of intraabdominal abscess or persistent leak. Therefore, 83% of animals in the control group developed either leak or abscess compared to 0% in the study group ($P < 0.01$, Fisher's exact test). Clinically, no leak or intraabdominal abscess developed in 66 patients who underwent laparoscopic GBP with the use of fibrin sealant. CONCLUSIONS: An anastomotic leak model was developed in swine with disruption of the stapled gastrojejunostomy to a 12-F opening. The use of fibrin sealant significantly reduces leak and abscess complication. Our results support the tissue sealing property of fibrin sealant and its use on high-risk gastrointestinal anastomosis.

Full Text:

Not Available

Staple pneumoreduction with fibrin sealant application: a reliable method of transplanting oversized lungs.

Authors: Shennib H, Adoumie R, Serrick C, Lulu H, Mulder D

Publication Date: 1994

Abstract:

Transplantation of a large lung allograft into a small chest could lead to atelectasis and hemodynamic instability. We developed a technique by which larger-sized lungs could be reduced to fit into smaller recipients. This entails multiple applications of a stapler device to progressively remove excessive lung tissue until the lung fits adequately into the recipient's chest cavity. An experimental animal model was used to test the applicability and safety of this technique. Because air leak from the resected margins was anticipated, we further examined the feasibility of reducing the latter by application of fibrin glue. Eight small mongrel dogs (20 to 25 kg) received left lung allotransplants from eight larger-sized dogs (35 to 40 kg) with the staple pneumoreduction technique. This group was further stratified to receive (group 1A; n = 4) or not receive application of fibrin sealant (group 1B; n = 4) to the stapled resection margins. Group 2 received lungs from similar-sized animals (20 to 25 kg; n = 4 each). Group 3 consisted of size-mismatched animals without pneumoreduction (n = 2). Recipient dogs were compared for facility of chest closure, gas exchange, and hemodynamic stability. The ability of the newly implanted lung to support respiratory function was also assessed by ligation of the opposite pulmonary artery at 4 hours. No difference was noted between groups 1 and 2 in terms of these variables. In sharp contrast, group 3 animals showed a rapid and profound drop in blood pressure after chest closure.(ABSTRACT TRUNCATED AT 250 WORDS)

Full Text:

Not Available

Hemostatic effect of new surgical glue in animal partial nephrectomy models.

Authors: Naitoh Y, Kawauchi A, Kamoi K, Soh J, Okihara K, Hyon SH, Miki T

Publication Date: 2013

Abstract:

OBJECTIVE: To evaluate the hemostatic effect of newly developed medical adhesive in animal partial nephrectomy models. MATERIALS AND METHODS: A total of 30 experimental rabbits were used in the first study. After clamping the renal vessels, partial nephrectomy was performed up to the opening of the calices. Bioglue was applied to the resection stumps using the new glue (group 1, n = 10) or fibrin glue (group 2, n = 10) for 2 minutes, and the blood loss was measured after unclamping the vessels. Simple unclamping without glue (group 3, n = 10) was also evaluated. For the second study, we used 9 dogs with blood pressure monitoring. After preparation similar to that for the first study, the new glue was applied in 3 dogs (group 4), fibrin glue in 3 dogs (group 5) and no glue in 3 dogs (group 6). Histologic evaluation was performed at 7 days and 1 month after surgery. RESULTS: The mean blood loss was significantly less in group 1 (1.45 g) than in groups 2 (6.59 g) and 3 (19.77 g; P <.001 for both). It was also significantly less in group 4 (12.5 g) than in group 5 (182.5 g; P <.001). Group 4 maintained their initial blood pressure throughout the study, but a significant decrease was observed in group 5. No hematoma was observed at day 7. CONCLUSION: The new glue showed acceptable hemostasis when applied to the resection stumps after partial nephrectomy in both the rabbit and the dog models. These findings indicate that it could be useful for hemostasis after partial nephrectomy.

Full Text:

Not Available

Biologic sealants: the next great thing in gastrointestinal surgery?.

Authors: Eisenberg D

Publication Date: 2013

Abstract:

Not Available

Full Text:

Not Available

[Fibrin glue anastomoses of the uterine tube using various experimental conditions]. [German]

Authors: Gauwerky JF, Reinecke M, Forssmann WG

Publication Date: 1989

Abstract:

Morphology and fertility was studied in 40 female New Zealand White rabbits after reanastomosis of the fallopian tube with fibrin glue and conventional microsurgical techniques. Isthmic anastomoses with and without resection of tubal segments as well as ampullary anastomoses were investigated. Gluing was as effective as microsuturing. Morphological studies demonstrated good healing of the oviduct. Gluing of ampullary segments, however, seems to increase the risk for dehiscence and formation of tubal fistulas at the site of anastomosis.

Full Text:

Not Available

Fibrin conduit supplemented with human mesenchymal stem cells and immunosuppressive treatment enhances regeneration after peripheral nerve injury.

Authors: McGrath AM, Brohlin M, Kingham PJ, Novikov LN, Wiberg M, Novikova LN

Publication Date: 2012

Abstract:

To address the need for the development of bioengineered replacement of a nerve graft, a novel two component fibrin glue conduit was combined with human mesenchymal stem cells (MSC) and immunosupressive treatment with cyclosporine A. The effects of MSC on axonal regeneration in the conduit and reaction of activated macrophages were investigated using sciatic nerve injury model. A 10mm gap in the sciatic nerve of a rat was created and repaired either with fibrin glue conduit containing diluted fibrin matrix or fibrin glue conduit containing fibrin matrix with MSC at concentration of 80x10(6) cells/ml. Cells were labeled with PKH26 prior to transplantation. The animals received daily injections of cyclosporine A. After 3 weeks the distance of regeneration and area occupied by regenerating axons and ED1 positives macrophages was measured. MSC survived in the conduit and enhanced axonal regeneration only when transplantation was combined with cyclosporine A treatment. Moreover, addition of cyclosporine A to the conduits with transplanted MSC significantly reduced the ED1 macrophage reaction.

Full Text:

Not Available

Tensile strength of biological fibrin sealants: a comparative study.

Authors: Lacaze L, Le Dem N, Bubenheim M, Tsilividis B, Mezghani J, Schwartz L, Francois A, Ertaud JY, Bagot d'Arc M, Scotte M

Publication Date: 2012

Abstract:

BACKGROUND: Fibrin sealants are commonly used in liver surgery, although their effectiveness in routine clinical practice remains controversial. Individual sealant characteristics are based on hemostatic effects and adhesion properties that can be experimentally measured using the 'rat skin test' or the 'pig skin test'. This study used a more relevant and realistic experimental canine model to compare the differences in the adhesive properties of four fibrin sealants in hepatectomy: Tisseel/Tissucol, Tachosil, Quixil, and Beriplast. MATERIALS AND METHODS: A partial hepatectomy was performed in beagle dogs under general anesthesia to obtain liver cross-sections. Fibrin sealants were allocated to dog livers using a Youden square design. The tensile strength measurement was performed using a traction system to measure the rupture stress point of a small wooden cylinder bonded to the liver cross-section. RESULTS: Significantly greater adhesion properties were observed with Tisseel/Tissucol compared with Quixil or Beriplast (P = 0.002 and 0.001, respectively). Similarly, Tachosil demonstrated significantly greater adhesive properties compared with Beriplast (P = 0.009) or Quixil (P = 0.014). No significant differences were observed between Tisseel/Tissucol and Tachosil or between Beriplast and Quixil. CONCLUSIONS: The results of this comparative study demonstrate that different fibrin sealants exhibit different adhesive properties. Tisseel/Tissucol and Tachosil provided greatest adhesion to liver cross-section in our canine model of hepatectomy. These results may enable the optimal choice of fibrin sealants for this procedure in clinical practice.

Full Text:

Not Available

Fibrin glue with gentamicin as an alternative to conventional surgery in experimental treatment of duodenal fistula in rats.

Authors: Gwozdziewicz L, Khan MA, Adamczyk L, Hac S, Rzepko R

Publication Date: 2012

Abstract:

Duodenal fistula is a significant ongoing surgical problem. Minimal invasive treatment might be an alternative to conventional open surgery. This study aimed to investigate whether addition of gentamicin to fibrin adhesive can augment current surgical methods. Having established a fistula, the defect was closed using the following: simple suturing, suturing covered with fibrin sealant only, or suturing with fibrin sealant mixed with gentamicin. Bursting pressure and macroscopic and microscopic examination were evaluated on the second and sixth day after surgery. The study demonstrated there was no significant difference in overall outcome between the 3 groups. However, on macroscopic examination, the mixture of antibiotic and fibrin adhesive decreased formation of adhesions and abscesses. Microscopically, there was decreased inflammation, improved granulation, and earlier onset of fibrin filament deposition, possibly leading to enhanced wound healing. The addition of gentamicin to fibrin sealant can be a useful adjunct to standard surgical closure in duodenal fistula management.

Full Text:

Not Available

Anastomotic sealing with a fibrin-coated collagen patch in small-diameter bowel.

Authors: Chmelnik M, Lasch L, Weih S, Wink E, Romero P, Holland-Cunz S

Publication Date: 2011

Abstract:

PURPOSE: The aim of this study was to evaluate the complication rates and inflammatory response in TachoSilTM-sealed small-diameter anastomoses with conventional and reduced suture number as a model for neonatal bowel surgery. METHODS: Ileo-ileal anastomoses were performed in 73 rats. In the control group, the anastomosis was accomplished with the conventional technique, using nine interrupted sutures. In the other groups with nine, six, and three interrupted sutures, the anastomotic line was additionally sealed with a fibrin-coated collagen patch (TachoSilTM). The rats were sacrificed on days 0, 2, and 10. Clinical and functional parameters included the rates of ileus, insufficiency and death, operating time, adhesions, bursting pressure, and preanastomotic dilatation. The histological examination of the anastomoses concentrated on assessing the inflammatory cell infiltration of the TachoSilTM patch and the intestinal wall. RESULTS: Severe preanastomotic dilatation was observed in additionally sealed ileo-ileal anastomoses with conventional suture number and high complication rates (ileus, perforation, death) occurred in additionally sealed anastomoses with reduced suture number. We found a massive microabscess-forming inflammation in additionally sealed anastomoses. Inflammatory cell infiltration was highest in the collagen layer of the sealing patch ($p<0.05$ vs. fibrin layer of the sealing patch and vs. intestinal wall). CONCLUSIONS: As a result of our findings, additional sealing of small-diameter intestinal anastomoses with TachoSilTM cannot be recommended.

Full Text:

Not Available

Sprayed fibrin sealant as the sole hemostatic agent for porcine laparoscopic partial nephrectomy.

Authors: Pick DL, Kolla SB, Mucksavage P, Louie MK, Sountoulides P, Kaufmann O, Olamendi S, Kaplan A, Huynh V, Ortiz-Vanderdys C, Truong HP, Said SA, Andrade L, Tongson-Ignacio J, McDougall EM, Clayman RV

Publication Date: 2011

Abstract:

PURPOSE: Tisseel is used to control minor bleeding during laparoscopic procedures. The DuploSpray MISTM spray system allows thin, even application over a larger surface area. We use sprayed Tisseel as the sole agent to control hemorrhage and seal the renal collecting system after severe porcine laparoscopic partial nephrectomy. METHODS AND MATERIALS: We performed staged bilateral severe laparoscopic partial nephrectomy in 12 Yucatan pigs using a longitudinal cut from upper to lower pole through the entire collecting system. In each pig 1 kidney was harvested immediately while the other was harvested after 4 weeks. After hilar clamping laparoscopic partial nephrectomy was done with cold scissors in 6 pigs while LigaSureTM was used in the other 6. Sprayed Tisseel was applied, and bleeding and urinary leakage were evaluated. Additional Tisseel was applied for repeat bleeding. We performed retrograde pyelogram (chronic) and burst pressure testing of the arterial and collecting systems. RESULTS: All animals survived 4 weeks. One urinoma was seen on retrograde pyelogram in the cold cut group. Average hilar clamp time was similar in the acute and chronic study arms. Average estimated blood loss was significantly less in the LigaSure group ($p = 0.0045$). Average arterial burst pressure was significantly different in the chronic and acute groups (605.8 vs 350.4 mm Hg, $p = 0.008$) but average collecting system burst pressure was similar (186.3 and 149.5 mm Hg, respectively). CONCLUSIONS: Sprayed Tisseel without suturing effectively sealed the arterial and collecting system after severe laparoscopic partial nephrectomy in the porcine model.

Full Text:

Not Available

Evaluation of intraperitoneal placement of absorbable and nonabsorbable barrier coated mesh secured with fibrin sealant in a New Zealand white rabbit model.

Authors: Jenkins ED, Melman L, Desai S, Brown SR, Frisella MM, Deeken CR, Matthews BD

Publication Date: 2011

Abstract:

BACKGROUND: This study aimed to evaluate the acute and chronic fixation strength of fibrin sealant (FS) as an alternative method of fixation for laparoscopic ventral hernia repair (LVHR). METHODS: Representative mesh types for LVHR included one nonabsorbable barrier mesh (Composix) and three absorbable barrier meshes (Sepramesh, Proceed, and Parietex composite). Macroporous polypropylene mesh (Prolite Ultra) served as the control mesh. Three methods of fixation were used, namely, 0-polypropylene suture+FS (ARTISS 4 IU), FS alone (ARTISS), and tacks alone, to secure 3x4-cm pieces of mesh (10 of each combination) to the peritoneal surface of New Zealand white rabbit abdominal wall. After 2 h of incubation at 37 degreeC, specimens underwent acute testing. Subsequently, a chronic phase was completed using the aforementioned fixation methods (10 of each combination), in which two 4x4-cm pieces of mesh were secured intraperitoneally in each of 75 New Zealand white rabbits, which survived 8 weeks until they were sacrificed. A transparent grid overlay was used to measure the mesh and adhesion area. Adhesion tenacity was characterized using the Garrard adhesion scale. In both the acute and chronic samples, a 3x3-cm area of mesh-tissue interface underwent lap shear testing at a rate of 0.42 mm/s using a tensiometer (Instron 5542). The maximum load sustained by the mesh-tissue construct was recorded as the acute fixation strength in newtons (N). Data are given as means+/-standard error of the mean. Statistical significance ($p<0.05$) was determined using a one-way analysis of variance (ANOVA) with Fisher's least significant difference (LSD) posttest or a nonparametric Kruskal-Wallis test (adhesion scores). RESULTS: The acute fixation strength was significantly greater for all the meshes secured with either suture+FS or tacks alone than for FS alone ($p<0.001$ for all comparisons). All the meshes except Proceed demonstrated greater acute fixation strength with suture+FS than with tacks alone ($p<=0.016$). Composix achieved greater acute fixation with suture+FS than all the other meshes ($p<=0.022$). Acute fixation with suture + FS was greater for Parietex Composite and ProLite Ultra than for Proceed ($p<=0.015$). When the animals were sacrificed, 48 of 50 meshes fixed with FS alone were insufficiently affixed to the abdominal wall, which may have resulted in hernia recurrence in a hernia model. The chronic fixation strength was greater for all the mesh types with either suture+FS or tacks only than with FS alone ($p<=0.0005$). The chronic fixation strength was greater with suture+FS than with tacks for Proceed and ProLite Ultra ($p<=0.013$). Neither mesh area nor adhesion tenacity differed significantly with any mesh/fixation method combination. CONCLUSIONS: In a chronic rabbit model of LVHR, fixation strength with FS alone was inadequate for selected nonabsorbable and absorbable barrier-coated meshes. The acute and chronic fixation strengths of suture+FS were equivalent or superior to the fixation strength of tacks alone. Using a combination of suture and FS for mesh fixation in LVHR may provide adequate fixation while decreasing postoperative pain due to spiral titanium tacks. In this preclinical series, mesh secured to the peritoneal surface by FS alone may have led to early recurrence.

Full Text:

Not Available

Evaluation of acute fixation strength for mechanical tacking devices and fibrin sealant versus polypropylene suture for laparoscopic ventral hernia repair.

Authors: Melman L, Jenkins ED, Deeken CR, Brodt MD, Brown SR, Brunt LM, Eagon JC, Frisella M, Matthews BD

Publication Date: 2010

Abstract:

BACKGROUND: The purpose of this comparative study is to evaluate the acute fixation strength of mechanical tacking devices and fibrin sealant against polypropylene suture for laparoscopic ventral hernia repair. METHODS: Three metallic mechanical tacking devices (ProTack, Salute, EndoANCHOR), 4 absorbable tacking devices (AbsorbaTack, PermaSorb, I-Clip, and SorbaFix), and 2 types of fibrin sealant (Tisseel, Artiss) were compared with 0-polypropylene suture. Three constructs from each device or an amount of sealant sufficient to cover a 3 x 3 cm(2) area were used to affix a 4 x 3 cm piece of absorbable barrier-coated mesh (Proceed, Ethicon, Inc) to the peritoneal surface of porcine abdominal wall. Ten samples were completed for each fixation modality. Acute fixation strength was measured via a lap shear test on an Instron tensiometer. RESULTS: Acute fixation strength was significantly greater for suture (59.7 7.2 N) compared with all laparoscopic tacking devices and to fibrin sealant ($P < .001$ for all comparisons). Protack (29.5 +/- 2.8 N) was stronger than Absorbatack (13.2 +/- 3.7 N; $P = .029$). Protack, Permasorb, SorbaFix, and I-clip were stronger than fibrin sealant ($P < .05$ for all comparisons). CONCLUSIONS: The acute fixation strengths of metallic or absorbable tacks as well as fibrin sealant are all significantly less than that achieved with polypropylene suture. These factors should be considered in selecting the type of mechanical fixation for patients undergoing laparoscopic ventral hernia repair.

Full Text:

Not Available

The effect of sealing with a fixed combination of collagen matrix-bound coagulation factors on the healing of colonic anastomoses in experimental high-risk mice models.

Authors: Pantelis D, Beissel A, Kahl P, Wehner S, Vilz TO, Kalff JC

Publication Date: 2010

Abstract:

PURPOSE: Experimental and clinical studies on the sealing of colorectal anastomoses in order to reduce the rate of leakage have previously been performed with divergent results. However, comparatively few studies have been performed on anastomotic healing using a fibrin glue-coated patch. The aim of this experimental basic scientific study in mice was to investigate the effect of fibrin glue-coated collagen patches on the healing process of colonic anastomoses in situations of adverse healing process (technical deficiency and peritonitis). METHODS: Colonic anastomoses were carried out in 206 mice and randomized into six groups (I: complete anastomoses, II: sealed complete anastomoses, III: incomplete anastomoses, IV: sealed incomplete anastomoses, V: complete anastomoses in the presence of bacterial peritonitis, VI: sealed complete anastomoses in the presence of bacterial peritonitis). Tissues from the anastomoses were removed and used for functional, histochemical, molecular, and biochemical investigations. RESULTS: The evaluation of postoperative

course data revealed the beneficial effect of additional sealing with a fixed combination of collagen matrix-bound coagulation factors I and IIa (Tachosil(), Nycomed Austria, Linz) in high-risk experimental anastomotic healing. Sealing incomplete anastomoses resulted in significantly lower lethality and leakage rates, as well as significantly higher bursting pressure values and histopathologic scores. Collagen 1 and 3 expressions and hydroxyproline concentrations are greatly increased with additional sealing in all high-risk anastomoses. CONCLUSIONS: In our current model, we demonstrate that additionally sealing high-risk experimental colonic anastomoses provides a positive effect on the healing process. The effect on the molecular level in particular seems to be essential and requires further experimental studies to evaluate the mechanism.

Full Text:

Not Available

Platelet-rich fibrin versus albumin in surgical wound repair: a randomized trial with paired design.

Authors: Danielsen PL, Agren MS, Jorgensen LN

Publication Date: 2010

Abstract:

OBJECTIVE: To study the effects of autologous platelet-rich fibrin (PRF) versus human albumin on incisional wound breaking strength and subcutaneous collagen deposition in patients undergoing laparoscopic cholecystectomy in a randomized trial. SUMMARY BACKGROUND DATA: Platelet peptidic growth factors may stimulate collagen synthesis and tissue repair. METHODS: One expanded polytetrafluoroethylene (ePTFE) tube was inserted subcutaneously from the edge of each of the two 10-mm trocar incisions in 51 patients. Treatment with PRF prepared from the patient's own blood or human albumin was randomized to respective wound site by concealed allocation. On postoperative day 10, breaking strength of the incisional wounds as well as the collagen concentration, type I procollagen mRNA, type III procollagen mRNA, matrix metalloproteinase-1 mRNA, and fibroblast density in the ePTFE tubes were determined. All analyses were assessor-blinded. The trial was registered in the Current Controlled Trials Registry (ISRCTN34481461). RESULTS: Local PRF had no significant effect on incisional wound-breaking strength. In the ePTFE tubes, PRF treatment decreased collagen concentration by 24% (P=0.046) and type I procollagen mRNA level by 29% (P=0.003), but had no significant impact on type III procollagen mRNA, matrix metalloproteinase-1 mRNA or fibroblast infiltration. The profibrotic transforming growth factor-beta1 level increased (P<0.0001) 2-fold with PRF. Collagen concentration in albumin-treated ePTFE tubes correlated with breaking strength of the skin incisions (rs=0.48, P=0.03). CONCLUSIONS: PRF did not improve wound strength significantly compared with albumin but suppressed subcutaneous collagen synthesis and deposition during early repair of surgical wounds in humans. Furthermore, deposition of reparative collagen in the subcutaneous ePTFE tube model partly predicted the breaking strength of an incisional skin wound.

Full Text:

Not Available

Fibrin sealant: past, present, and future: a brief review. [Review] [21 refs]

Authors: Spotnitz WD

Publication Date: 2010

Abstract:

BACKGROUND: Fibrin sealant is a two-component topical hemostat, sealant, and tissue adhesive consisting of fibrinogen and thrombin that has been used in the United States as a blood bank- or laboratory-derived product since the 1980s and has been commercially available since 1998. METHODS/RESULTS: Initially, surgeons employed hospital-based materials because of the lack of availability of a commercially produced agent. At present, there are five U.S. Food and Drug Administration (FDA)-approved forms including products derived from pooled or autologous human plasma as well as bovine plasma. On-label indications include hemostasis, colonic sealing, and skin graft attachment. Recent clinical and experimental uses include tissue or mesh attachment, fistula closure, lymphatic sealing, adhesion prevention, drug delivery, and tissue engineering. CONCLUSIONS: The modern literature on fibrin sealant now exceeds 3000 articles and continues to expand. This brief review presents the history of this material, its present clinical use, and its future applications. [References: 21]

Full Text:

Not Available

Mesh fixation with fibrin glue (Tissucol/Tisseel) in hernia repair dependent on the mesh structure--is there an optimum fibrin-mesh combination?--investigations on a biomechanical model.

Authors: Schug-Pass C, Lippert H, Kockerling F

Publication Date: 2010

Abstract:

BACKGROUND: Because of its hemostatic and adhesive properties, fibrin glue has been used in many areas of surgical treatment in recent years. One example is hernia repair, where fibrin gluing has become increasingly established as an alternative method for mesh fixation. Clinically, fixation with fibrin glue shows a reduced postoperative complication rate compared to other fixation methods (staples, sutures), particularly with regard to pain. MATERIALS AND METHODS: Six different lightweight meshes were tested: TiMesh light, TiMesh extralight, Parietene light, Ultrapro, Optilene LP,

and BARD Soft Mesh. Two millimeters Tissucol was used for fixation. Five meshes from each group were tested on muscular tissue with and without fibrin glue. The defined defect was 4.5 cm in diameter. The biomechanical measurements were taken in a standardized way using a materials testing machine. The minimum fixation strength required was 32 N, calculated from a corresponding model. RESULTS: The fixation strength measurements without fibrin glue gave a mean value for all 30 meshes of 2.98 N with a SD of 0.92 N. This was far below the 32 N required. With fibrin glue, the mean of all the measurements (30 meshes) was 61.86 +/- 23.0 N (min 34.9 N, max 97.3 N). The lowest value was recorded for Ultrapro (34.9 +/- 12.5 N). All the other meshes had a significantly higher fixation strength when fixed with fibrin glue than Ultrapro ($p = 0.001$). The best results were found for Optilene LP, and this was significantly better than all the other meshes (97.3 +/- 8.9 N; $p < 0.001$). CONCLUSION: Given the adequate stability and superior biocompatibility of lightweight large pore monofilament polypropylene meshes, heavyweight polypropylene meshes should no longer be used. It is possible to achieve adequate fixation of the meshes using fibrin glue. However, careful consideration should be given to the particular structure of the mesh in each case. Not every mesh is equally suitable for this purpose.

Full Text:

Not Available

Primary mesh augmentation with fibrin glue for abdominal wall closure--investigations on a biomechanical model.

Authors: Schug-Pass C, Lippert H, Kockerling F

Publication Date: 2010

Abstract:

BACKGROUND: The occurrence of incisional hernias after various types of abdominal procedures and incisions continues to be a problem. A number of studies conducted for diverse risk groups have identified a beneficial role for the prophylactic use of mesh augmentation. To what extent this affects the stability of a suture was tested in our biomechanical model. MATERIALS AND METHODS: To that effect, we compared three groups, carrying out six measurements in each case: (1) single suture in a muscle specimen, (2) suture and additional reinforcement with fibrin glue, and (3) suture and additional reinforcement with a mesh fixed with fibrin glue (Tissucol, Tisseel; with an overlap of 2 cm to all sides). RESULTS: The single suture conferred a tensile strength, which in our model, was just above the prescribed maximum abdominal pressure of 32 N (37.3 N). The additional use of fibrin glue did not have any significant impact on this result (41.8 N). Only through mesh augmentation with fibrin glue was it possible to achieve a significantly greater tensile strength (64.5 N, $p = 0.003$). CONCLUSIONS: The prophylactic use of meshes for stabilization of laparotomy closures appears to be effective. Adequate mesh fixation can be achieved with fibrin glue alone. Further experimental studies and in particular randomized clinical trials are needed to demonstrate proof of the long-term advantages of mesh augmentation in risk groups.

Full Text:

Not Available

Wound integrity of clear corneal incisions closed with fibrin and N-butyl-2-cyanoacrylate adhesives.

Authors: Banitt M, Malta JB, Soong HK, Musch DC, Mian SI

Publication Date: 2009

Abstract:

PURPOSE: To compare the integrity of clear corneal incisions closed with fibrin (Tisseel) and n-butyl-2-cyanoacrylate (Histoacryl) tissue adhesives to those closed with conventional sutures. METHODS: Four replicate experiments were performed on porcine eyes with each of the following conditions: three limbal clear corneal incision sizes (3.0 mm, 4.5 mm, and 6.0 mm), three incision closure techniques (fibrin adhesive, n-butyl-2-cyanoacrylate adhesive, and 10-0 interrupted nylon sutures)-1, 2, and 3 sutures at the 3.0-mm, 4.5-mm, and 6.0-mm incision sizes, respectively. Wound integrity was then measured by elevating the intraocular pressure of the eye to the point where wound leakage (IOP(L)) occurred. Two-way repeated measures analysis of variance (ANOVA) was used to analyze the IOP(L) data. RESULTS: Incision closure technique and incision size showed significant interaction in the ANOVA model ($p = 0.0008$). Fibrin adhesive demonstrated higher IOP(L) compared to suture closure at the 3.0-mm incision size ($p < 0.0001$). There was no significant difference in IOP(L) when comparing wound closure with fibrin adhesive and sutures at the 4.5-mm and 6.0-mm incision sizes ($p = 0.52$ and $p = 0.56$, respectively). There was no significant difference between the three closure techniques for the 6.0-mm incisions ($p > 0.15$). When comparing the wound closure techniques for all incision sizes, the mean IOP(L) significantly increased in the following order: suture(s), fibrin adhesive, n-butyl-2-cyanoacrylate glue. CONCLUSIONS: Fibrin or n-butyl-2-cyanoacrylate tissue adhesive may be used as a more stable alternative to conventional sutures in the closure of clear corneal incisions.

Full Text:

Not Available

Comparison of a new self-gripping mesh with other fixation methods for laparoscopic hernia repair in a rat model.

Authors: Fortelny RH, Glaser KS

Publication Date: 2009

Abstract:

Not Available

Full Text:

Not Available

The use of Tachosil surgical patch or fibrin glue in coronary artery surgery does not affect quality of anastomosis or provoke postoperative adhesions in pigs.

Authors: Erb MA, Claus T, Hartrumpf M, Bachmann S, Albes JM

Publication Date: 2009

Abstract:

OBJECTIVE: Fibrin glue products and collagen surgical patches (TachoSil) coated with coagulation factors I and IIa are increasingly being used to prevent oozing from distal or proximal coronary anastomosis. Furthermore, an increasing number of patients are being operated upon anti-platelet therapy. These patients often exhibit diffuse bleeding. Especially in an off-pump scenario surgeons refrain from placing additional stitches in order to avoid an impairment of the graft. In these situations, a biological glue can help resolve this dilemma. It is, however, assumed that these products may exert negative effects on the anastomosis. For obvious reasons a systematic histological assessment in humans is impossible. Therefore, a chronic, large animal model was developed to study the fate of these products on a coronary anastomosis. METHODS: In 15 pigs receiving off-pump coronary artery bypass graft of the left mammary artery to the left anterior descending coronary artery, three groups were defined. Group A served as control. In group B the anastomosis was covered with 1 ml fibrin glue; in group C TachoSil coverage was performed. Bypass flow (BF) was measured using a Doppler probe. After 3 months the pigs were sacrificed and the anastomoses were evaluated macroscopically and by means of light microscopy regarding patency and fibrosis. RESULTS: In group A, all five animals survived, three of the five anastomoses were patent and the mean BF was 26 ml min(-1). In group B, three of the five animals survived, all anastomoses were patent. The BF was 21 ml min(-1). In group C, all five animals survived, four of the five anastomoses were patent and BF was 21 ml min(-1). Macroscopic and histological evaluation showed no differences between the groups. Remnants of Tachosil or fibrin glue were not observed. CONCLUSIONS: In the chronic course, no evidence of adverse effects of TachoSil or fibrin glue was noted. Both agents can therefore be used safely in clinical practice for haemostyptic or positioning purposes.

Full Text:

Not Available

Is tisseel a viable option in posterior lamellar keratoplasty?.

Authors: Oberg TJ, Friday JW, Ursea R, Snyder RW

Publication Date: 2009

Abstract:

PURPOSE: It is well known that Tisseel Fibrin Sealant provides an excellent tissue adhesive. However, its thick and viscuous nature makes it nearly impossible to apply it in a uniform and thin layer. We propose applying the sealant phase as a dry powder and polymerizing it in-vivo by exposing it to thrombin solution after a graft has been placed. METHODS: For each experiment two rabbit corneal buttons were affixed to each other using either Tisseel or thrombin plus dry fibrinogen component, the tensile strength of the bond was then tested in the tension box. Balanced salt solution was used as an aqueous substitute. RESULTS: Tisseel was demonstrated to create significant adhesive tensile force (expressed as N/m) between corneal buttons ($P < 10$). Using only the dry fibrinogen component followed by injection of the thrombin solution directly into the balanced salt solution did not significantly alter the strength of the bond ($P = 0.18$). CONCLUSION: The use of the dry fibrinogen component followed by injection of thrombin solution into the balanced salt solution, without the accompanying fibrinolysis inhibitor, is equally effective in adhesive strength when compared to complete Tisseel. This technique may be used in lamellar corneal surgery, although there would be potential difficulties with its application in the in vivo setting.

Full Text:

Not Available

Fibrin adhesive and the vaginal vault synthesis on female rabbits abdominal hysterectomies.

Authors: Lima AG, Taha MO, Rivoire HC, Fagundes AT, Fagundes DJ

Publication Date: 2009

Abstract:

PURPOSE: To investigate the effectiveness of fibrin glue in comparison with polyglycolic acid suture to promote the closure of rabbit's vaginal vault, after abdominal hysterectomy. METHODS: Twenty female, adults, New Zealand rabbits, were submitted to abdominal hysterectomy and randomly distributed to polyglycolic acid suture (G-PA / n=10) or fibrin glue closure of vaginal vault (G-FG / n=10). Radiograph study allowed identifying vault vaginal suture disrupter or fistulas to urinary bladder or rectum. Videovaginoscopy study allowed identifying the presence of cellulites, abscess formation, tissue granulation or granuloma. Vaginal cuff burst test allowed to identify by the escape of air bubbles and rupture pression record. Histological sections stained with Picrosirius red allowed the measure of fibrous tissue healing. RESULTS: The videovaginoscopy identified a significant difference (Fisher Test $p<0.3142$) of granulation tissue in the animals of G-PA (40%) in comparison with the G-FG (20%). The gross inspection showed the same relation in the granulation tissue occurrence (Fisher test $p< 0.1749$) with G-PA (50%) and G-FB (20%). The visceral adhesion to the vaginal vault wound was statistical significant (Fisher test $p< 0.1749$) with G-PA (50%) and G-FG (20%). The pressure of rupture (mm Hg)

of the burst test was similar (p<0.0421) in the animals of G-PA (61.5+/-19.3) and G-FG (72.5+/-21.9). The collagen matrix of vault wound healing was similar (p< 0.0231) between the G-PA (31.63+/-15) and the G-FG (23.2+/-13.2). CONCLUSION: The vaginal vault closure using the fibrin glue is a safe and reliable procedure after abdominal hysterectomy in female rabbit model.

Full Text:

Not Available

A fibrin gel carrier system for islet transplantation into kidney subcapsule.

Authors: Lim JY, Min BH, Kim BG, Han HJ, Kim SJ, Kim CW, Han SS, Shin JS

Publication Date: 2009

Abstract:

Islet transplantation is a promising therapeutic option for type 1 diabetes, and actively performed in the clinic as well as in the animal experiments. For the rodent experiments, islet transplantation into kidney subcapsule is widely used to assess islet quality, however, it is often difficult to do using a polyethylene tubing and fine needle because of inherent dead volume of needle and stickiness of the tubing to islets. This problem makes it difficult to interpret the physiological response to different islet doses. Here, we developed a simple fibrin gel carrier system for islet transplantation into kidney subcapsule and utilized it to determine the marginal islet mass sufficient for correction of hyperglycemia in diabetic nude mice.

Full Text:

Not Available

Suture or hemostatic agent during laparoscopic partial nephrectomy? A randomized study using a hypertensive porcine model.

Authors: Rouach Y, Delongchamps NB, Patey N, Fontaine E, Timsit MO, Thiounn N, Mejean A

Publication Date: 2009

Abstract:

OBJECTIVES: To compare the efficacy of 3 biologic hemostatic devices with that of conventional suture during laparoscopic partial nephrectomy (LPN) in a hypertensive porcine model. Improving hemostasis, urinary tract closure, and the warm ischemia (WI) time are important in the development of LPN. METHODS: A total of 40 pigs were randomized prospectively into 4 groups before bilateral LPN.

Right LPN involved 30% of the renal parenchyma without a urinary tract opening, and left LPN involved 40% of the renal parenchyma with a urinary tract opening. The renal section was treated with fibrin/thrombin sealant, fibrin glue, thrombin/gelatin granules, and conventional suture in groups 1, 2, 3, and 4, respectively. At 10 days postoperatively, left retrograde pyelography was performed. The pigs were then killed and the kidneys sent for pathologic analysis. The main criteria were the estimated blood loss, perioperative WI time, leaking pressure during retrograde pyelography, and parenchyma necrotic-induced lesions. RESULTS: The estimated blood loss was lower in the pigs treated with either thrombin/gelatin granules or suture ($P < .001$). The use of thrombin/gelatin granules decreased the WI time compared with the use of suture ($P < .001$). However, the leaking pressure was greater in the pigs treated with suture ($P < .01$). The mean area of necrosis around the renal section was shorter when no suturing was performed ($P < .01$). CONCLUSIONS: The use of thrombin/gelatin granules alone controlled hemostasis as effectively as suture and significantly decreased the WI time. However, conventional suture of the urinary tract, when opened, should be considered. Additional evaluation in humans is required before any clinical recommendation can be made.

Full Text:

Not Available

New fibrin conduit for peripheral nerve repair.

Authors: Kalbermatten DF, Pettersson J, Kingham PJ, Pierer G, Wiberg M, Terenghi G

Publication Date: 2009

Abstract:

An ideal substitute to treat a nerve gap has not been found. Initially, silicone conduits were employed. Later, conduits were fabricated from collagen or polyesters carbonates. More recently, it has been shown that a bioresorbable material, poly-3-hydroxybutyrate (PHB), can enhance nerve repair. The present investigation shows the use of fibrin as a conduit to guide nerve regeneration and bridge nerve defects. In this study we prepared and investigated a novel nerve conduit made from fibrin glue. Using a rodent sciatic nerve injury model (10-mm gap), we compared the extent of nerve regeneration through the new fibrin conduits versus established PHB conduits. After 2 and 4 weeks, conduits containing proximal and distal stumps were harvested. We evaluated the initial axon and Schwann cell stimulation using immunohistochemistry. The conduits presented full tissue integration and were completely intact. Axons crossed the gap after 1 month. Immunohistochemistry using the axonal marker PGP 9.5 showed a superior nerve regeneration distance in the fibrin conduit compared with PHB (4.1 mm versus 1.9 mm). Schwann cell intrusion (S100 staining) was similarly enhanced in the fibrin conduits, both from the proximal (4.2 mm versus 2.1 mm) and distal ends (3.2 mm versus 1.7 mm). These findings suggest an advantage of the new fibrin conduit for the important initial phase of peripheral nerve regeneration. The use of fibrin glue as a conduit is a step toward a usable graft to bridge peripheral nerve lesions. This might be clinically interesting, given the widespread acceptance of fibrin glue among the surgical community.

Full Text:

Not Available

Sutureless pancreatojejunal anastomosis using an absorbable sealant: evaluation in a pig model.

Authors: Argyra E, Polymeneas G, Karvouni E, Kontorravdis N, Theodosopoulos T, Arkadopoulos N

Publication Date: 2009

Abstract:

BACKGROUND: Leakage from pancreatojejunal anastomosis continues to be a major source of morbidity in pancreatic surgery. In the present study, we test the hypothesis that a safe, sutureless pancreatojejunal anastomosis can be constructed using a synthetic surgical sealant. MATERIALS AND METHODS: Ten pigs weighing 20 to 25 kg underwent distal pancreatectomy and anastomosis of the pancreatic remnant with a jejunal limb with the use of an absorbable surgical sealant. Integrity of the anastomosis was checked on the 10th postoperative d by means of an autopsy study and histological examination. RESULTS: One animal died on the 3rd postoperative d of peritonitis. The remaining 9 animals had an uneventful postoperative course. Gross and microscopic pathological examination revealed intact pancreatojejunal anastomosis in all surviving animals. CONCLUSIONS: Following distal pancreatectomy in pigs, pancreatojejunal anastomoses with the use of sealant are technically feasible. During a 10-d observation period, the sealant appeared to prevent anastomotic dehiscence and allow normal anastomotic healing.

Full Text:

Not Available

The hemodynamic behavior of arterial anastomosis using fibrin sealant: experimental study in swine.

Authors: Rocha EA, de Souza C

Publication Date: 2008

Abstract:

The wide use of biological sealants as a reinforcement for arterial sutures and the small experimental base in literature motivated this study. Our aim was to evaluate the flow, tear pressure, and the need of reinforcement stitches in sutured arteries after a cross-section. This research project complied with the Helsinki convention. The Tissucol (Baxter) fibrin sealant was used in all experiments. The femoral and carotid arteries of 17 swine from the same breed (weighing from 15 to 20 kg) were cross-sectioned after heparinization and subjected to anastomoses using a single continuous plane of 7-0 prolene. We worked with 68 artery samples, 34 in the treatment group and 34 in the control group. For each animal, one carotid and one femoral artery randomly received fibrin sealant with the contralateral side being used as a control. The need and the number of reinforcement stitches were recorded. Ten minutes after protamine infusion, the animals were sacrificed and the arteries were catheterized respecting 1 cm proximal and distal. The arteries were measured and placed on a flow meter to evaluate the flow

rate of 10 mL of 0.9% NaCl in a 50 cm high column. The arteries were then subjected to air infusion at increasingly higher pressures (stepwise increases of 25 mm Hg), the grafts were dipped in 0.9% NaCl solution, the first air leakage was observed, and the tear pressure recorded. Data was analyzed with EpiInfo 6 data manager. The external diameters and thickness of the arteries were similar in both the treatment and control group. There was no significant difference between the groups regarding the tear pressure (P = 0.329), flow rate (P = 0.943), and the number of samples with a tear pressure above 200 mm Hg. However, the sealant reduced the number of reinforcement stitches necessary (P = 0.029). We conclude that fibrin sealant reduces the need of additional stitches; however, it does not change the tear pressure nor significantly reduces the flow.

Full Text:

Not Available

Mechanical resistance of peripheral nerve repair with biological glue and with conventional suture at different postoperative times.

Authors: Nishimura MT, Mazzer N, Barbieri CH, Moro CA

Publication Date: 2008

Abstract:

Regardless of its type, the repair of a peripheral nerve must ideally permit early motion of the affected limb and resist disruption by the tensile forces generated throughout the healing process and regeneration. A comparative study of the mechanical resistance of the repair of the sciatic nerve with biological glue and conventional microsurgical suture over time was undertaken in 48 rats. Both right and left sciatic nerves were exposed simultaneously and repaired at random with the glue on one side and conventional suture on the opposite side. Mechanical resistance of the repair was evaluated in situ with a universal testing machine using a hooklike accessory applied proximally to the repair site, immediately and at 7, 14, and 28 days postoperatively. A load was applied at the rate of 2 mm/min till rupture. The resistance of both types of repair significantly increased up to day 14 (P < 0.001), and the repair with the glue was significantly less resistant than repair with conventional suture immediately postoperatively (P < 0.001) and on day 7 (P = 0.03). Resistance became equivalent for the two types of repair on days 14 (P = 0.67) and 28 (P = 0.34). The change in resistance of both types of repair with time was in accordance with the power function numeric formula.

Full Text:

Not Available

Laparoscopic intraperitoneal mesh fixation with fibrin sealant (Tisseel) vs. titanium tacks: a randomised controlled experimental study in pigs.

Authors: Eriksen JR, Bech JI, Linnemann D, Rosenberg J

Publication Date: 2008

Abstract:

BACKGROUND: The main reason for hospital stay after laparoscopic ventral hernia repair (LVHR) is probably pain, which also causes a lengthening of the patient's time to assume normal daily activities and work. It is likely that titanium tacks may be the main contributing factor to early (and maybe chronic) pain after LVHR. Therefore, non-invasive and patient-friendly mesh fixation methods must be considered. The present study was designed to investigate the technical applicability, safety and effect of Tisseel for intraperitoneal mesh fixation. METHODS: Nine 40-kg Danish Landrace female pigs had two pieces of MotifMESH and two pieces of Proceed mesh fixed in the intraperitoneal position by a laparoscopic technique. The two pieces of the same mesh were fixed with fibrin glue (Tisseel) and titanium tacks, respectively. All pigs were euthanised on the 30th postoperative day and the mesh-tissue samples were tested for strength of ingrowth (peel test), adhesion formation, mesh shrinkage and examined for histological alterations. RESULTS: No meshes were displaced from their initial position at autopsy, but we observed two cases of mesh folding that could have resulted in hernia recurrence in real patients. There were no significant differences in the strength of ingrowth between different mesh types or fixation methods, measured as peel work per area of mesh (J/m2) and peak force per width of mesh (Nmax/cm). The Proceed mesh shrank by 11% compared to 4% for the MotifMESH mesh ($p = 0.002$). There was no difference in the grade of adhesions (%) between fixation methods ($p = 0.794$) or different mesh types ($p = 0.296$). In the same fashion, there was no difference in the strength of adhesions (grades 0-4) between the two fixation methods or different mesh types ($p > 0.5$, chi2 test). There was no significant difference in the formation of fibrosis or inflammation between the different meshes or fixation methods. All samples showed significant foreign-body reaction with giant cells. CONCLUSION: Our results suggest that the laparoscopic fixation of an intraperitoneal mesh with Tisseel is safe and technically feasible in a pig model. There is still no evidence that fibrin-sealing alone is appropriate for intraperitoneal mesh fixation in hernia repair, but the technique might become an alternative or supplement to mechanical mesh fixation. Until then, further experimental research in animal hernia models with larger meshes is needed, especially with a focus on mesh folding and displacement.

Full Text:

Not Available

Fibrin sealant (Tissucol) enhances tissue integration of condensed polytetrafluoroethylene meshes and reduces early adhesion formation in experimental intraabdominal peritoneal onlay mesh repair.

Authors: Petter-Puchner AH, Walder N, Redl H, Schwab R, Ohlinger W, Gruber-Blum S, Fortelny RH

Publication Date: 2008

Abstract:

BACKGROUND: The laparoscopic intraabdominal peritoneal onlay mesh repair (IPOM) is a common technique for the reinforcement of multiple ventral hernias or defined defects after laparotomies. However, the placement of synthetic meshes in the intraabdominal cavity can be associated with severe complications. Adhesions frequently originate from the implant and protruding parts of fixation devices, presenting a serious clinical problem with potentially detrimental consequences. This study was designed to assess the impact of fibrin sealing with Tissucol (FS; Baxter, Vienna, Austria) on adhesion formation to condensed polytetrafluoroethylene meshes (Motif Meshes, MM; Proxy Biomedical, Galway, Ireland) as well as on tissue integration of these implants in experimental IPOM repair in rats. It was tested whether FS application allowed the reduction of sutures for mesh fixation without increasing the risk of mesh dislocation. MATERIALS AND METHODS: Sixteen rats were assigned to the implantation of MM with four nonresorbable sutures (Synthofil; Ethicon, Norderstedt, Germany) with additional fibrin coating with 0.2 mL FS or to MM fixation with six nonresorbable sutures without FS (n = 8 per group). MM with 2 cm in diameter were implanted in open IPOM by a laparatomy. The observation period of 17 days ensured assessment of adhesions after the full degradation of FS. Adhesions were rated with the score suggested by Vandendael. Histology was performed. RESULTS: All eight MMs without FS sealing elicited severe (grade III) adhesions, whereas fibrin-sealed MM were rated mild in 1, moderate in 5, and severe in 2 cases. The superior finding in the FS group was statistically significant. Impaired integration of sutured-only MM was observed in four cases, whereas all FS-sealed MM were well integrated. CONCLUSIONS: FS improves the tissue integration, reduces early adhesion formation to cPTFE implants, and allows reduction of perforating fixation devices in experimental IPOM repair.

Full Text:

Not Available

Comparison of healing after cystotomy and repair with fibrin glue and sutured closure in the porcine model.

Authors: Borin JF, Deane LA, Sala LG, Abdelshehid CS, White SM, Poulson AK, Khan F, Edwards RA, McDougall EM, Clayman RV

Publication Date: 2008

Abstract:

PURPOSE: We compared healing after laparoscopic cystotomy using fibrin glue, sutures, or a combination to determine whether fibrin glue can obviate the need for sutures and whether there is any detriment when glue is used in the presence of sutures. MATERIALS AND METHODS: In 24 Yorkshire pigs, a 3.5 cm vertical cystotomy was created laparoscopically and repaired as follows: Group 1--no closure; group 2--fibrin glue closure; group 3--suture repair; group 4--combined fibrin glue and suture repair. All animals had a Foley catheter for 1 week. In each group, three animals were harvested at 1 week (acute) and three animals were harvested at 6 weeks (chronic). RESULTS: Acute: Group 1--all pigs had an unhealed defect that leaked when evaluated by cystography. Groups 2, 3, 4--mean leak pressures were 80, 97, and 60 cm H(2)O (P = 0.36), respectively. Mean bladder capacity was not

significantly different between groups. Chronic: No leakage seen on a cystogram at 1 week; at 6 weeks, bladders were filled at > or =95 to 100 cm H(2)O without leakage. Histologically, there was more inflammation in the acute group v chronic group pigs. In the acute group pigs repaired with glue or suture + glue, there was more inflammation and less epithelial continuity than in the suture alone group. At 6 weeks, there was no difference between groups. CONCLUSION: Fibrin glue provoked an intense inflammatory response that might have delayed healing acutely, resulting in a lower burst pressure in both scenarios in which it was used (i.e., alone or in combination with sutures). However, by 6 weeks, there did not seem to be any difference between groups either clinically or histopathologically.

Full Text:

Not Available

In vivo efficacy of a new autologous fibrin sealant.

Authors: Alston SM, Solen KA, Sukavaneshvar S, Mohammad SF

Publication Date: 2008

Abstract:

BACKGROUND: Fibrin-based sealants are commonly used to arrest bleeding following surgery. A new method has been developed for preparation of autologous fibrin sealant (FS) from protamine-precipitated fibrinogen concentrate. This FS has the potential to be a low-cost, safe, and convenient alternative to commercial sealants or cryoprecipitates usually prepared from patient or banked plasma. In this study, the efficacy of human FS was evaluated in a rat kidney model. MATERIALS AND METHODS: FS containing various fibrinogen concentrations (ranging from 15 to 60 mg/mL) were applied to controlled renal incisions, and bleeding time and blood loss were measured. Bleeding from the wounds was also predicted using a mathematical model based on tensile strength and adhesion strength of the sealants. RESULTS: The sealants, when applied under controlled conditions, reduced the blood loss and bleeding time more effectively than controls (where no sealant, plasma, or the commercial product Tisseel (Baxter Healthcare Corp., Westlake Village, CA) was applied). The sealant also significantly reduced bleeding time with a concomitant decrease in blood loss in rats that were anticoagulated with heparin. Bleeding times predicted by the mathematical model agreed well with experimental data and demonstrated that the ability of sealant to reduce bleeding time largely depended on its adhesion strength. CONCLUSION: The autologous fibrin sealant can be prepared with any volume (e.g., 5 to 500 mL) of patient's blood, within minutes, and exhibits equal or greater hemostatic efficacy compared with the leading commercial sealant.

Full Text:

Not Available

The venous graft as an effector of early angiogenesis in a fibrin matrix.

Authors: Polykandriotis E, Tjiawi J, Euler S, Arkudas A, Hess A, Brune K, Greil P, Lametschwandtner A, Horch RE, Kneser U

Publication Date: 2008

Abstract:

The arteriovenous loop (AV loop) model is gaining importance as a means of initiating and sustaining perfusion in tissue engineering constructs in vivo. This study represents an attempt to dissect the morphology of early arterialization and angiogenesis in the AV loop in a fibrin matrix with special focus on the interpositional venous graft (IVG) segment. An AV loop was constructed in 30 rats using the femoral vessels and an IVG. The AV loop was encased in an isolation chamber filled with a fibrin matrix. Evaluation methods included scanning electron microscopy (SEM) of corrosion casts, immune histology and micro magnetic resonance angiography (MRA). Direct luminal neovascular sprouting was evident between day 10 and day 14 from the vein and the IVG but not from the arterial segment. Arterialization of the IVG manifested itself on the corrosion casts as a gradual reduction in luminal caliber with onset after day 7. Microdissection of the microvascular replicas could demonstrate for the first time the presence of direct luminal sprouts from the IVG. MRA was used to display the shunt pattern of perfusion in the patent AV loop. From the three segments of the vascular axis in the AV loop the IVG is the most versatile for applications in the clinical as well as the experimental setting. Kinetics of angiogenesis warrant further investigation in the IVG.

Full Text:

Not Available

Hemodinamic behavior of arterial anastomosis using fibrin sealant: experimental study in swine.

Authors: Rocha EA, Souza Cd

Publication Date: 2007

Abstract:

OBJECTIVES: To evaluate the flow, tear pressure, the need of reinforcement stitches in sutured arteries reinforced or not using fibrin sealant after a cross-section. METHOD: Tissucol fibrin sealant was used. The femoral and carotid arteries of seventeen swine from the same breed (weighing from 15 to 20 kg) were cross-sectioned after heparinization and subjected to anastomoses using a single continuous plane of prolene 7-0. We worked with 68 artery samples, 34 in the Treatment Group and 34 in the Control Group. For each animal, one carotid and one femoral artery randomly received fibrin sealant with the contralateral side being used as a control. The need and the number of reinforcement stitches were recorded. Ten minutes after protamine infusion, the animals were sacrificed and the arteries were catheterized. The arteries were measured and placed on a flow meter. The arteries were then subjected to air infusion at increasingly higher pressures (stepwise increases of 25 mmHg), the grafts were dipped in saline solution, the first air leakage was observed and the tear pressure recorded. RESULTS: The external diameters and thickness of the arteries were similar in both the Treatment and Control Group. There was no significant difference between the groups regarding the tear pressure

(p=0.329), flow rate (p=0.943) and the number of samples with a tear pressure above 200 mmHg. However, the sealant reduced the number of reinforcement stitches necessary (p=0.029). CONCLUSION: Fibrin sealant reduces the need of additional stitches.

Full Text:

Not Available

Novel sutureless transplantation of bioadhesive-coated, freeze-dried amniotic membrane for ocular surface reconstruction.

Authors: Sekiyama E, Nakamura T, Kurihara E, Cooper LJ, Fullwood NJ, Takaoka M, Hamuro J, Kinoshita S

Publication Date: 2007

Abstract:

PURPOSE: To evaluate the efficacy and safety of a novel sutureless transplantation of bioadhesive-coated, sterilized, freeze-dried amniotic membrane (FD-AM) for ocular surface reconstruction. METHODS: A bioadhesive-coated, freeze-dried amniotic membrane was made by freeze drying the denuded AM in a vacuum, applying the minimum amount of fibrin glue (mixture of fibrinogen and thrombin) necessary to retain adhesion on the chorionic side, and sterilizing it by gamma-radiation. The resultant AM was characterized for its biological and morphologic properties by immunohistochemical and electron microscopic examination. In addition, fibrin glue-coated, freeze-dried (FCFD) AM was transplanted onto a rabbit scleral surface without sutures, to examine its biocompatibility. RESULTS: Immunohistochemistry of the FCFD-AM revealed that fibrinogen existed on its chorionic side, and the process of applying fibrin glue did not affect its biological and morphologic properties. Moreover, electron microscopic examination of the chorionic side of the FCFD-AM revealed tiny microfibrils (which are probably fibrinogen protofibrils), and showed that the epithelial surface of FCFD-AM consisted of intact basal lamina similar to that of FD-AM. FCFD-AM transplantation was very easily performed, and the graft adhered to the bare sclera immediately. Though the fibrinogen naturally biodegraded within 2 weeks, the FCFD-AM remained for at least 12 weeks after transplantation. Epithelialization on the FCFD-AM was achieved within 2 weeks, as was the case with FD-AM transplantation. The conjunctival epithelium on the FCFD-AM was well stratified and not keratinized, suggesting that FCFD-AM supports normal cell differentiation. CONCLUSIONS: The FCFD-AM retained most of the biological characteristics of FD-AM. Consequently, this sutureless method of transplantation of FCFD-AM is safe, simple, and useful for ocular surface reconstruction.

Full Text:

Not Available

Experimental comparison of type of Tissucol dilution and composite mesh (Parietex) for laparoscopic repair of groin and abdominal hernia: observational study conducted in a university laboratory.

Authors: Olmi S, Addis A, Domeneghini C, Scaini A, Croce E

Publication Date: 2007

Abstract:

PURPOSE: The primary objective of this observational study was to determine the best possible dilution of fibrin glue (Tissucol) to employ for prosthesis fixing in laparoscopic treatment of abdominal wall defects and, secondly, to assess its feasibility and safety. MATERIALS AND METHODS: This study was carried out in a university experimental animal laboratory in accordance with all international laws, ethics regulations and quality criteria associated with animal experiments. The tests were carried out on two pigs, using four samples of mesh (Parietex). All meshes were fixed using two different Tissucol dilutions (standard with distilled water and that with calcium chloride). Follow-up evaluations were at 15 days after 30 days, with the latter consisting of traction tests and a biopsy for histological analysis. RESULTS: No post-operative complications were observed. The collagen-coated polyester meshes showed 0% adhesions, and reperitonealization had ensued after 15 days. We saw no shrinkage or migration of any of the meshes. Histopathological analyses confirmed a greater stability, greater tissue integration and the largest number of fibroblasts in meshes fixed with a 1/10 Tissucol dilution without calcium chloride. CONCLUSIONS: This observational study using animals showed that the 1/10 standard dilution - not that with calcium chloride - provided the best fixation and integration and prevented the formation of intraperitoneal adhesions, provided a hydrophilic collagen film-covered mesh was used.

Full Text:

Not Available

Effect of fibrin adhesive application in microvascular anastomosis: a comparative experimental study.

Authors: Cho AB, Junior RM

Publication Date: 2007

Abstract:

BACKGROUND: Microvascular anastomosis is the most critical step during free flap transfers or replantations. Although the conventional suture is still considered the standard technique, it is technically difficult, time consuming, and traumatic to the vessel wall. The aim of this study was to evaluate the effectiveness of fibrin adhesive to overcome these problems when applied in

microvascular anastomosis. METHODS: Sixty-eight Wistar rats were used in this study. Eight animals were used in a pilot study to determine the minimum amount of suture stitches required per anastomosis when the fibrin adhesive was applied. In the definitive study, we performed 30 anastomoses in the femoral artery and 30 anastomoses in the carotid artery. In each artery, half of the anastomoses were performed using interrupted sutures without fibrin adhesive (control groups), and the other half were performed using fibrin adhesive and fewer sutures (experimental groups). RESULTS: The application of fibrin adhesive significantly reduced the number of sutures and the time taken to perform the anastomosis. The anastomotic bleeding was also significantly reduced in both experimental groups. The immediate and late patency rates were not compromised by fibrin glue application. No significant differences were observed in the histologic analysis of the anastomosed vessels between the two techniques. CONCLUSIONS: The application of fibrin adhesive did not result in any harmful effects in the microvascular anastomosis. The authors encourage the clinical application of fibrin adhesive in more complex cases, when more than one microvascular anastomosis is required.

Full Text:

Not Available

Effect of 5-fluorouracil plus interferon on the integrity of colonic anastomoses covering with fibrin glue.

Authors: Kanellos D, Blouhos K, Pramateftakis MG, Kanellos I, Demetriades H, Sakkas L, Betsis D

Publication Date: 2007

Abstract:

BACKGROUND: It has been well established that the immediate postoperative intraperitoneal administration of chemotherapeutic agents such as 5-fluorouracil (5-FU) after curative colon resection for colon cancer destroys disseminated cancer cells and inhibits micrometastases but also inhibits anastomotic healing. On the other hand, the application of fibrin glue constitutes a physical barrier around the anastomosis and may prevent anastomotic leakage. The purpose of this experimental study was to determine the effect of 5-FU plus interferon (IFN)-alpha-2a on the integrity of colonic anastomoses covered with fibrin glue when injected intraperitoneally immediately after colon resection. MATERIALS AND METHODS: Sixty rats were randomized to one of four groups. After resection of a 1-cm segment of the transverse colon, an end-to-end sutured anastomosis was performed. Rats of the control and the fibrin glue groups were injected with 6 ml of 0.9% sodium chloride (NaCl) solution intraperitoneally. Rats in the 5-FU + IFN and the 5-FU + IFN + fibrin glue groups received 5-FU plus IFN intraperitoneally. The colonic anastomoses of the rats in the fibrin glue and in the 5-FU + IFN + fibrin glue groups were covered with fibrin glue. All rats were sacrificed on the 8th postoperative day, and the anastomoses were examined macroscopically. The bursting pressure measurements were recorded, and the anastomoses were graded histologically. RESULTS: Only the 5-FU + IFN group had anastomoses rupture, and the rupture rate (33%) in this group was significantly greater than in the other groups, where there were no ruptures ($P = 0.015$). The adhesion formations score was, on average, significantly higher in rats of the 5-FU + IFN group compared with the control group ($P = 0.006$) and the 5-FU + IFN + fibrin glue group ($P = 0.010$). Bursting pressures were significantly lower in the control group when compared to the fibrin glue and 5-FU + IFN + fibrin glue group ($P < 0.001$). Rats

in the 5-FU + IFN + fibrin glue group developed significantly more marked neoangiogenesis than rats in the other groups. Inflammatory cell infiltration, collagen deposition, and fibroblast activity did not differ significantly among the four groups (P = 0.856, P = 0.192 and P = 0.243, respectively). CONCLUSION: The immediate postoperative intraperitoneal administration of 5-FU plus IFN impairs colonic healing. However, when the colonic anastomoses were covered with fibrin glue, the injection of 5-FU plus IFN had no adverse effects on the integrity of the anastomoses.

Full Text:

Not Available

The use of hemostatic agents and sealants in urology. [Review] [50 refs]

Authors: Hong YM, Loughlin KR

Publication Date: 2006

Abstract:

PURPOSE: While hemostatic agents and sealants have long been used in the fields of surgery and urology, confusion persists about their indications for use and the optimal agent choice. We comprehensively defined and evaluated the scientific basis for hemostatic agent and sealant use in urology, and provide a conceptual framework for future research and discussion. MATERIALS AND METHODS: A MEDLINE search of all available literature concerning hemostatic agents in urology was performed, including topical hemostats, anti-fibrinolytics, fibrin sealants and matrix hemostats. Select references were also chosen from the broader surgical literature. Animal studies, case reports, retrospective and prospective studies, and opinion articles were reviewed. RESULTS: Hemostatic agents include a wide range of components. Recent literature has focused on fibrin sealants and matrix agents. Two main indications exist for hemostatic agents, including 1) hemostasis and 2) sealant. The best evidence for efficacy and safety exists for hemostasis, especially for nephrectomy and trauma. Newer data highlight urinary tract reconstruction, fistula and percutaneous tract closure, suture line strengthening and infertility as potential uses. Novel drug delivery and tissue engineering are areas with large clinical potential. CONCLUSIONS: Hemostatic agent use is promising and yet unproven for most conditions currently treated in urology. Hemostasis continues to be the main indication, which is well established. Few trials have examined comparative efficacy among hemostatic agents and further prospective studies are needed to justify additional indications as well as determine the optimal mode of use. Minimally invasive surgery will further drive the use of hemostatic agents and sealants. Cost-effective, evidence based hemostatic agent use will continue to challenge all urologists. [References: 50]

Full Text:

Not Available

[The use of the fibrin glue in the peripheral nerves reconstructions]. [Polish]

Authors: Gosk J, Knakiewicz M, Wiacek R, Reichert P

Publication Date: 2006

Abstract:

In this study we presented essential historical data about application of the fibrin glue in microsurgical reconstructions of the peripheral nerves. The technique of the preparation of the fibrin glue and the most important aspects of the clinical practice were described. We presented also our own experience in the use of the fibrin glue (Tissucol Kit firmy Baxter AG, Beriplast P firmy Behring), in microsurgical reconstructions of the brachial plexus and peripheral nerves. The basic principles of management were emphasized and a few clinical cases were presented. Microsurgical reconstructions of the nerves with using of the fibrin glue are atraumatic and don't cause inflammation and granuloma formation. These methods allowed to while away the time of surgical procedure and allowed to perform a microsurgical reconstruction in difficult conditions. Microsurgical reconstructions of the nerves with fibrin glue application may be used individually or in connection with suture materials.

Full Text:

Not Available

The role of biological adhesive and suture material on rabbit hepatic injury.

Authors: Taha MO, De Rosa K, Fagundes DJ

Publication Date: 2006

Abstract:

PURPOSE: To evaluate the performance of fibrin adhesive and absorbable suture thread in the repairing of hepatic injures in rabbits. METHODS: New Zealand albino rabbits (n=16), males and females, from 5 to 6 months old, average weight of 2500 g, were distributed randomly in Group A (n-8) - biological adhesive and Group B (n=8) - suture thread. After anesthesia with acepromazine (1mg/Kg), ketamine (50mg/Kg) and fentanyl EV (0,5ml/Kg), it was performed a supra-umbilical median laparotomy, the median hepatic lobe was isolated and subjected to severe standardized incision. In the group B the incision edges were sutured with simple 4-0 catgut, in separated stitches. It was evaluated the total time of the procedure, the hemostasis time and hemorrhage volume. In the 21st post-operative day it was evaluated the presence of adherences and signs of infection in the abdominal cavity, and it was followed by the resection of the median hepatic lobe for the histological evaluation. RESULTS: The calculated mean and standard deviation showed that the procedure time, hemostasis time and bleeding amount were significantly smaller in the group of animals subjected to the use of fibrin adhesive. The surgical abdominal incision was significantly more extensive in the animals of the suture group

(average of 6,8 cm) in relation to the adhesive group (average of 3,8), as well as the number of occurrences of abscesses. The adherence of the intestinal ansas to the sutured incision (group B) occurred in five cases and the major omentum adhesion occurred in all animals. In the group A (adhesive) it occurred adherences of the major omentum in three cases. The microscopy of the hepatic incision repaired with the use of fibrin showed that the inflammatory infection is less intense, not associated with the formulation of secretion in the abscesses, and therefore has a more favorable later cicatricial aspect than a conventional suture with surgical thread. CONCLUSION: In agreement with other biomedical literature works, the fibrin adhesive is a viable option for the performance of hemostasis in a animal model (rabbit) with severe hepatic injury.

Full Text:

Not Available

An in vitro and in vivo analysis of fibrin glue use to control bone morphogenetic protein diffusion and bone morphogenetic protein-stimulated bone growth.

Authors: Patel VV, Zhao L, Wong P, Pradhan BB, Bae HW, Kanim L, Delamarter RB

Publication Date: 2006

Abstract:

BACKGROUND CONTEXT: Recombinant human bone morphogenetic protein-2 (rh-BMP2) has become popular for augmenting spine fusion in the lumbar and cervical spine. Concerns exist, however, over bone morphogenetic protein (BMP)-stimulated soft-tissue swelling and bone growth stimulation in areas where bone is not desired, especially as the material "leaks" into such spaces. The most detrimental effects of such leakage might be airway compromise, while heterotopic bone formation into the spinal canal has been reported in animal and human studies. Fibrin glue has been used as a carrier of many osteoinductive materials; however, its efficacy at modulating the clinical effects of BMP are not known. The amorphous nature of fibrin glue makes it a candidate to control diffusion of BMP and possibly limit bone formation by limiting BMP diffusion to areas where such bone is not desired. PURPOSE: To evaluate the use of fibrin glue to limit BMP diffusion and BMP-stimulated bone growth. STUDY DESIGN/SETTING: This is an in vitro basic science study and an in vivo prospective randomized animal study. STUDY SAMPLE: Eighteen Lewis rats. OUTCOME MEASURES: In vitro study: Enzyme-linked immunosorbent assay measurement of rh-BMP2 concentration in saline. In vivo study: At day 60, rats were evaluated for neurologic deficits before sacrifice. Spines were harvested, and the following studies were performed: 1) manual testing for fusion and bone growth; 2) X-ray evaluation; 3) Micro-computed tomography (micro-CT) scans. METHODS: In vitro study: Collagen sponges soaked with BMP at two different concentrations were incubated in saline solution with and without encapsulation by fibrin glue. Saline BMP concentrations were measured at consecutive time points. In vivo study: A rat fusion model using rh-BMP2 for fusion has been developed and tested with resultant100% fusion in over 100 rats. Lewis rats were divided into two groups and treated as follows: I: Exposure of L4-L5 transverse processes, decortication, and placement of BMP sponge in the lateral intertransverse space. II: Exposure and decortication as above

and placement of fibrin glue before BMP sponge placement. RESULTS: In vitro study: Peak rh-BMP2 concentrations in saline were 20% and 45% of the maximum possible for fibrin glue encapsulated sponges and controls, respectively, with a more gradual increase to peak concentration in samples encapsulated in fibrin glue. In vivo study: No rats exhibited any neurologic deficits. X-rays revealed at least partial bone formation in all rats. Manual testing of intertransverse fusion spines revealed 100% fusion in rats treated with BMP only, whereas rats treated with fibrin glue before placement of BMP sponges revealed only one possible fusion. Posterior-lateral bone formation was present on X-ray in both groups, and micro-CT imaging revealed bridging bone from transverse processes to the BMP-stimulated bone in the control groups. In spines treated with fibrin glue before rh-BMP2 placement, bone formation could still be seen within the soft tissues; however, bridging bone connecting to the transverse processes was either significantly decreased or not present. CONCLUSIONS: Fibrin glue can limit rh-BMP2 diffusion. Also, because it limited bone formation at the transverse processes, it can be inferred that fibrin glue can limit bone formation when used to separate areas of desired bone formation from areas where bone formation is not desired.

Full Text:

Not Available

Differential, time-dependent effects of perivenous application of fibrin glue on medial thickening in porcine saphenous vein grafts.

Authors: Wan S, Arifi AA, Chan MC, Yip JH, Ng CS, Chow LT, Yim AP, Jeremy JY

Publication Date: 2006

Abstract:

OBJECTIVE: Neointimal and medial thickening play a critical role in late vein graft failure following CABG. Previous ex vivo experiment suggested that perivenous application of fibrin glue may reduce the damage in the circular smooth muscle cell layer of the media of the vein graft shortly after exposing to arterial pressure. However, the in vivo as well as the longer term impact of this intervention remain unknown. METHODS: Bilateral saphenous vein-carotid artery interposition grafting was performed in eight large white pigs (35-45 kg). In each pig, one of the grafts was randomly selected to receive perivenous fibrin glue support while the contralateral graft served as control. At 1 and 4 months following surgery (n=4 pigs in each group), all 16 patent vein grafts were removed and pressure-fixed. Multiple histological sections from each graft were prepared. Proliferating cell nuclear antigen (PCNA) was detected by immunocytochemistry. Vein graft morphology was assessed using computer-aided planimetry. RESULTS: Although perivenous application of fibrin glue had little effects either on medial thickness 1 month after implantation or on PCNA index, it significantly increased medial thickness (control: 0.37+/-0.02 mm; treated: 0.55+/-0.02 mm, p<0.001) and total wall thickness (control: 0.75+/-0.04 mm; treated: 0.92+/-0.04 mm, p=0.008) at 4 months (mean+/-SEM; n=4 in each group). CONCLUSIONS: Our data indicated that perivenous application of fibrin glue enhances graft thickening and as such does not constitute a strategy for preventing late vein graft failure after CABG.

Full Text:

Not Available

Skin graft fixation by slow clotting fibrin sealant applied as a thin layer.

Authors: Mittermayr R, Wassermann E, Thurnher M, Simunek M, Redl H

Publication Date: 2006

Abstract:

Human fibrin sealant (FS) has been proven effective for skin grafting after severe burn, however no systematic evaluation of application conditions has been performed so far. In order to find the optimal FS amount for fixation of skin grafts to deep defects, we created four full thickness wounds (8 cmx4 cm) on the dorsum of six male pigs. Wounds were covered with unmeshed split thickness skin grafts and fixed either with a thin layer (0.05 ml/cm2) or a thick layer (0.15 ml/cm2) of fibrin sealant (FS) without additional sutures. Sutures served as controls. FS was used as a slow clotting spray (4-5 IUthrombin/ml). Outcome measurements revealed that hematoma formation (day of surgery) was more extensive and occurred more frequently in the suture group as compared to FS 0.05 ml/cm2 ($p<0.05$). Areas of graft dislocation tended to be larger in the suture group versus the FS 0.05 ml/cm2. The FS 0.05 ml/cm2 graft take on day 5 appeared to be enhanced in comparison to the suture group. Excellent outcome was notable on the final observation day (day 21) in the FS 0.05 ml/cm2 group with a take of 99.7% (IQR 96.1-100%). Corresponding values in the FS 0.15 ml/cm2 group were 96.9% (IQR 92.2-99%) and 95.9% (IQR 93.2-98%) in the suture group. The results indicate, that the usage of a sprayed thin FS layer (0.05 ml/cm2) in a slow clotting rate (4-5 IUthrombin/ml) is an appropriate fixation method in split thickness skin transplantation.

Full Text:

Not Available

Evaluation of a hybrid scaffold/cell construct in repair of high-load-bearing osteochondral defects in rabbits.

Authors: Shao XX, Hutmacher DW, Ho ST, Goh JC, Lee EH

Publication Date: 2006

Abstract:

The objective of this study was to evaluate the feasibility and potential of a hybrid scaffold system in large- and high-load-bearing osteochondral defects repair. The implants were made of medical-grade PCL (mPCL) for the bone compartment whereas fibrin glue was used for the cartilage part. Both matrices were seeded with allogenic bone marrow-derived mesenchymal cells (BMSC) and implanted

in the defect (4 mm diameter x 5 mm depth) on medial femoral condyle of adult New Zealand White rabbits. Empty scaffolds were used at the control side. Cell survival was tracked via fluorescent labeling. The regeneration process was evaluated by several techniques at 3 and 6 months post-implantation. Mature trabecular bone regularly formed in the mPCL scaffold at both 3 and 6 months post-operation. Micro-Computed Tomography showed progression of mineralization from the host-tissue interface towards the inner region of the grafts. At 3 months time point, the specimens showed good cartilage repair. In contrast, the majority of 6 months specimens revealed poor remodeling and fissured integration with host cartilage while other samples could maintain good cartilage appearance. In vivo viability of the transplanted cells was demonstrated for the duration of 5 weeks. The results demonstrated that mPCL scaffold is a potential matrix for osteochondral bone regeneration and that fibrin glue does not inherit the physical properties to allow for cartilage regeneration in a large and high-load-bearing defect site.

Full Text:

Not Available

Evaluation of hydrogel tissue sealant in porcine laparoscopic partial-nephrectomy model.

Authors: Bernie JE, Ng J, Bargman V, Gardner T, Cheng L, Sundaram CP

Publication Date: 2005

Abstract:

BACKGROUND AND PURPOSE: Laparoscopic partial nephrectomy (LPN) is technically challenging with a steep learning curve, primarily because techniques used to control bleeding on the cut surface of the kidney can be ineffective, inconsistent, or challenging. Hemostatic techniques can include intracorporeal suturing, vascular coagulation (argon-beam coagulator, bipolar cautery, laser), and application of various tissue sealants. There is no uniformity of opinion regarding which hemostatic technique is optimal for this application. CoSeal, a hydrogel (Baxter Healthcare Corp, Deerfield, IL), has been effective following vascular surgery but has not been applied to a partial-nephrectomy model. We evaluated the effectiveness of this hydrogel in controlling bleeding and sealing the collecting system by comparing it with intracorporeal suturing and fibrin sealant (Tisseel; Baxter) in a porcine laparoscopic partial-nephrectomy model. MATERIALS AND METHODS: Bilateral synchronous upper-pole partial nephrectomies were performed in two groups of 18 farm pigs, and the three hemostatic techniques (suturing, Tisseel, CoSeal) were applied. In the first group, partial nephrectomies were performed and the pigs sacrificed 3 days postoperatively (acute group). In the second group, the pigs were euthanized 6 weeks postoperatively (chronic group). In both groups, weight, blood pressure, estimated blood loss, weight of the partial and completion nephrectomy specimen, presence/ absence of urinary leak on retrograde study, histopathologic findings, and complications were recorded. RESULTS: The mean weight, blood pressure, estimated blood loss, histopathology findings, and weight of the partial and completion nephrectomy specimens were similar in the three groups. CoSeal did not adhere well to the renal parenchyma compared with Tisseel. All three animals in the acute CoSeal group and three of the six pigs in the sutured group had small urinary leaks during retrograde ureteral study, whereas none of the pigs in the fibrin-glue cohort had urinary leaks. There was one complication (urinary leak) in the CoSeal group, necessitating sacrifice of the animal on postoperative day 8 because of sepsis. CONCLUSIONS: CoSeal is not as effective as fibrin glue in adhering to the cut renal surface and

sealing the collecting system during laparoscopic partial nephrectomy.

Full Text:

Not Available

Controlled survival study of the effects of Tisseel or a combination of FloSeal and Tisseel on major vascular injury and major collecting-system injury during partial nephrectomy in a porcine model.

Authors: L'Esperance JO, Sung JC, Marguet CG, Maloney ME, Springhart WP, Preminger GM, Albala DM

Publication Date: 2005

Abstract:

PURPOSE: We report the results of a controlled survival study in a porcine model investigating Tisseel or a combination of FloSeal and Tisseel in dealing with vascular and collecting-system injury during partial nephrectomy. MATERIALS AND METHODS: We performed an open right lower-pole partial nephrectomy on 15 large female pigs. The defect was repaired using standard open techniques (N = 5; controls), Tisseel only (N = 6; group I), or FloSeal followed by Tisseel (N = 4; group II). A Jackson-Pratt drain was placed. Nephrectomy and retrograde pyelography were performed at 1 week. RESULTS: Operative times were shorter in both study groups, achieving statistical significance in group I (P = 0.008). Warm-ischemia times were significantly improved in both study groups (P = 0.029 and P = 0.00005 in groups I and II, respectively). Time to hemostasis was significantly shorter in group II only (P = 0.002) but approached significance in Group I as well (P = 0.09). Estimated blood loss was not significantly different from the controls in either group. When Tisseel was placed alone after hilar control, hematoma formation under the Tisseel was noted on release of the hilar clamp. After 1 week, there was one urinoma and three urine leaks in the control group. In group I, there was one urinoma and four urine leaks, and there was only one urine leak and no urinomas in group II. There were no hematomas in any of the groups. CONCLUSIONS: Tisseel alone is not adequate for either hemostasis or management of major collecting-system injury. FloSeal capped with Tisseel appears sufficient to control major vascular and collecting-system injuries without adjunctive surgical measures. A proposed technique for laparoscopic partial nephrectomy without reconstructive techniques is presented that warrants clinical study.

Full Text:

Not Available

Commercial fibrin sealants are not equivalent in a rabbit liver-resection model which quantitatively

evaluates hemostasis and formation of adhesions.

Authors: Nur I, Lyahovetsky Y, Bar L, Schon M

Publication Date: 2005

Abstract:

A rabbit partial liver resection model was used to determine the hemostatic effectiveness of a new fibrin sealant. Persistent bleeding, with a mean bleeding time of 372 s and blood loss of 18 ml, from a resected lobe of the liver was achieved after rabbits in the untreated control group had been infused continuously with unfractionated heparin over 20 min with 0.2 IU/ml at a rate of 1 ml/min. Spraying the resected surface with the new fibrin sealant, Quixil, reduced bleeding to < 1 ml and the post-resection bleeding times was 25 s. Bleeding time, blood loss and the volume of sealant used in the rabbit model were inversely correlated with the thrombin concentration in the sealant. In direct comparisons with Tissucol and Beriplast, Quixil was associated with the shortest bleeding times, the lowest volume of sealant used and the lowest score of abdominal adhesions. Copyright 2005 S. Karger AG, Basel.

Full Text:

Not Available

Fibrin sealing versus stapling of hernia meshes in an onlay model in the rat.

Authors: Petter-Puchner AH, Fortelny R, Mittermayr R, Ohlinger W, Redl H

Publication Date: 2005

Abstract:

Incisional and inguinal hernia repair are among the most common procedures of general surgery. Mesh fixation by means of staples or sutures may lead to severe complications. The use of fibrin sealant (FS) has been suggested as alternative, but data on biocompatibility and adhesive strength of FS in combination with macroporous meshes is limited. Ventral hernia (n = 8 per group) was treated in rats in onlay technique with two types of meshes, fibrin sealed or stapled. TI-Mesh (TMxl) extralight and VYPROII (VPII) were tested 17 days post op. No failure in mechanical tests (tensile and burst strength) occurred in sealed or stapled meshes. Histology revealed equally good tissue integration and neovascularization in all groups. Fibrin sealant yields excellent fixation in experimental hernia repair. This rat model is suitable for testing meshes and fixation techniques.

Full Text:

Not Available

Mesothelial cell sheets cultured on fibrin gel prevent adhesion formation in an intestinal hernia model.

Authors: Takazawa R, Yamato M, Kageyama Y, Okano T, Kihara K

Publication Date: 2005

Abstract:

In the present study, we examined a novel technique to prevent adhesion formation in a rat intestinal hernia model with mesothelial cell sheets cultured on fibrin gel. Mesothelial cells were obtained from isologous rats by enzymatic disaggregation of mesentery and cultured on fibrin gel. Electron microscopy revealed that these cultured cells form contiguous monolayer cell sheets with well-developed microvilli. These tissue-engineered constructs were grafted in vivo to an intestinal hernia model that results in regular surgical adhesions without treatment. Five days postgrafting, rats were sacrificed. Adhesion formation was not observed in rats grafted with the constructs, whereas severe adhesions were observed in all control rats. Constructs seeded with mesothelial cells isolated from EGFP-transgenic rats clearly revealed that grafted mesothelial cells remained at the host tissue site even after fibrin scaffold degradation. These cells developed more abundant microvilli in vivo than those in vitro. These results show that cultured mesothelial cell sheets are effective in preventing adhesion formation and should reduce postoperative complications caused by adhesion formation.

Full Text:

Not Available

Scientific evidence for application of topical hemostats, tissue glues, and sealants in hepatobiliary surgery.

Authors: Kraus TW, Mehrabi A, Schemmer P, Kashfi A, Berberat P, Buchler MW

Publication Date: 2005

Abstract:

Not Available

Full Text:

Not Available

Facial nerve repair with epineural suture and anastomosis using fibrin adhesive: an experimental study in the rabbit.

Authors: Junior ED, Valmaseda-Castellon E, Gay-Escoda C

Publication Date: 2004

Abstract:

PURPOSE: An experimental model in rabbits was used to compare epineural suturing and fibrin adhesive anastomosis for facial nerve repair. MATERIALS AND METHODS: Thirty-four facial nerves from 17 rabbits were isolated, transected, and anastomosed, with an evaluation of their electrophysiologic and histologic parameters. The rabbits were divided into 2 groups of 5 and 12 animals, respectively: a 10-mm defect was made in the right facial nerve in the first group, with transection and epineural suturing of the left nerve, followed by death after 120 days. This was the control-versus-epineural suture group. In the second group, the right facial nerve was transected and subjected to epineural suturing, while the left nerve was transected and anastomosed using fibrin adhesive. The rabbits were killed 15, 30, 60, and 120 days after the microsurgical procedure. This was the epineural suture-versus-fibrin adhesive group. RESULTS: From day 30, the number of regenerated axons increased with time in the epineural suture and fibrin adhesive anastomotic specimens. Epineural suture showed more regenerated axons and a faster linear rate of regeneration than anastomosis with fibrin adhesive. The reduction in conduction velocity decreased significantly with time with the same linear pattern for both suture techniques. CONCLUSIONS: Epineural suturing offered superior performance versus anastomosis with fibrin adhesive in terms of axon count but not in decrease in conduction velocity.

Full Text:

Not Available

Validating the subcutaneous model of injectable autologous cartilage using a fibrin glue scaffold.

Authors: Westreich R, Kaufman M, Gannon P, Lawson W

Publication Date: 2004

Abstract:

PURPOSE: To create and validate an injectable model for autologous in vivo cartilage engineering with ultimate clinical applicability in human subjects. HYPOTHESIS: Cartilage can be generated subcutaneously using fibrin glue and autologous chondrocyte components. BACKGROUND: To date, cartilage engineering studies have been limited by several factors. Immunocompromised animals and nonautologous chondrocytes have been successfully used to create cartilage, but results using

identical designs failed in immunocompetent subjects. Recent studies using more biocompatible tissues and matrices have been performed with both in vitro and in vivo steps. Although successful, several problems are notable. In vitro cartilage displays a poor modulus of elasticity, even after in vivo implantation. Variable deformation and volume loss occurs when in vitro specimens are matured in vivo. These concerns limit the clinical utility of these methods. We therefore set out to create autologous cartilage using a model that was clinically feasible, easy to create, and could be performed with very low patient harvest morbidity. MATERIALS AND METHODS: Eight New Zealand white rabbits underwent a unilateral harvest of ear cartilage. Samples were then digested using standard methods. Cell counts and survival assays were performed before implantation. One sample of fibrin glue (Tisseel) and chondrocytes was injected subcutaneously into each donor rabbit and then left in situ for 3 months. A second sample with both basic fibroblast growth factor (b-FGF) and insulin-like growth factor (IGF)-1 in the injection suspension was also assessed (for a total of 16 samples). After harvest, analysis of overall volume, histology, and chondrocyte drop out counts was performed. RESULTS: Cartilage formation occurred in 8 of 14 (57%) specimens that were obtained at the time of sacrifice. Of note, 6 of 7 (85%) non-growth-factor containing samples yielded positive results. Comparison with the success rate using concomitant growth factors (2/7) showed a negative effect on cartilage yield (P = .015). Chondrocyte survival, based on chondrocyte dropout counts, was not effected. Angiogenesis appeared to correlate with cartilage formation in the central regions of the implant. Alcian blue demonstrated the presence of active matrix deposition, and elastin Verhoff-van Geison (EVG) stains were positive, showing an elastic cartilage phenotype. Very limited osteoid formation was seen in successful implants. Failed implants demonstrated avascular necrosis, giant cell reactions, and inflammatory infiltrates. CONCLUSIONS: This study validates the subcutaneous site as a recipient bed for the engineering of autologous cartilage in vivo. It also represents the first subcutaneous implantation of fibrin glue and chondrocytes in an immunocompetent host as well as the first published report of elastic cartilage generation in vivo. Although the model needs to be further streamlined to increase yields and overall volume, this study clearly demonstrates the feasibility of in vivo chondrogenesis (85% success). The addition of FGF and IGF-1 at the concentrations used negatively influenced cartilage yield. However, extrapolation of these results to other combinations or concentrations can not be done, and this issue deserves further investigation.

Full Text:

Not Available

A review of bioceramics and fibrin sealant. [Review] [73 refs]

Authors: Le Guehennec L, Layrolle P, Daculsi G

Publication Date: 2004

Abstract:

This review focuses on bone substitute composites made by mixing ceramic biomaterials with fibrin sealants. Different biomaterials such as coral, bone-derived materials, bioactive glass ceramics, and synthetic calcium phosphate have been mixed with fibrin sealant, resulting in a combination of the biological properties of the two components. This type of association has not produced identical results in all studies. In the past for some, the addition of fibrin sealant to the biomaterial failed to produce any significant, positive effect on osteointegration, whereas others found a positive impact on bone

colonization. Despite the negative biological effects reported previously, bioceramic-fibrin composites have been widely used in various types of bone surgery because they are easy to manipulate. In particular, the intra-operative preparation of these composites makes it possible to add bone growth factors or autologous osteoprogenitor cells prior to bone reconstruction. The bone growth factors and autologous osteoprogenitor cells associated with the bioceramic-fibrin composites should provide surgeons with tissue engineered grafts with enhanced osteointegrative properties. This review discusses both the advantages and disadvantages, as well as the future perspectives, of using bioceramic-fibrin composites in various clinical indications. [References: 73]

Full Text:

Not Available

[Sutureless lamellar keratoplasty by microkeratome combined with fibrin tissue adhesive in rabbits]. [Chinese]

Authors: Chen W, Qu J, Lu F, Zhu RY

Publication Date: 2004

Abstract:

OBJECTIVE: To evaluate the feasibility and safety of sutureless lamellar keratoplasty by microkeratome combined with fibrin tissue adhesive. METHODS: Twenty-four New Zealand white rabbits were divided into two groups, the donor grafts and recipient beds were made by the microkeratome, the grafts were glued over the stoma bed using the commercial product Tisseel in one group; and grafts without tissue adhesive were used as the control group. Corneal refractive power was measured by automated keratometer preoperatively and in 3 days, 2 weeks, 1 and 3 months postoperatively. Rejection and cornea transparency were observed. Confocal microscopy was used to observe corneal wound healing response and to measure the keratocyte and endothelium densities in vivo. Corneal wound healing was also evaluated using light and fluorescence microscopy. RESULTS: Ninety-two percent (11/12 eyes) of the glued grafts were retained in the Tisseel group, whereas all grafts were lost in the control group. All survived grafts were clear 1 month after surgery. However, in the control group, severe haze in the grafts occurred 2 weeks postoperatively. Confocal microscopy showed that there was a significant decrease of the keratocyte density surrounding the lenticule-host interface, and no changes occurred in the posterior keratocyte and endothelium. Histopathologic observations demonstrated the presence of a line of amorphous eosinophilic substance in the lenticule-host interface at 3 days after surgery, but the line disappeared after 1 month. Fluorescence microscopy showed no detectable regenerated stromal tissue. CONCLUSIONS: This initial study demonstrates sutureless optical lamellar keratoplasty performed by microkeratome combined with fibrin tissue adhesive is a simple and safe technique. Stromal wound healing response to this surgery is minimal. Fibrin tissue adhesive has no influence on the cornea optical property.

Full Text:

Not Available

Sinus floor augmentation with bovine hydroxyapatite mixed with fibrin glue and later placement of nonsubmerged implants: a retrospective study in 50 patients.

Authors: Hallman M, Nordin T

Publication Date: 2004

Abstract:

PURPOSE: The aim of the present study was to evaluate retrospectively both the results of using a mixture of bovine hydroxyapatite (BHA) and fibrin glue as the only grafting material in the floor of the maxillary sinus and the outcome of nonsubmerged implants placed later. MATERIALS AND METHODS: A total of 50 consecutive patients (71 maxillary sinuses) were augmented with a mixture of BHA and fibrin glue. The grafts were allowed to heal for a mean of 8 months prior to implant placement. A total of 218 solid titanium screw-type implants were placed in a nonsubmerged fashion and allowed to heal for a mean of 10 weeks before loading (range, 10 days to 10 months). The outcome of the placed dental implants was evaluated retrospectively. RESULTS: Twelve implants were lost, giving a cumulative survival rate of 94.5% after a mean loading time of 20 months (range, 6 to 42 months). DISCUSSION: This study shows that augmentation of the maxillary sinus with a BHA/fibrin glue mixture and later placement of nonsubmerged implants with short healing times preceding functional loading can be a predictable concept. However, the use of autogenous bone and placement of submerged implants in the grafts with long healing times is routine in many clinics. This article discusses the evidence on which this protocol is based. CONCLUSION: The short-term results from this retrospective clinical study indicated that BHA/fibrin glue can be used as a grafting material without autogenous bone in the maxillary sinus to produce a high survival rate for later placement of nonsubmerged implants.

Full Text:

Not Available

Effects of the use of fibrin glue around the colonic anastomosis of the rat.

Authors: Kanellos I, Mantzoros I, Goulimaris I, Zacharakis E, Zavitsanakis A, Betsis D

Publication Date: 2003

Abstract:

BACKGROUND: This study was aimed at examining whether the addition of fibrin glue to a sutured colonic anastomosis improves its healing or not. METHODS: We studied the effect of adding fibrin glue on a sutured colonic anastomosis. Thirty-six Wistar rats were randomized into two groups of 18 rats

each. A sutured anastomosis was performed in all rats. Fibrin glue was applied around the anastomosis of the rats of group B. Rats were sacrificed on the eighth postoperative day. RESULTS: The rate of anastomotic leakage was found not to be significantly different between the two groups. The mean bursting pressure of the colonic anastomoses was significantly higher in group B (fibrin-treated) than in group A. CONCLUSION: Fibrin glue application around a sutured anastomosis provides a safer anastomosis which is stronger than the sutured one.

Full Text:

Not Available

A comparison of keratinocyte cell sprays with and without fibrin glue.

Authors: Currie LJ, Martin R, Sharpe JR, James SE

Publication Date: 2003

Abstract:

Fibrin glue is an excellent template for cellular migration and has been shown to be an effective delivery system for cultured autologous keratinocytes. We have investigated whether fibrin glue has any benefit on the percentage of epithelial cover when cultured autologous keratinocytes are sprayed onto a freshly debrided wound bed. Three pigs were used for this study. This provided a total of 18 full thickness, vertically orientated wounds, each 4cm in diameter and isolated in PTFE chambers to prevent re-epithelialisation from the wound margins. Eight wounds were sprayed with cultured autologous keratinocytes suspended in 2ml culture medium and eight wounds were sprayed with cultured autologous keratinocytes suspended in 1ml of the fibrin/aprotinin component of Tisseel fibrin glue (Baxter) mixed with 1ml of culture medium. In the latter group the thrombin component of the fibrin glue kit was applied to the wound bed immediately prior to grafting. The remaining two wounds were used as controls and sprayed with either culture medium or fibrin glue without cells. Epithelial cover was calculated in whole-wound biopsies at 3 weeks using image analysis, histology and immunohistochemistry. The cell suspension in fibrin glue appeared to spread more evenly over the wound surface, with no pooling in the inferior aspect of the wound. However, mean epithelial area at 3 weeks in the fibrin group was 1.6cm(2) per wound compared with 1.8cm(2) for the non-fibrin group, as measured by image analysis of digital photographs. There was no statistically significant difference between the two groups (P=0.802). This surprising result was confirmed by histological analysis of the wound biopsies, with a good correlation between histological and image analysis data (R=0.967). There was no observable difference in the quality of the epithelium on histological and immunohistological analysis of either group.

Full Text:

Not Available

Fibrin sealing improves stability of corneal prostheses during vitreoretinal procedures.

Authors: Uhlig CE, Gerding H

Publication Date: 2003

Abstract:

PURPOSE: The aim of this study was to test the effectiveness of using a fibrin sealant as an aid to stabilize temporarily sutured keratoprostheses. METHODS: Ex vivo the corneas were removed from six porcine eyes, and an Eckardt prosthesis was sutured and additionally fixed with fibrin sealant. The outflow resistance was recorded from eyes with and without fibrin-sealed keratoprostheses at different levels of intraocular pressure. The method of sealing the prosthesis was applied in the clinic and documented in four patients during intravitreal surgery. RESULTS: The flow volume of the irrigating system was measured ex vivo. Control trials were performed to investigate the effects of graduated increases in hydrostatic pressure on the system. Leakage areas were calculated, and the stability of the system was monitored during the surgical procedure. Slit-lamp biomicroscopy, funduscopy, and visual outcome were documented in the patients. Ex vivo the differences in the leakage areas between the fibrin-sealed and the unsealed conditions were statistically significant up to 51.45 mmHg (P = 0.01). In clinical applications, the fibrin sealant stabilized the keratoprosthesis, and no significant leakage or system instabilities occurred. CONCLUSIONS: The results confirm that sealing increases the stability of the keratoprosthesis and may enable greater surgical control.

Full Text:

Not Available

[Use of fibrin glue in the prevention of leakage in pancreatico-jejunal anastomoses]. [Croatian]

Authors: Stojanovic M, Jeremic M, Stojanovic P, Stojiljkovic M, Gmijovic D, Stanojkovic Z, Savic V, Djordjevic V, Cvetkovic Z, Kostov M, Colovic R

Publication Date: 2002

Abstract:

The aim of this study was to test the protective effects of fibrin sealing on the pancreatico-jejunostomy (PJA), the high-risk anastomosis following pancreas head resection. Experimental study was performed on the mongrel dogs, divided in two groups (20 animals each): Experimental group-with end to end "dunking" PJA, protected by temporary occlusion of the pancreatic duct with fibrin sealant/Tissucol/Immuno Ag/, while control group was without any protective procedure. The animals were followed 5 months in order to study: protective effects of such procedure on the PJA quantified with the percent of anastomotic leakage, effects of the exocrine secretion and effects the endocrine function Results: PJA leakage occurred in 13.33% in control group. No leakage was registered in

experimental group. Biochemical, histological and electron microscopic study showed slight transitory elevation of amylase levels. Fibrin glue plug was dissolved and pancreatic juice output was reestablished 12th days postoperatively. Long term follow-up showed no damages of the endocrine and exocrine pancreas. Pancreatic duct occlusion with fibrin glue appeared to be an useful method in the prevention of pancreatico-jejunostomy leakage, without negative effects on the exocrine and endocrine pancreas.

Full Text:

Not Available

Comparison of two fibrin glues in anastomoses and skin closure.

Authors: Park W, Kim WH, Lee CH, Kim DY, Choi JH, Huh JW, Sung HM, Kim IS, Kweon OK

Publication Date: 2002

Abstract:

To control intra-operative haemorrhage, fibrin glues are preferred by many surgeons because of their biological advantages and convenience of application. Manufacturers have developed a few kinds of fibrin glues with a little difference in their composition. This study was to compare the effectiveness of two commercially available fibrin glues; Greenplast (Green Cross P. D. Company, Yongin, Korea) and Tisseel (Baxter-Immuno AG, Vienna, Austria). They were applied experimentally to several kinds of surgery in dogs - renal vessel anastomosis, partial splenectomy, intestinal anastomosis and incision skin wound - and evaluated for their haemostatic and adhesive effects. When the two glues were applied in renal vessel anastomosis, the amount of haemorrhage in artery and vein decreased significantly. They also decreased the haemorrhage in partial splenectomy. At 10 min after application of the glues to an incision skin wound, the tensile strengths developed were significantly higher than that of control. The present study indicates that two-component fibrin glues have a haemostatic effect as a mechanical barrier in renal vessel anastomosis and an adhesive effect in the early stage of incision skin wound closure, and the two glues have similar effects with no complications.

Full Text:

Not Available

The use of fibrin glue in skin grafts and tissue-engineered skin replacements: a review. [Review] [116 refs]

Authors: Currie LJ, Sharpe JR, Martin R

Publication Date: 2001

Abstract:

Fibrin glue has been widely used as an adhesive in plastic and reconstructive surgery. This article reviews the advantages and disadvantages of its use with skin grafts and tissue-engineered skin substitutes. Fibrin glue has been shown to improve the percentage of skin graft take, especially when associated with difficult grafting sites or sites associated with unavoidable movement. Evidence also suggests improved hemostasis and a protective effect resulting in reduced bacterial infection. Fibrin, associated with fibronectin, has been shown to support keratinocyte and fibroblast growth both in vitro and in vivo, and may enhance cellular motility in the wound. When used as a delivery system for cultured keratinocytes and fibroblasts, fibrin glue may provide similar advantages to those proven with conventional skin grafts. Fibrin glue has also been shown to be a suitable delivery vehicle for exogenous growth factors that may in the future be used to accelerate wound healing. [References: 116]

Full Text:

Not Available

Laser, fibrin glue, or suture repair of peripheral nerves: a comparative functional, histological, and morphometric study in the rat sciatic nerve.

Authors: Menovsky T, Beek JF

Publication Date: 2001

Abstract:

OBJECT: This study was undertaken to evaluate CO2 laser-assisted nerve repair and compare it with nerve repair performed with fibrin glue or absorbable sutures. METHODS: In eight rats, the sciatic nerve was sharply transected and approximated using two 10-0 absorbable sutures and then fused by means of CO2 milliwatt laser welding (power 100 mW, exposure time 1 second per pulse, spot size 320 microm), with the addition of a protein solder (bovine albumin) to reinforce the repair site. The control groups consisted of eight rats in which the nerves were approximated with two 10-0 absorbable sutures and subsequently glued using a fibrin sealant (Tissucol), and eight rats in which the nerves were repaired using conventional microsurgical sutures (four to six 10-0 sutures in the perineurium or epineurium). Evaluation was performed 16 weeks postsurgery and included the toe-spreading test and light microscopy and morphometric assessment. The motor function of the nerves in all groups showed gradual improvement with time. At 16 weeks, the motor function was approximately 60% of the normal function, and there were no significant differences among the groups. On histological studies, all nerves revealed various degrees of axonal regeneration, with myelinated fibers in the distal nerve segments. There were slight differences in favor of the group treated with laser repair, in terms of wound healing at the repair site. In all groups, the number of axons distal to the repair site was higher compared with those proximal, but the axon diameter was significantly less than that in control nerves ($p < 0.05$). There were no significant differences in the number, density, or diameter of the axons in the proximal or distal nerve segments among the three nerve repair groups ($p < 0.05$), although there was a trend toward

more and thicker myelinated axons in the distal segments of the laser-repaired nerves. CONCLUSIONS: It was found that CO2 laser-assisted nerve repair with soldering is at least equal to fibrin glue and suture repair in effectiveness in a rodent model of sciatic nerve repair.

Full Text:

Not Available

Fibrin sealants in microvascular surgery: current status. [Review] [34 refs]

Authors: Drake DB, Ferguson RE Jr

Publication Date: 2001

Abstract:

During the last two decades, advances in fibrin sealant formulation have resulted in its investigational and clinical use in various surgical endeavors, including microvascular surgery. Several investigations have comparatively evaluated fibrin adhesive-enhanced microvascular anastomoses vs. conventional suture repair. The purpose of this review is to summarize the collective documentation on fibrin adhesives in microvascular surgery on the basis of the scientific performance parameters of vessel patency, bursting strength, anastomotic competence, and reendothelialization. In addition, other applications of fibrin sealants and other qualities unique to fibrin adhesives are addressed. [References: 34]

Full Text:

Not Available

Re: Lessons learned from laser tissue soldering and fibrin glue pyeloplasty in an in vivo porcine model.

Authors: Eden CG

Publication Date: 2001

Abstract:

Not Available

Full Text:

Not Available

Use of fibrin sealant for prosthetic mesh fixation in laparoscopic extraperitoneal inguinal hernia repair.

Authors: Katkhouda N, Mavor E, Friedlander MH, Mason RJ, Kiyabu M, Grant SW, Achanta K, Kirkman EL, Narayanan K, Essani R

Publication Date: 2001

Abstract:

OBJECTIVE: To evaluate the efficacy of mesh fixation with fibrin sealant (FS) in laparoscopic preperitoneal inguinal hernia repair and to compare it with stapled fixation. SUMMARY BACKGROUND DATA: Laparoscopic hernia repair involves the fixation of the prosthetic mesh in the preperitoneal space with staples to avoid displacement leading to recurrence. The use of staples is associated with a small but significant number of complications, mainly nerve injury and hematomas. FS (Tisseel) is a biodegradable adhesive obtained by a combination of human-derived fibrinogen and thrombin, duplicating the last step of the coagulation cascade. It can be used as an alternative method of fixation. METHODS: A prosthetic mesh was placed laparoscopically into the preperitoneal space in both groins in 25 female pigs and fixed with either FS or staples or left without fixation. The method of fixation was chosen by randomization. The pigs were killed after 12 days to assess early graft incorporation. The following outcome measures were evaluated: macroscopic findings, including graft alignment and motion, tensile strength between the grafts and surrounding tissues, and histologic findings (fibrous reaction and inflammatory response). RESULTS: The procedures were completed laparoscopically in 49 sites. Eighteen grafts were fixed with FS and 16 with staples; 15 were not fixed. There was no significant difference in graft motion between the FS and stapled groups, but the nonfixed mesh had significantly more graft motion than in either of the fixed groups. There was no significant difference in median tensile strength between the FS and stapled groups. The tensile strength in the nonfixed group was significantly lower than the other two groups. FS triggered a significantly stronger fibrous reaction and inflammatory response than in the stapled and control groups. No infection related to method of fixation was observed in any group. CONCLUSION: An adequate mesh fixation in the extraperitoneal inguinal area can be accomplished using FS. This method is mechanically equivalent to the fixation achieved by staples and superior to nonfixed grafts. Biologic soft fixation with FS will prevent early graft migration and will avoid the complications associated with staple use.

Full Text:

Not Available

Experimental study of sutureless colorectal anastomosis.

Authors: Capitan Morales LC, Rodriguez Nunez E, Morales Conde S, Sanchez Ganfornina F, Del Rio Lafuente FD, Cabot Ostos E, Ortega Bevia JM, Loscertales Abril J, Cantillana Martinez J

Publication Date: 2000

Abstract:

BACKGROUND/AIMS: The present research project has been made mainly with the idea of comparing the tensile strength values and histological answers of three types of colon anastomosis: sutured with silk 5/0; polyglycolic acid 5/0; and sutureless anastomosis with human fibrin gum. METHODOLOGY: One hundred and five (105) Wistar breath rats allocated into 3 groups of 35 animals were used to implement this experimental research project: silk, polyglycolic acid and human fibrin gum. Furthermore, each group was subdivided in 5 series respectively to carry out an experimental study on the tensile strength parameter and anatomic-pathological determinations on the 10th, 20th, 30th, 40th and 50th day after the surgical intervention. The following surgical interventions were practiced on them: A cross section of the colon, followed by: group 1: an end-to-end discontinuous suture anastomosis with Silk; group 2: an end-to-end discontinuous suture anastomosis with polyglycolic acid; group 3: sutureless anastomosis with human fibrin gum. On the 10th, 20th, 30th, 40th and 50th days we proceeded to measure the anastomosis' tensile strength value for each series. We used a tensile strength apparatus and waited until the break down of the suture sample took place and wrote down the value, in g/cm, given by the voltmeter at that moment. RESULTS: The results obtained indicate that anastomosis made in group 1 (silk) lasted longer to the tensile strength apparatus; followed by those practiced in group 2 (polyglycolic acid); and finally anastomosis carried out in group 3 (human fibrin gum). However in the anastomotic process carried out with the human fibrin gum the healing started from the 10th day. In the same period of time we carried out the following anatomic-pathological determinations: a) sharp inflammation; b) edema; c) non-specific chronic inflammatory infiltrate; d) granulomatous inflammatory infiltrate to foreign bodies; e) fibrosis. CONCLUSIONS: The results show a better answer for anastomosis made with human fibrin gum than those carried out with the two other suture materials. This conclusion is based on the facts that the human fibrin gum used to carry out sutureless anastomosis during this research project generated a lower sharp inflammation and speediness in its absorption; absence of granular reaction to a foreign body; a minor or non-existent edema at all; as well as a good fibrous healing speediness process. Therefore, all these experimental results lead us to conclude that the human fibrin gum used to carry out sutureless anastomosis may be an alternative to the handmade conventional anastomosis. Moreover they are easy to be implemented.

Full Text:

Not Available

An evaluation of fibrin tissue adhesive concentration and application thickness on skin graft survival.

Authors: O'Grady KM, Agrawal A, Bhattacharyya TK, Shah A, Toriumi DM

Publication Date: 2000

Abstract:

OBJECTIVES: To examine the effects of fibrinogen concentration and application thickness of fibrin tissue adhesive on skin graft survival. STUDY DESIGN: Prospective controlled study. METHODS: Ten domestic pigs were included in the study. A 20 x 5-cm area of skin was harvested bilaterally along the flanks of the animals using a Padgett dermatome. The harvested grafts were trimmed into four 4 x 4-cm squares. Donor sites were treated according to group assignment and the non-meshed grafts were placed on the side opposite their initial orientation and secured with staples. Both single- and

multiple-donor human fibrin tissue adhesive preparations, with low and high average fibrinogen concentrations of 30 mg/mL and 60 mg/ mL, were used. Adhesive preparations were applied in either a thin layer (0.015 mL/cm2) or a thick layer (0.06 mL/cm2) using a spray applicator. A constant thrombin concentration of 10 U/mL was used in the study. No adhesive was used in the control group and grafts were stabilized with staples. No topical dressings were applied to any of the treatment sites. Animals were sacrificed 4 weeks after graft application. RESULTS: Based on statistical analysis, thickness of adhesive application had a significant effect on skin graft survival. Percent mean graft survival in the control and thin application groups was found to be 92% and 97.8% respectively; the mean survival rate in the thick application group was 63.1%. Fibrinogen concentration, when evaluated independently within the thin and thick application groups, was found to have no significant effect on graft survival. CONCLUSION: Independent of fibrinogen concentration, a thin layer of fibrin tissue adhesive, when applied between two opposing surfaces, does not interfere with and may support the healing process, whereas a thick layer of adhesive inhibits skin graft healing.

Full Text:

Not Available

Lessons learned from laser tissue soldering and fibrin glue pyeloplasty in an in vivo porcine model.

Authors: Barrieras D, Reddy PP, McLorie GA, Bagli D, Khoury AE, Farhat W, Lilge L, Merguerian PA

Publication Date: 2000

Abstract:

PURPOSE: We compared sutured pyeloplasty to 2 newer techniques of tissue anastomosis, including laser soldered pyeloplasty using a diode laser with 50% albumin solder mixed with indocyanine green and fibrin glue. MATERIALS AND METHODS: We performed 53 pyeloplasties in 50 pigs using suture, laser or fibrin glue. In the immediate group anastomotic leak pressure was measured immediately postoperatively, and then animals were euthanized. At 1, 3 and 4 weeks postoperatively a pressure flow study at 10 cc per minute in cm. H2O was performed, and tissue was sent for histological and collagen content analysis. RESULTS: In the immediate studies laser soldering achieved a significantly higher mean anastomotic leak pressure (50.5 +/- 15.1 cm. H2O) than sutured (17.3 +/- 5.4) or fibrin glued (3.5 +/- 1.5) repairs. In the 1, 2 and 4-week studies animals in the sutured pyeloplasty group had no complications, and all pressure flow studies except 1 were normal. However, in the laser soldered groups we observed 8 urinomas in 19 animals, and most occurred during the first part of our study. This complication was prevented by stopping urine flow at the anastomotic site at laser irradiation and by improving application of the solder. Of the 11 animals in which pressure flow studies were performed only 2 were obstructed. Of the 7 chronic fibrin glue group 4 animals had urinomas and 2 had unobstructed pressure flow studies. Histological studies and immunohistochemical staining for collagen showed no differences in collagen distribution among the 3 procedures. CONCLUSIONS: Laser soldering and fibrin glue pyeloplasties are not superior in the long-term compared to sutured pyeloplasty. Fibrin glue in our animal model had the highest failure rate. Further improvements in the technical aspect of laser tissue welding need to be made to benefit from its theoretical advantages in minimally invasive surgery.

Full Text:

Not Available

Use of fibrin sealant as a hemostatic agent after liver biopsy in swine.

Authors: Paulson EK, Stephenson GR, Neal MC, Rossin V, Lawson JH

Publication Date: 2000

Abstract:

PURPOSE: To determine whether fibrin sealant injected into the tract created by liver biopsy can be used to decrease postprocedural bleeding. An innovative delivery system was used to deploy the fibrin sealant. MATERIALS AND METHODS: Fibrin sealant is a hemostatic agent consisting of a suspension of fibrinogen and thrombin. A delivery system was devised whereby fibrin sealant could be injected into the tract created by liver biopsy. Thirty swine were randomized into three groups: control (n = 10), heparin (n = 10), and warfarin (n = 10). Each swine underwent laparotomy and was randomized to undergo three to five open liver biopsies with either a 14-gauge cutting needle in conjunction with the fibrin sealant device or a standard 14-gauge cutting needle alone. Forty-seven biopsy procedures were performed with the device; 64 biopsy procedures were performed without the device. Immediate blood loss per biopsy (mL) was estimated based on the size of the blood stain on a sponge. Specimens were assessed for sample size. RESULTS: Immediate blood loss with and without the device, respectively, was: control, 0.1 mL, 5.4 mL; heparin, 0 mL, 7 mL; warfarin, 0.1 mL, 9.3 mL. These differences were significant ($P < .01$) for each group of swine. In 43 of 47 biopsies (91%), the device functioned without difficulty. There was no difference in sample size when the device was used. CONCLUSIONS: The fibrin sealant device is effective in reducing bleeding after open liver biopsy in anticoagulated and nonanticoagulated swine. The promising results suggest that a trial of percutaneous liver biopsy in swine should be considered.

Full Text:

Not Available

Management of a patient with a mechanical aortic valve and antibodies to both thrombin and factor V after repeat exposure to fibrin sealant.

Authors: Zumberg MS, Waples JM, Kao KJ, Lottenberg R

Publication Date: 2000

Abstract:

We describe a patient who developed a markedly prolonged PT, PTT, and thrombin time 13 days after repeat exposure to fibrin sealant during coronary artery bypass grafting and aortic valve replacement. Evaluation revealed an inhibitor to bovine thrombin that cross-reacted with human thrombin. In addition an inhibitor to human coagulation factor V was identified. Despite coagulation abnormalities there was no evidence of bleeding. Nevertheless, effective anticoagulation was required to minimize the thrombotic complications associated with the patient's prosthetic valve. We elected to take a conservative approach and not utilize pharmacologic anticoagulation until there was diminution in the effect of the acquired inhibitors. We report on our patient's course and review the available literature addressing the management of patients demonstrating inhibitors to blood coagulation factors after repeat exposure to fibrin sealants.

Full Text:

Not Available

Prophylactic percutaneous sealing of lumbar postdural puncture hole with fibrin glue to prevent cerebrospinal fluid leakage in swine.

Authors: Garcia-Aguado R, Gil F, Barcia JA, Aznar J, Hostalet F, Barbera J, Grau F

Publication Date: 2000

Abstract:

UNLABELLED: We explored the effect of fibrin glue injection at the site of dural puncture on cerebrospinal fluid (CSF) leakage in a swine model. Pigs were subjected to a lumbar dural CSF puncture in the sitting position with a 17-gauge Tuohy needle. Fibrin glue 1.4 mL was injected through the same needle into the epidural space. Evans blue dye was infused through the cisterna magna 15 min later, and the appearance of dyed CSF through the skin puncture and along the needle trajectory to the dura was inspected and categorized. In seven of eight animals, the CSF leak was sealed with fibrin glue. Control animals were injected with 1.4 mL saline. A sham operation group of animals underwent cisternal dye infusion without a lumbar puncture. CSF pressure at the cisterna magna was recorded throughout the procedure. No significant differences in the leakage indicators were found between the fibrin glue-injected and sham-operated group, whereas both groups showed significant differences with respect to the control group. The fibrin glue seal was effective against CSF pressures of 24.5 [17-31] cm H(2)O. We conclude that percutaneously injected fibrin glue is effective in stopping CSF leaks after dural puncture in this animal model. IMPLICATIONS: In this swine study, we repaired a cerebrospinal fluid leak after a dural puncture by percutaneously injecting tissue adhesive. The technique of percutaneous injection of fibrin glue seems promising for the prophylaxis of headache associated with cerebrospinal fluid leakage, and may be an alternative to an epidural blood patch.

Full Text:

Not Available

Antifibrinolytic additives to fibrin glue for laparoscopic wound closure in urinary tract.

Authors: Beduschi R, Beduschi MC, Wojno KJ, Jhung M, Williams AL, Wolf JS Jr

Publication Date: 1999

Abstract:

BACKGROUND AND OBJECTIVES: Fibrinolytic activity of urine may rapidly degrade fibrin glue used in the urinary tract, thereby limiting tissue adhesion. The goals of this study were to verify the ability of antifibrinolytic agents to delay the degradation of fibrin glue in the urinary tract and to assess the results of this delay on subsequent wound healing. MATERIALS AND METHODS: In 25 domestic pigs, a 3.5-cm incision in the urinary bladder was left open (N = 6) or closed laparoscopically with fibrin glue alone (N = 6), fibrin glue containing aprotinin 5000 KIU/mL (N = 6), or fibrin glue containing aprotinin 2500 KIU/mL with (N = 4) or without (N = 3) aminocaproic acid 12.5 mg/mL. At harvest 7 days later, the bladder was tested for leakage. Histologic features were scored by a pathologist blinded to the closure method. RESULTS: There were no significant differences among the groups in the amount of leakage at harvest. Significant fibrin glue material in the wound was noted more often in the pigs treated with fibrin glue plus aprotinin (7 of 13) than in the fibrin glue-only group (0 of 6; P = 0.04). The presence of significant fibrin material in the wound correlated well with absence of granulation tissue (P < 0.001), such that granulation tissue bridging the wound edges was found more often in the fibrin glue-only group (6 of 6) than in the groups treated with fibrin glue plus aprotinin (4 of 13; P = 0.01). CONCLUSIONS: Although aprotinin +/- aminocaproic acid did delay the degradation of fibrin glue used to close a bladder wound, it was associated with inhibition of granulation tissue in the glued wound. These findings suggest that aprotinin alone and aprotinin plus aminocaproic acid are not useful additives to fibrin glue used for wound closure in the urinary tract.

Full Text:

Not Available

Antiphospholipid antibodies in left-ventricular assist system recipients after exposure to topical bovine thrombin.

Authors: Fastenau DR, Hormuth DA, McIntyre JA

Publication Date: 1999

Abstract:

Not Available

Full Text:

Not Available

Sutureless small bowel anastomoses: experimental study in pigs.

Authors: Zilling TL, Jansson O, Walther BS, Ottosson A

Publication Date: 1999

Abstract:

OBJECTIVE: To evaluate a new technique for experimental anastomosis with fibrin glue, and to compare the results with those of stapled and one-layer sutured anastomosis. DESIGN: Open laboratory study. SETTING: Teaching hospital, Sweden. ANIMALS: Ten Swedish domestic pigs. INTERVENTIONS: Each pig had three anastomoses made in the small bowel, one by each technique. The pigs were killed on the 4th postoperative day. MAIN OUTCOME MEASURES: Blood flow, collagen concentration, anastomotic index, breaking strength, thickness of bowel wall, and histological appearance. RESULTS: Two pigs died postoperatively, leaving 8 for analysis. The blood flow at each anastomotic site studied by the microsphere technique was similar irrespective of the type of anastomosis ($p = 0.3$), as was anastomotic collagen concentration ($p = 0.09$). The anastomotic index, however, was significantly higher in the stapled than in the glued or sutured ones ($p = 0.03$). The glued anastomosis was the weakest, being only one fifth the strength of the stapled and one third the strength of the sutured anastomosis. There was no sign of rejection of the glue (of human origin) on histological examination. Glued and stapled anastomoses showed signs of mild inflammation, which did not reach the intensity of that around the sutured anastomoses. CONCLUSION: It is possible to make a sutureless anastomosis that does not leak with a modified stapler using fibrin glue instead of staples, but the anastomosis has considerably lower breaking strength than either stapled or sutured anastomoses.

Full Text:

Not Available

First clinical evaluation of a new concept for puncture-site occlusion in interventional cardiology and angioplasty.

Authors: Illi OE, Meier B, Paravicini G

Publication Date: 1998

Abstract:

UNLABELLED: Percutaneous transluminal angioplasties of coronary and peripheral vessels are frequently used and replace open surgery in a certain percentage. Hemostasis in most of these patients is reduced or inhibited and often leads to hemorrhage from the puncture track. Due to this fact, hospitalization is not only mandatory, but also surgical revision of the puncture site is often required. We designed and produced a coaxial delivery system, which is mounted on the indwelling guide-wire after withdrawal of the instrumentation for angioplasty. The delivery system is advanced down to the outer wall of the punctured vessel and 1 cc of human two-compound fibrin glue is released. Based on our experience with laboratory and animal research, which we already presented at the 7th International Symposium on Pediatric Surgical Research in Heidelberg, May 27-28, 1994, we conducted the first trials in interventional cardiology. In 1996, a first group of 10 patients, aged 49 to 80 years, underwent sealing of the right femoral artery after diagnostic evaluation (n = 3) of coronary balloon dilatation (n = 7). In patients, the local manual compression time was less than 5 minutes and 1 patient needed 10 minutes of digital compression. In one case, bleeding continued and a compression bandage was successful, whereas in another case the local hematoma formation needed surgical revision with suture of the ruptured vessel wall. CONCLUSION: Puncture-track sealing with locally applied fibrin glue seems to be an efficient tool to avoid bleeding after interventions of coronary and peripheral vessels. In the meantime, the device has been improved by a target system to optimize the delivery of the glue exactly at the outer wall of the vessel.

Full Text:

Not Available

Use of fibrin glue to protect tissue during CO2 laser surgery.

Authors: Menovsky T, de Vries J

Publication Date: 1998

Abstract:

OBJECTIVE: Accidental injury of tissues during CO2 laser irradiation can lead to serious morbidity, especially during ear, nose, and throat, neurosurgical, and plastic-reconstructive procedures. This experimental study describes a new technique in which vital structures are coated with a thin layer of fibrin glue to protect them from accidental CO2 laser irradiation. STUDY DESIGN/MATERIALS AND METHODS: The femoral neurovascular bundles (femoral artery, vein, and nerve) of 12 rats were exposed. On one side the bundle was coated with fibrin glue, which is a biological two-component glue consisting of fibrinogen solution and thrombin. Upon application, an elastic mass on the neurovascular bundle was formed. The contralateral neurovascular bundle was left uncoated. Subsequently both bundles were subjected to CO2 laser irradiation at different powers (5, 7, and 9 W), with an irradiation time of 0.1 seconds. Light microscopy was performed at 30 minutes and 2 days after surgery. RESULTS: No macroscopic visible hemorrhages occurred during laser irradiation in the glue-coated bundle. Light microscopic evaluation revealed an undamaged neurovascular bundle without any signs of thermal damage. In the uncoated bundles intraoperative hemorrhages resulting from laser energy occurred in all specimens. Furthermore, severe thermal damage was present in arteries, veins, and nerves. CONCLUSIONS: Intraoperative coating with fibrin glue can serve as a shield to protect vital structures such as arteries, veins, and nerves from accidental CO2 laser exposure.

Full Text:

Not Available

Use of fibrin glue in maxillofacial surgery.

Authors: Davis BR, Sandor GK

Publication Date: 1998

Abstract:

OBJECTIVE: To describe various applications of homologous fibrin glue in maxillofacial surgery. The clinical outcomes of the treated cases are discussed. METHODS: During the period January 1993 to July 1995, 71 patients underwent maxillofacial procedures in which homologous fibrin glue was utilized. The material used in each case was Tisseel, which is composed of human fibrinogen and bovine thrombin. The material was used to provide close and secure re-approximation of soft tissue in 20 patients requiring coronal flaps. Bone or alloplast fixation was undertaken with fibrin sealant in 14 patients. In 13 cleft lip and palate patients, the material was used in the repair of residual fistulas or clefts. Twelve patients had sinus lift procedures where the material fixated the bone graft and repaired the torn mucoperiosteal lining. Finally, 12 patients with coagulopathies had fibrin glue placed following exodontia. All patients were followed for a minimum of 6 months postoperatively. RESULTS: Seventy patients treated with Tisseel had successful outcomes as determined by preoperative criteria. A single oral antral fistula recurred 3 weeks after surgery. No adverse reaction to the material was noted in any of the patients. CONCLUSIONS: Homologous fibrin glue has various applications in the field of maxillofacial surgery and can be used with safe and predictable results.

Full Text:

Not Available

Comparative study of air coagulation, fibrin sealant, and suture in experimental liver injury.

Authors: Tovar MC, Sanchez-Valverde MA, Agut A, Laredo FG, Murciano J

Publication Date: 1998

Abstract:

OBJECTIVE: To test the effects of hot air coagulation, fibrin sealant, and horizontal mattress sutures on haemostasis and regeneration in experimental hepatectomy. DESIGN: Randomised laboratory experiment. SETTING: Teaching hospital, Spain. MATERIAL: 200 rats divided into four groups (three experimental [n=60 in each] and one control [n=20]). INTERVENTIONS: Hepatic injuries were repaired by suture, coagulation, or fibrin sealant in the three experimental groups. The control group was used only to supply baseline blood samples. 10 animals in each experimental group were killed at 3, 5, 10, 25, 40, and 60 days. MAIN OUTCOME MEASURES: Time taken to achieve haemostasis, and

histopathological scores of healing. RESULTS: Mattress sutures took mean (SEM) of 346 (7) seconds to control the haemorrhage and allow the liver to regain its shape and 4 rats developed abscesses (7%). Fibrin sealant achieved haemostasis immediately and the liver regained its shape in 58 (2) seconds; 2 rats (3%) developed abscesses. Hot air coagulation achieved haemostasis in 27 (1) seconds and there were no abscesses. CONCLUSION: Fibrin sealant was the best technique because it achieved immediate haemostasis and speedy regeneration. However, hot air coagulation is a useful and cheaper alternative.

Full Text:

Not Available

Laser-cured fibrinogen glue to repair bleb leaks in rabbits.

Authors: Wright MM, Brown EA, Maxwell K, Cameron JD, Walsh AW

Publication Date: 1998

Abstract:

OBJECTIVE: To determine whether laser-cured fibrinogen glue can close bleb leaks in rabbits. METHODS: Full-thickness filtration surgery with intraoperative mitomycin and a sutured limbus-based conjunctival flap was performed in 1 eye each of 19 New Zealand albino rabbits. On the second postoperative day, a 2- to 3-mm hole was made in the bleb. In 9 rabbits, the hole was glued using fibrinogen glue with indocyanine green dye added. The glue was "cured" with a diode laser. Eyes that had been glued and developed a subsequent leak had the glue reapplied on the day the leak was detected. RESULTS: The glue remained on the conjunctiva for an average (mean+/-SD) of 1.9+/-1.8 days (range, 0-5 days). The last day of bleb leak for the rabbits with glued eyes was 1.6+/-2.4 days; for the control rabbits, it was 8.0+/-4.4 days (P=.001, Mann-Whitney U test). CONCLUSION: Laser-cured fibrinogen glue is effective in closing bleb leaks in rabbits.

Full Text:

Not Available

Reduction of femoral artery bleeding post catheterization using a collagen enhanced fibrin sealant.

Authors: Falstrom JK, Goodman NC, Ates G, Abbott RD, Powers ER, Spotnitz WD

Publication Date: 1997

Abstract:

As the number of cardiac catheterization procedures increases, so do associated complications and costs. This study suggests that the application of a new collagen enhanced fibrin sealant, Collaseal, may be used effectively to achieve rapid hemostasis at the arterial puncture site following femoral artery catheterization. Results in nine dogs anticoagulated with heparin (activated clotting time 396 +/- 107, mean +/- S.D.) revealed a statistically significant reduction in signs of gross bleeding in the sealant-treated groins as compared to control (2 versus 9, P = .0156). These results indicate that this commercially produced sealant might be used in human patients undergoing cardiac catheterization to decrease complications, lengths of stay, and costs.

Full Text:

Not Available

Sliding, absorbable, reinforced ring and an axially driven stent placement device for sutureless fibrin glue gastrointestinal anastomosis.

Authors: Detweiler MB, Verbo A, Kobos JW, Granone P, Picciocchi A

Publication Date: 1996

Abstract:

Reduced blood flow of from 43 to 71% has been reported in sutured and stapled anastomoses. The sutureless sliding, absorbable, intraluminal, nontoxic stent (SAINT)-fibrin glue anastomotic method, which clamps the stump margins between 2 dissolving surfaces, includes only two stages of temporary compression (about 6 min total using 4 IU/mL thrombin) during the glue application in order to promote vascularization. A SAINT placement device (SAINT-PD) was introduced to facilitate low rectal anastomoses. Morphohistologic results from limited trials using fibrin glue with an untied sutureless stapler technique and a prototype non-gear-driven SAINT-PD, neither having the two dissolvable clamping surfaces of the SAINT, showed a 29 and 25% incidence of intraluminal tissue ridges, respectively. Since these tissue ridges could result in subclinical dilatation or frank stenosis, and the more extensive SAINT trials had an 8% incidence of tissue ridges, redesign of the SAINT-PD was undertaken. Consequently, to improve the anastomotic quality of the SAINT-PD, the sliding absorbable reinforced ring (sucrose base) acting as the second dissolvable surface for the SAINT-PD and a new axially controlled geared SAINT-PD design are described.

Full Text:

Not Available

Experimental measure of the tensile strength of biological sealant-collagen association after

hepatectomy in dogs.

Authors: Scotte M, Dujardin F, Amelot A, Azema P, Leblanc I, Bouvier P, Michot F, Teniere P

Publication Date: 1996

Abstract:

Fibrin sealants are commonly used in liver surgery. The aim of this study was to test the adhesive properties of a biological sealant-collagen bonding, using an experimental model. After hepatectomy in dogs, we measured the rupture stress point of a fibrin clot on the liver cross-section. The tensile strength was 0.28 N, 5 times higher than the force of arterial pressure in a 2-mm-diameter vessel. These results indicate that the adhesion of fibrin sealants is effective to prevent hemorrhage from the liver cross-section after hepatectomy.

Full Text:

Not Available

Seroma prevention in a rat mastectomy model: use of a light-activated fibrin sealant.

Authors: Wang JY, Goodman NC, Amiss LR Jr, Nguyen DH, Rodeheaver GT, Moore MM, Morgan RF, Abbott RD, Spotnitz WD

Publication Date: 1996

Abstract:

Seroma formation following mastectomy and axillary dissection remains a common and significant problem contributing to patient morbidity and health-care costs. Previous data have suggested that fibrin sealant (FS), a biological adhesive, is capable of controlling lymphatic leakage and assisting with skin graft adhesion. In this study, the use of an experimental, light-activated FS under development by CryoLife (CFS) was evaluated in a rat mastectomy model in order to reduce seroma formation. CFS is a premixed form of FS, containing an inactivator that is reversed in the presence of light, causing sealant to form. In this model, rats underwent mastectomy and extensive dissection of the axillary lymphovasculature. Next, 1 ml of saline or FS was applied to the operative site and the wound was closed. Three groups of animals were evaluated 5 days postoperatively by measuring the volume (in milliliters) of seroma able to be aspirated from the surgical site. The saline control group (N = 20) had a seroma volume (mean +/- standard deviation [SD]) of 4.2 +/- 2.9 ml, while a form of CFS containing human fibrinogen (80 to 100 mg per milliliter) and human thrombin (20 U per milliliter) (N = 20) had a significantly smaller seroma volume of 1.1 +/- 1.6 ml ($p < 0.001$ analysis of variance). University of Virginia (UVA) FS, containing human fibrinogen (20 mg per milliliter) and bovine thrombin (500 U per milliliter) (N = 20), had a seroma volume of 2.0 +/- 1.6 ml ($p < 0.01$, compared to control; $p > 0.2$, compared to CFS). Thus, this form of CFS significantly reduced seroma formation compared to saline control and also appeared to result in a smaller fluid accumulation than with UVA FS, although this trend was not statistically significant. These data suggest that the use of CFS may help to reduce

seroma formation in humans.

Full Text:

Not Available

Delayed vasal reanastomosis in rats: comparison of a microsurgical technique and a fibrin-glued procedure.

Authors: Vankemmel O, Rigot JM, Burnouf T, Mazeman E

Publication Date: 1996

Abstract:

OBJECTIVES: To compare fibrin-glued vasovasostomy to a conventional microsurgical technique in a protocol of delayed vasovasostomy. MATERIALS AND METHODS: Forty male Sprague-Dawley rats underwent bilateral vasectomy through a midline abdominal incision. Two weeks later all animals underwent a bilateral vasectomy reversal through a bilateral inguino-scrotal incision, following two different protocols. Invariably, the proximal segment had a larger lumen. The control group (20 rats) had a conventional modified one-layer sutured vasal anastomosis with 10/0 nylon. The experimental group (20 rats) underwent vasal anastomosis using fibrin glue and consisting of three transmural sutures with 10/0 nylon followed by the application of fibrin glue circumferentially to seal the anastomosis. The fibrin-tissue adhesive was obtained from pooled donor plasma and was virally inactivated by a solvent-detergent treatment. Seven weeks after surgery all animals were killed and the vasal specimens were evaluated for gross patency and the incidence of sperm granuloma. RESULTS: The control group had a patency rate of 85% and half had sperm granuloma. The experimental group had a patency rate of 92% and 40% had sperm granuloma; neither difference was significant. The mean operative time was significantly shorter for the fibrin glue-assisted vasovasostomy ($P < 0.001$). CONCLUSION: This study showed that a delayed fibrin-glued vasovasostomy gave a comparable anatomical success and an incidence of sperm granuloma similar to that using a conventional microsurgical technique, but with the advantages of a shorter operative time and a less technically demanding anastomosis.

Full Text:

Not Available

The effect of fibrin sealant on spinal fusions using allograft in dogs.

Authors: Jarzem P, Harvey EJ, Shenker R, Hajipavlou A

Publication Date: 1996

Abstract:

STUDY DESIGN: This study investigated the use of Tisseel (immuno [Canada], Toronto, Ontario) as an adjunct to allograft spinal fusion. Thirteen mongrel, dogs were fused bilaterally with morcellized graft from a separate dog. OBJECTIVES: To evaluate whether fibrin sealant had an effect on bone volume of fusion mass in allograft fusions of the spine. SUMMARY OF BACKGROUND DATA: Fibrin sealant has been promoted for use in many orthopedic applications. There is controversy about its effectiveness in augmenting bone graft healing. However, some surgeons make routine use of the sealant in augmentation of bone grafting procedures. METHODS: To test the usefulness of this material in augmenting allograft fusions, the authors carried out bilateral posterolateral fusions in 13 mongrel dogs. At surgery, 15 cm3 of allograft was placed into a posterolateral position at the L5-L6 region on both sides of the spine. Fibrin sealant (Tisseel) was allocated randomly to one side only. Fusion mass was tested 6 months after the initial operation by computed tomographic scan imaging and mechanical testing. RESULTS: A significantly smaller bone volume mass, as illustrated by computed tomographic measurement, was seen on the Tisseel side (P = 0.03). Biomechanical testing indicated that there was a trend for the Tisseel side to be stiffer than the untreated side, particularly at lower weights, but statistical significance was not achieved. Computed tomographic volumetric analysis showed that Tisseel-treated allograft led to a significantly smaller fusion volume. CONCLUSIONS: This study refutes the belief that Tisseel is a good material for accomplishing or augmenting intervertebral arthrodesis. Fibrin sealant significantly retards allograft fusion mass formation in dogs.

Full Text:

Not Available

Microvascular anastomoses. A comparative study of fibrinogen adhesive and interrupted suture techniques.

Authors: Bowen CV, Leach DH, Crosby NL, Reynolds R

Publication Date: 1996

Abstract:

A modified sleeve technique was developed for making microsurgical anastomoses using a commercially produced fibrinogen adhesive called Tisseel. A controlled study was then carried out to compare the new fibrinogen adhesive anastomoses with conventional suture anastomoses in a bilateral groin flap model using 50 consecutive rabbits. Statistical analysis of the results indicated that flap survival rate and vascular patency rate were comparable for the two techniques. The fibrinogen adhesive anastomoses took less time to complete and, subjectively, were less difficult technically. The suture anastomoses were more versatile. Histologic studies revealed that the adhesive did not flow through the sleeve into the lumen, and that, although there was a brief inflammatory response associated with healing, this inflammation was very localized and did not involve the inner layers of the vessel wall or lumen. It was concluded that the new technique was a useful addition to techniques already available.

Full Text:

Not Available

Reduction of femoral arterial bleeding post catheterization using percutaneous application of fibrin sealant.

Authors: Ismail S, Combs MJ, Goodman NC, Teotia SS, Teates CD, Abbott RD, Fechner RE, Nolan SP, Powers ER, Spotnitz WD

Publication Date: 1995

Abstract:

The number of cardiac catheterizations performed yearly is growing with correspondingly increasing amounts of morbidity, complications, and hospital costs. This study suggests that fibrin sealant instillation via an arterial sheath at the completion of femoral catheterization may improve hemostasis. Results using fibrin sealant in 12 unheparinized dogs documented significant reductions (McNemar's exact test) versus control for groin ecchymoses (1 versus 8, P = .008) and radiolabeled hematoma formation (0 versus 7, P = .016). Also swelling was less in the fibrin sealant treated groins when compared to control groins (1 versus 6, P = .125), but failed to reach statistical significance. Results in eight heparinized dogs (activated clotting time 374 +/- 22, mean +/- SEM) revealed a statistically significant reduction in signs of gross bleeding in the fibrin sealant-treated groins (1 versus 8, P = .016). This method may contribute to reduced morbidity, complications, and length of hospitalization. It may also allow for earlier patient mobilization after cardiac catheterization.

Full Text:

Not Available

Fibrin glue and conventional sutured vasal anastomosis in the rat.

Authors: Kucukaydin M, Okur H, Kontas O, Patiroglu TE

Publication Date: 1995

Abstract:

The present study was undertaken to evaluate the use of fibrin glue (Tisseel, Immune U.S., Inc) for vasovasostomy and to compare this technique to conventional sutured vasovasostomy. Thirty immature Sprague-Dawley rats, weighing from 60 to 80 g, were used in this study. A conventional

one-layer sutured anastomosis (Ethilon 10-O) in 10 rats was compared to a fibrin glue technique of vasal anastomosis (10 rats). The fibrin glue technique was performed without sutures and was unstented. The biological glue was utilized to seal both ends of the vas. The contralateral vas was ligated with 5-O prolein. In the control group (10 rats) the left vas was ligated in the same way, and only the contralateral vas was explored. After 2 months, one male and two female rats were placed in a cage for a further 2 months. At the end of this period, the fertility rate was 80% (n = 8) of the control group, 60% (n = 6) of the conventional anastomosis, and 70% (n = 7) of fibrin glue groups, respectively. The testes and vasal specimens were evaluated for the presence of sperm granuloma, and histologic studies were performed. The incidence of sperm granuloma after vasovasostomy was 20% (n = 2) for the fibrin glue group and 30% (n = 3) for the sutured group. The sperms were seen in the proximal and distal side of the vasal anastomosis in 10 rats in the control group, in 8 in the glue group, and in 8 in the conventional sutured anastomosis group.(ABSTRACT TRUNCATED AT 250 WORDS)

Full Text:

Not Available

[Healing of tubal anastomoses--microsurgery vs. fibrin gluing: morphologic aspects]. [German]

Authors: Gauwerky JF, Klose RP, Forssmann WG

Publication Date: 1994

Abstract:

The healing of anastomoses either by microsurgical suture technique or by fibrin sealant technique has been examined in an experimental morphological study. With view to morphological criteria the healing of tubal anastomoses after one month is completed. Afterwards only little areas of regeneration could be found in the region of the anastomosis. These statements are valid for both types of anastomoses. In single cases a more progressive regeneration of the mucosa could be demonstrated. Using fibrin glue a more pronounced fibrosis could not be seen.

Full Text:

Not Available

Canine choledochotomy closure with diode laser-activated fibrinogen solder.

Authors: Bass LS, Libutti SK, Oz MC, Rosen J, Williams MR, Nowygrod R, Treat MR

Publication Date: 1994

Abstract:

BACKGROUND: An alternative to mechanical stapling or hand suturing is needed to permit laparoscopic common bile duct exploration. We evaluated the strength and healing characteristics of canine choledochotomies sealed with a fibrinogen solder and a diode laser. METHODS: After creation of a 0.5 cm longitudinal choledochotomy, the edges were coapted with forceps, and a fibrinogen solder mixed with indocyanine green dye was applied. The solder was sealed in place with an 810 nm diode laser (125 W/cm2). RESULTS: Immediate mean leakage pressure was 264 +/- 7 mm Hg compared with 83 +/- 66 mm Hg in suture controls. This increased to 364 +/- 115 mm Hg at 2 days and was more than 510 mm Hg at 7 days. On histologic examination rapid reabsorption of the solder with no signs of inflammation or stenosis was seen. No episodes of dehiscence or peritonitis occurred. CONCLUSIONS: Laser soldering provides a watertight choledochotomy closure with adequate immediate strength allowing a reliable, technically feasible common bile duct exploration via a laparoscopic approach.

Full Text:

Not Available

Argon laser-welded bovine heterograft anastomoses.

Authors: Mueller MP, Kopchok GE, Tabbara MR, Cavaye DM, White RA

Publication Date: 1993

Abstract:

UNLABELLED: This study evaluated the strength of laser-welded arteriovenous shunts established using St. Jude BioPolyMeric vascular grafts. The arterial anastomoses of the biological graft were laser welded with and without the addition of soluble collagen or fibrin sealant. In four dogs, 16 arteriovenous grafts were implanted between the femoral artery and vein or the carotid artery and jugular vein using a 6 cm long, 4 mm internal diameter prosthesis. The 16 arterial anastomoses were evenly divided into four groups: sutured control, laser welded (LW), LW with soluble collagen applied immediately before and during welding, and LW with fibrin sealant applied after welding. All arterial control and venous anastomoses were sutured using continuous 6-0 polypropylene suture. All LW anastomoses were initially divided into six 5 mm long segments using six evenly spaced 6-0 polypropylene stay sutures. Each segment was laser welded using 15 to 18 5-sec pulses of the 0.5 W (7.5 W/cm 2) argon laser energy delivered via a 300 mum fiber while cooling the tissue with slow-drip saline irrigation. Blood flow was established and maintained through each anastomosis for 1 h. The vessels were then controlled, and anastomotic bursting pressure was determined with infusion of heparinized blood. RESULTS: An additional hemostatic suture was required in 3 LW anastomoses (2 LW, 1 LW with collagen). Mean bursting pressures (mm Hg) of the arterial anastomoses were as follows: sutured controls 165 +/- 159, LW 144 +/- 58, LW and collagen 93 +/- 47, LW and fibrin sealant 181 +/- 45.(ABSTRACT TRUNCATED AT 250 WORDS)

Full Text:

Not Available

Laser-assisted fibrinogen bonding of umbilical vein grafts.

Authors: Oz MC, Williams MR, Souza JE, Dardik H, Treat MR, Bass LS, Nowygrod R

Publication Date: 1993

Abstract:

Despite success with autologous tissue welding, laser welding of synthetic vascular prostheses has not been possible. The graft material appears inert and fails to allow the collagen breakdown and electrostatic bonding that results in tissue welding. To develop a laser welding system for graft material, we repaired glutaraldehyde-tanned human umbilical cord vein graft incisions using laser-assisted fibrinogen bonding (LAFB) technology. Modified umbilical vein graft was incised transversely (1.2 cm). Incisions were repaired using sutures, laser energy alone, or LAFB. For LAFB, indocyanine green dye was mixed with human fibrinogen and the compound applied with forceps onto the weld site prior to exposure to 808 nm diode laser energy (power density 4.8 W/cm 2). Bursting pressures for sutured repairs (126.6 +/- 23.4 mm Hg) were similar to LAFB anastomoses (111.6 +/- 55.0 mm Hg). No evidence of collateral thermal injury to the graft material was noted. In vivo evaluation of umbilical graft bonding with canine arteries demonstrates that LAFB can reliably reinforce sutured anastomoses. The described system for bonding graft material with laser exposed fibrinogen may allow creation or reinforcement of vascular anastomoses in procedures where use of autologous tissue is not feasible.

Full Text:

Not Available

Comparison of vasovasostomy techniques in rats utilizing conventional microsurgical suture, carbon dioxide laser, and fibrin tissue adhesives.

Authors: Ball RA, Steinberg J, Wilson LA, Loughlin KR

Publication Date: 1993

Abstract:

An evaluation of vas reanastomoses in rats comparing suture only, carbon dioxide (CO2) laser-assisted, and fibrin-based tissue adhesive was performed in our laboratory. A cohort of 60 known fertile male Sprague Dawley rats initially underwent lower midline abdominal exploration and transection of their vas deferens bilaterally, followed by immediate microsurgical vasovasostomy by one of the three experimental methods. All groups initially had the severed vasa ends coapted by two or three transmural (mucosa through serosa) sutures of 10-0 nylon under an operating microscope. The conventionally sutured group had an additional four to six nylon 10-0 sutures placed externally in the serosa only to complete the anastomosis. The CO2 laser-assisted group underwent laser welding

with denaturation of the serosa to seal the anastomosis. A fibrin-based tissue adhesive, produced by combining human cryoprecipitate and thrombin, was placed topically over the coapted vas ends to seal the anastomosis in the third group. Postoperative evaluation revealed similarities among the three surgical groups with the fibrin-based tissue adhesive group resulting in the highest patency rate (89%) and pregnancy rate (85%) as well as the lowest granulation rate (18%) and shortest operative time (27 minutes). The laser-assisted group resulted in the lowest pregnancy rate (68%), while the sewn anastomosis group had the lowest patency rate (76%). Both laser-assisted and conventionally sewn vasectomy reversals required significantly longer operative time (39 and 46 minutes, respectively) compared with the fibrin-based tissue adhesive-assisted procedures ($p < 0.01$). This study provides evidence that alternative microsurgical techniques may be utilized to perform uncomplicated, expeditious, and successful vasectomy reversals.

Full Text:

Not Available

Intraoperative procurement of autologous fibrin glue.

Authors: Quigley RL, Perkins JA, Gottner RJ, Curran RD, Kuehn BE, Hoff WJ, Wallock ME, Arentzen CE, Alexander JC Jr

Publication Date: 1993

Abstract:

A method of intraoperative procurement of autologous fibrin glue is described. The relative efficacy of our autologous preparation is compared with that of fibrin glue made with homologous cryoprecipitate. Experimentally, the fibrinogen content and the strength are less than those found in cryoprecipitate and appear related to the fibrinogen content of the autologous plasma used as substrate in the fibrin glue reaction. Clinically, no significant differences are noted in the performance of autologous fibrin glue. We believe the absence of the risk of blood-borne infection with the autologous product is a major advantage.

Full Text:

Not Available

Measuring the rupture stress point of biological sealant-collagen bonding: validation of a technique used after hepatectomy.

Authors: Michot F, Scotte M, Dujardin F, Hoebeke Y, Le Blanc I, Amelot A, Azema P, Bouvier P

Publication Date: 1993

Abstract:

The aim of this experimental study was to measure the rupture stress point of a fibrin clot situated on a liver, in realistic surgical conditions. The experimental method was carried out with a machined wooden cylinder bonded on the liver, connected with a wire to a setup and pulled at a constant speed, and a sensor was placed on the wire measuring the applied strength. This method, realized in the dog, made it possible to validate a precise and reproducible method designed for testing the adhesive characteristics of biological sealant-collagen bonding on the liver.

Full Text:

Not Available

Collagen repair not improved by fibrin adhesive. Cruciate ligament ruptures studied in dogs.

Authors: Lazovic D, Messner K

Publication Date: 1993

Abstract:

The anterior cruciate ligament in 30 dogs was transected and repaired by simple suture. In every other dog, fibrin adhesive (Tisseel Kit, Immuno AG, Vienna, Austria) was applied to the transection area before suturing. The proportion of organized versus unorganized and inflammatory tissue formation was assessed histologically. At 3 weeks, the amount of normal organized collagenous tissue was reduced to 20 percent both without and with fibrin adhesive. After 6 weeks, a substantial increase of organized collagenous tissue was observed after suture only, which at 12 weeks reached about 70 percent of the total area. In contrast, repair with fibrin adhesive had at 12 weeks only 30 percent of normal collagenous tissue.

Full Text:

Not Available

[Comparison of different types of ovarian wound closure in rats. Role of biological glue]. [French]

Authors: Bruel D, Gadonneix P, Tranbaloc P, Villet R

Publication Date: 1993

Abstract:

Three techniques for closing the ovary have been compared. The test was carried out on 30 rats' ovaries. After the ovary had been cut with scissors it was closed with rapid acting Tissucol (a biological glue) or closed with interrupted stitches of 10/0 Vicryl, or left to close by itself. Sixty days later the ovaries were looked at macroscopically and histologically. The macroscopic score was established according to the presence of adhesions, the size of the ovary, the presence of cysts; and the histological score was carried out according to the presence of granulomatous macrophage lesions, the degree of fibrosis and the existence of germ cell cysts. The results were identifically the same as far as these five different criteria were concerned. All the same, Tissucol brought about less fibrosis and less atrophy of the ovary. Tissucol, therefore, is a good alternative for suturing the ovary as compared with stitching or no formal closure after the removal of ovarian cysts, particularly laparoscopically.

Full Text:

Not Available

Laser bonding of secondary bronchi with solvent--detergent-treated cryoprecipitate.

Authors: Oz MC, Williams MR, Moscarelli R, Libutti SK, Kaynar M, Fras CI, Treat MR, Nowygrod R

Publication Date: 1992

Abstract:

Management of bronchopleural fistula is a challenging clinical problem. Laser-assisted cryoprecipitate bonding techniques offer a means to fix precisely tissue glues into the fistulae through a bronchoscopic approach. Analogous studies exist using fibrin glue with thrombin. Using a canine model, secondary bronchi were sealed with cryoprecipitate made from solvent/detergent-treated plasma (treated to inactivate membrane-enveloped virus) mixed with indocyanine green (absorption 805 nm). Diode laser energy (emission 808 nm, 7.3 W/cm 2) was applied to the solder until dessication was observed. Leakage pressures (n = 7) ranged between 18 and 86 mmHg with a mean of 46 +/- 24 mmHg. Laser-assisted solder techniques provide a reliably strong seal over leaking bronchial stumps and use of dye enhancement prevents undesired collateral thermal injury to surrounding bronchial tissue. Solvent/detergent plasma, prepared by methods shown to inactivate large quantities of HIV, HBV, and HCV, is an effective source of cryoprecipitate and should allow widespread use of pooled human material in a clinical setting.

Full Text:

Not Available

The effect of fibrin glue on skin grafts in infected sites.

Authors: Jabs AD Jr, Wider TM, DeBellis J, Hugo NE

Publication Date: 1992

Abstract:

Fibrin bonding of skin grafts to wounds is an essential part of the graft-adherence process. Bacteria, in concentrations greater than 10(5)/gm of tissue, are associated with graft failure. Sixty-five rats were randomly divided into three groups, dorsal split-thickness skin grafts were harvested, and the sites were inoculated with Staphylococcus aureus. After incubation, each wound was quantitatively biopsied and treated with saline, fibrin glue with aprotinin, or fibrin glue alone. We found that the addition of commercially available fibrin glue with or without the antifibrinolytic agent aprotinin is capable of restoring graft adherence to normal levels in graft sites infected with greater than 10(5) bacteria/gm of tissue. Fibrin glue may have potential for increasing skin-graft take in the clinical situation where the graft bed is infected.

Full Text:

Not Available

Mechanical properties of fibrin adhesives for blood vessel anastomosis.

Authors: Flahiff C, Feldman D, Saltz R, Huang S

Publication Date: 1992

Abstract:

Various methods have been used for anastomosing, or attaching, two ends of a severed blood vessel together. The most common method, suturing, is tedious, can be time-consuming, and requires special training in microvascular surgery. Other methods, such as mechanical devices and lasers, have some problems as well. The use of fibrin adhesives for blood vessel anastomosis might eliminate some of the current problems by allowing a quicker, simpler, and more reliable method of attachment. Although mechanical studies have been conducted to determine fibrin glue properties in shear, tensile, and burst tests; most of these studies have used skin or intestinal tissue. Therefore, to evaluate the feasibility of using fibrin glue as an adhesive for blood vessel anastomosis, the mechanical properties of blood vessels joined with fibrin glue were examined using tensile and burst tests. High and low fibrinogen concentrations were tested after 5- or 45-min time periods. In addition, three clinical methods of attachment were compared: end-to-end anastomosis, vessel overlapping, and suturing. In this study, because the adhesive strength was not found to increase significantly after 5 min, setting times for fibrin glue may be short enough to make it a clinical option when compared to suturing. In addition, the higher fibrinogen concentration did not result in a significantly higher adhesive strength, indicating that the lower concentration fibrin adhesives may be of comparable strength to the higher concentrations for clinical applications.

Full Text:

Not Available

Fixation of osteochondral fractures in rabbit knees. A comparison of Kirschner wires, fibrin sealant, and polydioxanone pins.

Authors: Plaga BR, Royster RM, Donigian AM, Wright GB, Caskey PM

Publication Date: 1992

Abstract:

We compared fibrin sealant, polydioxanone (PDS) pins and Kirschner wires in the fixation of osteochondral fractures in rabbit knees. Standardised osteochondral fractures of the right medial femoral condyle were made in 56 adult New Zealand white rabbits. There were equal groups of control knees, and those which had Kirschner-wire, fibrin-sealant or PDS-pin fixation. No external immobilisation was used. One animal from each group was killed at two, three and four weeks. The remaining rabbits were killed at six weeks. A fracture which healed with less than 1 mm of displacement was considered a success. There was successful healing in 29% of the control group, in all of the Kirschner-wire group, in 50% of the fibrin-sealant group, and in 86% of the PDS-pin group. The use of PDS pins appears to be a reliable alternative to the use of metal in the fixation of osteochondral fractures in rabbits.

Full Text:

Not Available

Adverse influence of fibrin sealant on the healing of high-risk sutured colonic anastomoses.

Authors: Byrne DJ, Hardy J, Wood RA, McIntosh R, Hopwood D, Cuschieri A

Publication Date: 1992

Abstract:

The effect of fibrin glue sealing on sutured colonic anastomoses was studied using a 'high-risk' colon anastomosis model in the rat. Animals (n = 104) were randomized to have their sutured anastomosis sealed with fibrin glue or left untreated. They were assessed clinically until they were killed on the fourth day after surgery when contrast radiology, detailed post-mortem examination, anastomotic bursting pressure (ABP) and assessment of adhesion formation were performed. The clinical outcome was worse in the glued group (toxic or death from sepsis: 18 versus seven in the non-glued group; P = 0.0354), which also showed a significantly higher moderate to major leak rate (17 versus two in the non-glued group; P = 0.0009). The median ABP was significantly higher in the glued anastomosis group (96 versus 68 cmH2O in the non-glued group; P = 0.0367). Excessive perianastomotic adhesion formation was significantly greater in the glued group. Microscopic examination showed an extremely

intense inflammatory reaction in the glued anastomoses compared with that in the untreated group. These results indicate that sealing of a sutured anastomosis with fibrin glue containing an antiproteinase impairs healing the of anastomotic wound, probably by resisting the ingrowth of vascular granulation tissue during the early stages of repair.

Full Text:

Not Available

[Choice of thrombin concentration of common fibrin glue systems for nerve anastomosis]. [German]

Authors: Herter T, Windmann D

Publication Date: 1992

Abstract:

Although fibrin glue has been used in several areas of surgery with increasing success, it has not become fully established in nerve coaptation. Initially, significant advantages were expected, however, as the fibrin clot dissolved prematurely, gapping occurred and antifibrinolytic substances had to be added to the glue. Following this procedure, fibrosis occurred frequently. This remains a problem. Therefore, the dosage dependent fibrosis-inducing effect of thrombin was investigated in an animal experimental study. Thrombin demonstrates a fibrosis-promoting effect and we therefore recommend 1-1.5 NIH thrombin/ml glue, as lower concentrations increase the clotting time.

Full Text:

Not Available

[Therapy of splenic injuries by freezing and fibrin gluing. Animal experiment study]. [German]

Authors: Vatankhah M, Moller KO, Lind BM, Baretton G

Publication Date: 1992

Abstract:

The goal of this investigation was to improve the reliability of intraoperative and postoperative hemostasis and to observe the healing process after using a combined technique of tissue freezing followed by the application of collagen fleece and fibrin glue for the treatment of splenic ruptures. Grade II lesions were inflicted on the spleens of 15 swine. The bleeding wounds were frozen for 1 min at -60 degrees C using a cryosurgical device. Immediately afterwards the frozen lesions were covered with fibrin glue and collagen fleece and kept under slight compression. In every case complete hemostasis

was achieved intraoperatively. The spleens of three animals each time were collected for gross and microscopic examination after 2 days and 1, 2, 5, and 6 weeks. A visceroperitoneal adhesion was observed in only one spleen, U-shaped viscerovisceral adhesions in five spleens. Superficial coagulation necroses could be detected microscopically only after 2 days and 1 week. Organization of the wounds, indicated by granulation tissue which contained siderophages, started in the 2nd week. There was distinct formation of collagen fibers after 5 and 6 weeks; only a residue of the collagen fleece was visible and the surplus fibrin glue was encapsulated. With this combined technique complete and safe hemostasis and a good subsequent healing process was achieved.

Full Text:

Not Available

[Changes in the vascular wall induced by surgical glues. Experimental study]. [French]

Authors: Portoghese M, Acar C, Jebara V, Chachques JC, Fontaliran F, Deloche A, Carpentier A

Publication Date: 1992

Abstract:

The effects on vascular tissues of two different types of surgical glue, gelatin-resorcinol-formaldehyde (GRF) and fibrin (Tissucol) were tested on the rat abdominal aorta. The GRF glue induced destruction of the vascular wall: multiple inclusions of the glue were noted in the media. Conversely, the fibrin glue preserved the normal architecture of the three arterial layers. The use of GRF glue therefore should be avoided on particularly fragile tissues (e.g. coronary arteries), and it seems preferable in such cases to use the fibrin glue.

Full Text:

Not Available

Use of autologous fibrin glue in the treatment of splenic trauma: an experimental study.

Authors: Kuzu A, Aydintug S, Karayalcin K, Koksoy C, Yerdel MA, Eraslan S

Publication Date: 1992

Abstract:

There is little doubt that preserving the spleen will contribute to a much more favourable outcome in patients undergoing splenic surgery, as a result of avoiding the well known risks of splenectomy. Among many operative methods described for splenic salvage, application of autologous fibrin glue

(AFG) is particularly promising because of its unique characteristics. The use of AFG has been evaluated and its efficacy and tissue compatibility assessed in the treatment of splenic trauma in 15 partially splenectomized New Zealand White rabbits. The application of the AFG to the resected splenic surface achieved complete haemostasis in all animals. The animals were divided into four groups and were killed at varying intervals ranging from 24 h to 10 weeks. During re-exploration there was no evidence of recurrent bleeding and histopathological examination revealed progressive absorption of the AFG with a minimal inflammatory response. It is concluded that AFG is an effective haemostatic agent with good systemic and local compatibility and can be used in splenic salvage, which thereby avoids the use of non-autologous products with their risks of disease transmission.

Full Text:

Not Available

Fibrin glue vasal anastomosis compared to conventional sutured vasovasostomy in the rat.

Authors: Silverstein JI, Mellinger BC

Publication Date: 1991

Abstract:

Vasectomy reversal has become a frequently performed surgical procedure with best results obtained with the use of the operating microscope and microsurgical technique. The present study was undertaken to evaluate the use of fibrin glue ("Tisseel", Immuno U.S., Inc.) for vasovasostomy and to compare this technique to conventional sutured vasovasostomy. Utilizing 60 male Sprague Dawley rats, a conventional two layered sutured anastomosis of vasovasostomy (30 rats) was compared to a fibrin glue technique of vasal anastomosis (30 rats). The fibrin glue technique was performed with two transmural sutures, was unstented, and utilized the biological glue to seal the anastomosis. The contralateral vas of each animal underwent vasectomy and reapproximation of unligated ends so that the rate of spontaneous recanalization could be accessed. Rats were sacrificed at 24 hours, one week, four weeks, and three months postvasovasostomy. The vasal specimens were evaluated for gross patency, presence and size of sperm granuloma, mean flow rates at varying infusion pressures, tensile strength measurements and histologic studies. Combining the one and three month groups, a similar patency rate was obtained by either technique; 83% (n = 18) for the sutured group, and 90% (n = 21) for the fibrin glue group. The rate of spontaneous recanalization of the contralateral vasa in the one and three month animals was 8% (n = 38). The mean flow rates obtained at high and low infusion pressures were not statistically different for the two techniques. The tensile strength of the glue anastomosis averaged 78% of the tensile strength achieved by the conventional sutured technique. The incidence of sperm granuloma after vasovasostomy was 28% for the fibrin glue group and 61% for the sutured group. Additionally, 67% of granulomas were small (less than 3 mm.) in the glue group, compared to only 36% in the sutured group. Histology revealed similar morphological changes in the area of anastomosis with either technique. Operative time for sutured vasovasostomy averaged 24 minutes, compared to an average of 11 minutes for the glue assisted vasovasostomy. The use of fibrin glue allowed the performance of a sperm tight patent anastomosis that had the advantages of reduced incidence of sperm granuloma formation, reduced operative time, and less microsurgical skill required to perform the anastomosis.

Full Text:

Not Available

Stapedectomy modified by the application of fibrin tissue adhesive.

Authors: Siedentop KH, Schobel H

Publication Date: 1991

Abstract:

Certain failures of the stapes operation are caused by loosening of the crimped metal loop on the long process of the incus, atrophy or necrosis of the lenticular process, erosion of the long process with the prosthesis causing injury to the labyrinth, erosion of the incudostapedial joint with upward rotation of the long process, and dislocation of the prosthesis. To reduce the occurrences of these failures following stapes removal, we close the oval window by gluing a fascia graft into place with fibrin tissue adhesive. A ceramic strut with a cup on its upper end that fits the lenticular process is glued between the fascia graft and the lenticular process. This method does not cause bone necrosis or blood circulation disturbances. The hearing results are the same or better than those reported for other stapes procedures.

Full Text:

Not Available

Alveolar ridge augmentation with hydroxylapatite using fibrin sealant for fixation. Part I: An experimental study.

Authors: Hotz G

Publication Date: 1991

Abstract:

Histological studies in animals have shown that fibrin sealant can be employed as a resorbable, biological binding agent for fixation of initially mouldable hydroxylapatite (HA) implants. Mixing HA granules with a 2 component fibrin sealant from which thrombin solution has been diluted to 1 IU/ml provides a simple method for obtaining mouldable implants. During insertion of the HA granules, the sealant prevents dislocation and migration, and on solidification, the moulded implant securely retains its shape and position until connective tissue ingrowth is complete. The use of polygonal granules permits a constant implant contour from the very beginning.

Full Text:

Not Available

[Comparative studies of the stability of nerve anastomoses using CO2 laser adaptation compared with conventional technics]. [German]

Authors: Thumfart WF, Gunkel A, Ollwig M

Publication Date: 1990

Abstract:

Despite sophisticated microsurgical techniques for nerve repair, neural anastomoses often dehisce, especially under pronounced traction on the nerve endings. We investigated the resistance to traction of several neural anastomoses made by different techniques, including the laser. Neural anastomoses constructed or fixed by a CO2 laser beam were considered with special interest. The forces required to disrupt the different anastomoses were monitored by a dynamometer, and the whole procedure was recorded in slow motion on video. Improved results cannot be achieved with the laser techniques available today: indeed neural anastomoses were less resistant to traction after CO2 laser coagulation. Anastomoses constructed by means of epineural sutures showed much the best resistance to traction.

Full Text:

Not Available

Comparison between fibrin tissue adhesive, epineural suture and natural union in intratemporal facial nerve of cats.

Authors: Bento RF, Miniti A

Publication Date: 1989

Abstract:

Our objective was to study intratemporal anastomosis of the facial nerve in cats. Clinical, electrophysiological and histological results of the use of fibrin tissue adhesive, epineural suture and natural adhesion were compared. The 30 adult cats studied had undergone mastoidectomy exposure, and section of the facial nerve 1 cm before its exit from the stylomastoid foramen. Anastomosis was then undertaken, using epineural suture combined with stabilization through fibrinic tissue adhesive, and union of the stumps without stabilizing them. Each type of anastomosis was carried out in 10 animals. Clinical, electrophysiological and histological assessments of both the site of anastomosis and the ventral branch of the facial nerve followed the aforementioned procedures. By means of statistical

analysis, the authors reached the following conclusions: 1) Considering the clinical assessment per se, both groups with fibrinic tissue adhesive and suture showed similar features and results, which in both cases were better than those following natural union. 2) Considering the electrophysiological results per se, the use of fibrin tissue adhesive was superior to any other method used. 3) Considering the histological examination per se, both groups with fibrin tissue adhesive and suture revealed similar features which were more favourable than those shown by natural union. 4) In the overall comparison of the various parameters in the three groups, the use of fibrin tissue adhesive achieved better results than any other method. Based on the results of this study, the authors conclude that the use of fibrin tissue adhesive has technical advantages, and that the results of this use outweigh those achieved with both epineural suture and natural union. The authors recommend this technique as the most beneficial to be resorted to, for intrapetrous anastomosis of the facial nerve.

Full Text:

Not Available

[Electrophysiologic comparison between sutured and glued nerve anastomoses]. [German]

Authors: Herter T

Publication Date: 1989

Abstract:

Fibrinadhesires are successfully used in many areas of surgery, but they have not been generally adopted for the construction of neural anastomoses, even though the conventional suturing technique is also not completely satisfactory. In the early phase of fibrinotherapy, dehiscence occurred. The addition of antifibrinolytics has admittedly led to stabilization of the clots, but since the introduction of this procedure fibrosis has been observed with increasing frequency. This can cause even initially successful anastomoses to fail later. The objective of the work described in the present paper was to compare the conventional suturing technique and fibrinotherapy for the fixation of anastomoses. Electrophysiological methods of measurement were used, as it is ultimately the degree of reinnervation achieved that is of decisive importance. No significant difference was noted when an epineural technique was used.

Full Text:

Not Available

Sealing of gastrointestinal anastomoses with fibrin glue coated collagen patch.

Authors: Nordentoft T

Publication Date: 2015

Abstract:

BACKGROUND: Colorectal cancer (CRC) is the most common cancer of the gastrointestinal tract. In Denmark is CRC the 3. most frequent form of cancer and the 3. leading cause of cancer-related death. Anastomoses: Surgical resection is the only curative treatment of CRC and in Denmark about 85% of patients with CRC are therefore operated. An anastomosis will be established in most cases. Colorectal anastomoses are established in the treatment of benign diseases too, i.e. as part of the surgical treatment of inflammatory bowel disease and in acute surgery. Furthermore anastomoses are conducted in other parts of the gastrointestinal tract i.e. esophagus, stomach, small bowel and bile system. Anastomotic leakage (AL): AL is the most serious complication of gastrointestinal surgery with a 30-day mortality of 13-27%. The reported AL rate ranges from 1 to 39%. In addition to immediate clinical consequences AL is an independent predictor of reduced general and cancer-specific survival. Leakage can manifest as generalized peritonitis, requiring acute resurgery or as a more localized accumulation/abscess or as a subclinical leakage. Sealing of anastomoses: Numerous studies on anastomotic sealing have been conducted with the aim of reducing the number of AL's. The results of these are conflicting and predominantly disappointing. The drug Tacho-Sil (TS) consists of a collagen patch, which on the one side is coated with fibrin glue (FG), which gives it an adhesive property. TS is registered for use in surgical hemostasis. Animal models: Spontaneous AL in animals is infrequent. It is therefore necessary to use a model of AL. No such model exists and must be developed. OBJECTIVE: To clarify if the sealing of anastomoses with TS is feasible and safe in an experimental design. To develop a standardized model of AL in pigs. To clarify if sealing of colon-anastomoses with TS can reduce the number of clinical ALs in an experimental design. To clarify whether there is evidence that FG influences healing of gastrointestinal anastomosis. STUDIES: Safety study, that examines whether it is safe to seal anastomoses with a TS. Experimental study on pigs. Two anastomoses on each pig, one sealed with TS. After 1-6 weeks of observation the anastomosis were examined for AL, stenoses, strength and compared microscopic. RESULTS: No difference between sealed and unsealed anastomosis. This study is completed and published. Model study, to develop model of AL on pigs. A total of 22 pigs had an anastomosis of colon. All anastomoses were left with a standardized defect on 5-21 mm. The pigs were observed in order to assess how big the defect should be before the pigs developed visible leakage and/or fecal peritonitis. RESULTS: Model developed. 21 mm defect significant. This study is completed and published. Efficacy study, testing if TachoSil can seal an AL and thus prevent that this becomes clinically significant. A total of 20 pigs had a colon-anastomoses with a standardized defect of 21 mm. The pigs were randomized to sealing with TS or no sealing. Re-laparotomy after 7 days examining for visible leakage and/or fecal peritonitis. RESULTS: TachoSil able to seal the defect (p=0.0055). This study is completed and published. Systematic review, with the purpose to study whether there is evidence that FG influence the healing of gastrointestinal anastomosis. RESULTS: Conflicting. FG does not seem to have an effect. This study completed and published. CONCLUSIONS: Sealing of GI-anastomosis with TachoSil is safe and feasible. A defect of at least 21mm must be left in colon anastomosis to induce clinical peritonitis. Sealing of defect colon-anastomosis in pigs with TachoSil can prevent clinical leakage and peritonitis. FG has no positive effect on microscopically healing of GI-anastomosis.

Full Text:

Not Available

Subconjunctival topotecan in fibrin sealant in the treatment of transgenic murine retinoblastoma.

Authors: Tsui JY, Dalgard C, Van Quill KR, Lee L, Grossniklaus HE, Edelhauser HF, O'Brien JM

Publication Date: 2008

Abstract:

PURPOSE: To test the effects of subconjunctival topotecan (TPT) in fibrin sealant (FS) in transgenic murine retinoblastoma (RB). METHODS: Growth inhibitory, apoptotic, and cell cycle effects of TPT were assayed in human RB cell lines. In a dose-escalation study, eight groups of three 10- to 14-week-old wild-type mice were treated bilaterally with a single 30-microL injection of subconjunctival TPT in FS (0.025, 0.05, 0.1, 0.2, 0.4, 0.8, 1.6, or 3.2 mg/mL). Two groups of twenty 10-week-old LHbeta-Tag transgenic mice were then treated in the right eye only with TPT in FS (3.2 mg/mL in 30 microL; 0.1-mg total dose) or with FS only. The contralateral eye in each group was left untreated to serve as an internal control. After 3 weeks, ocular tumor burden was determined by histologic examination. RESULTS: At 48 hours, IC(50) values of TPT in Y79 and Weri-Rb1 RB cell lines were 35 nM and 50 nM, respectively. Growth inhibitory effects were correlated with increased apoptosis and accumulation of cells in G2. Cytotoxicity of TPT was comparable in aqueous media and in FS. In the dose-escalation study, no histopathologic evidence of ocular toxicity was observed at any dose. Clinical toxicities (mild enophthalmos and eyelid alopecia) were observed only at the highest dose tested (3.2 mg/mL). In the treatment study, both eyes of TPT-treated mice demonstrated significant reduction in tumor burden compared with both eyes of mice treated with FS only (59% reduction; P = 0.04). In mice treated with TPT, tumor burden in TPT-treated eyes and in untreated contralateral eyes did not differ significantly. CONCLUSIONS: Subconjunctival administration of TPT in FS to one eye allows the formation of a TPT depot sufficient for an effect to occur 3 weeks after treatment. This effect -- bilateral reduction in tumor burden without a significant difference in treated versus untreated eyes -- suggests that the major route of drug delivery in this system is hematogenous rather than transscleral.

Full Text:

Not Available

Autologous bone marrow-derived cultured mesenchymal stem cells delivered in a fibrin spray accelerate healing in murine and human cutaneous wounds.

Authors: Falanga V, Iwamoto S, Chartier M, Yufit T, Butmarc J, Kouttab N, Shrayer D, Carson P

Publication Date: 2007

Abstract:

The nonhematopoietic component of bone marrow includes multipotent mesenchymal stem cells (MSC) capable of differentiating into fat, bone, muscle, cartilage, and endothelium. In this report, we describe the cell culture and characterization, delivery system, and successful use of topically applied autologous MSC to accelerate the healing of human and experimental murine wounds. A single bone

marrow aspirate of 35-50 mL was obtained from patients with acute wounds (n = 5) from skin cancer surgery and from patients with chronic, long-standing, nonhealing lower extremity wounds (n = 8). Cells were grown in vitro under conditions favoring the propagation of MSC, and flow cytometry and immunostaining showed a profile (CD29+, CD44+, CD105+, CD166+, CD34-, CD45-) highly consistent with published reports of human MSC. Functional induction studies confirmed that the MSC could differentiate into bone, cartilage, and adipose tissue. The cultured autologous MSC were applied up to four times to the wounds using a fibrin polymer spray system with a double-barreled syringe. Both fibrinogen (containing the MSC) and thrombin were diluted to optimally deliver a polymerized gel that immediately adhered to the wound, without run-off, and yet allowing the MSC to remain viable and migrate from the gel. Sequential adjacent sections from biopsy specimens of the wound bed after MSC application showed elongated spindle cells, similar to their in vitro counterparts, which immunostained for MSC markers. Generation of new elastic fibers was evident by both special stains and antibodies to human elastin. The application of cultured cells was safe, without treatment-related adverse events. A strong direct correlation was found between the number of cells applied (greater than 1 x 10(6) cells per cm2 of wound area) and the subsequent decrease in chronic wound size (p = 0.0058). Topical application of autologous MSC also stimulated closure of full-thickness wounds in diabetic mice (db/db). Tracking of green fluorescent protein (GFP)+ MSC in mouse wounds showed GFP+ blood vessels, suggesting that the applied cells may persist as well as act to stimulate the wound repair process. These findings indicate that autologous bone marrow-derived MSC can be safely and effectively delivered to wounds using a fibrin spray system.

Full Text:

Not Available

Fibrin glue system for adjuvant brachytherapy of brain tumors with 188Re and 186Re-labeled microspheres.

Authors: Hafeli UO, Pauer GJ, Unnithan J, Prayson RA

Publication Date: 2007

Abstract:

Brain tumors such as glioblastoma reappear in their original location in almost 50% of cases. To prevent this recurrence, we developed a radiopharmaceutical system that consists of a gel applied immediately after surgical resection of a brain tumor to deliver local radiation booster doses. The gel, which strongly adheres to tissue in the treatment area, consists of fibrin glue containing the beta-emitters rhenium-188 and rhenium-186 in microsphere-bound form. Such microspheres can be prepared by short (2 h or less) neutron activation even in low neutron flux reactors, yielding a mixture of the two beta-emitters rhenium-188 (E(max)=2.1 MeV, half life=17 h) and rhenium-186 (E(max)=1.1 MeV, half life=90.6h). The dosimetry of this rhenium-188/rhenium-186 fibrin glue system was determined using gafchromic film measurements. The treatment efficacy of the radioactive fibrin glue was measured in a 9L-glioblastoma rat model. All animals receiving the non-radioactive fibrin glue died within 17+/-3 days, whereas 60% of the treated animals survived 36 days, the final length of the experiment. Control animals that were treated with the same amount of radioactive fibrin glue, but had not received a previous tumor cell injection, showed no toxic effects over one year. The beta-radiation

emitting rhenium-188/rhenium-186-based gel thus provides an effective method of delivering high doses of local radiation to tumor tissue, particularly to wet areas where high adhesive strength and long-term radiation (with or without drug) delivery are needed.

Full Text:

Not Available

Subconjunctival carboplatin in fibrin sealant in the treatment of transgenic murine retinoblastoma.

Authors: Van Quill KR, Dioguardi PK, Tong CT, Gilbert JA, Aaberg TM Jr, Grossniklaus HE, Edelhauser HF, O'Brien JM

Publication Date: 2005

Abstract:

PURPOSE: To evaluate the efficacy of subconjunctival carboplatin in fibrin sealant in the treatment of transgenic murine retinoblastoma. DESIGN: Experimental study using LHbeta-Tag transgenic mice in a randomized controlled trial. PARTICIPANTS AND CONTROLS: Thirty-three 10-week-old LHbeta-Tag transgenic mice: 22 carboplatin-treated animals and 11 control animals. METHODS: Three groups of 11 mice were treated with a single, 30 microl injection of fibrin sealant in the subconjunctival space of 1 eye; the opposite eye was left untreated as an internal control. Group 1 (low-dose group) received 37.5 mg/ml calculated concentration of carboplatin in fibrin sealant (0.66 mg measured total dose). Group 2 (high-dose group) received 75 mg/ml calculated concentration of carboplatin in fibrin sealant (1.23 mg measured total dose). Group 3 (control group) received fibrin sealant only. Mice were killed on day 22 after treatment. Eyes were serially sectioned, and retinal tumor burden was quantified by histopathologic analysis. For statistical analysis of treatment effects, eyes were divided into 6 groups: low-dose group, sealant-treated eyes; low-dose group, untreated eyes; high-dose group, sealant-treated eyes; high-dose group, untreated eyes; control group, sealant-treated eyes; and control group, untreated eyes. MAIN OUTCOME MEASURES: Main outcome measure was mean tumor burden per level per eye in each experimental group. RESULTS: The best therapeutic results were obtained in eyes treated with low-dose carboplatin in fibrin sealant, where no histopathologic evidence of toxicity was observed, and 6 of 11 eyes had zero tumor burden. Tumor burden in the remaining 5 eyes in this group was minimal (4 eyes) or moderate (1 eye) compared with mean control values. Mean tumor burden in this group was significantly smaller than mean tumor burden in untreated eyes from the same mice ($P<0.004$), sealant-treated eyes in the control group ($P<0.004$), and untreated eyes in the control group ($P<0.002$). Although a similar reduction in mean tumor burden was observed in eyes treated with high-dose carboplatin in fibrin sealant, 5 of 10 eyes analyzed in this group also demonstrated histopathologic evidence of severe toxicity. CONCLUSIONS: Subconjunctival carboplatin in fibrin sealant is effective in the treatment of transgenic murine retinoblastoma. A single injection of low-dose carboplatin in fibrin sealant was sufficient to induce complete or near-complete intraocular tumor regression in 10 of 11 eyes (91%), with no associated histologic evidence of toxicity. These results suggest that subconjunctival carboplatin in fibrin sealant provides sustained release and could have clinical use in the treatment of intraocular retinoblastoma.

Full Text:

Not Available

Healing of colon anastomoses covered with fibrin glue after immediate postoperative intraperitoneal administration of 5-fluorouracil.

Authors: Kanellos I, Mantzoros I, Demetriades H, Kalfadis S, Kelpis T, Sakkas L, Betsis D

Publication Date: 2004

Abstract:

PURPOSE: The aim of this experimental study was to investigate whether covering the colonic anastomoses with fibrin glue can protect the colonic healing from the adverse effects of 5-fluorouracil (5-FU), when it is injected intraperitoneally immediately after colon resection. METHODS: Sixty-four rats were randomized to one of four groups. After resection of a 1-cm segment of the transverse colon, an end-to-end sutured anastomosis was performed. Rats of the control group and the fibrin glue group were injected with 6 ml of solution 0.9 percent NaCl intraperitoneally. Rats in the 5-FU and the 5-FU + fibrin glue groups received 5-FU intraperitoneally. The colonic anastomoses of the rats in the fibrin glue group and in the 5-FU + fibrin glue group were covered with fibrin glue. All rats were killed on the 8th postoperative day and the anastomoses were examined macroscopically. The bursting pressure measurements were recorded and the anastomoses were graded histologically. RESULTS: The leakage rate of the anastomoses was significantly higher in the rats of the 5-FU group than in those of the fibrin glue group and those of the 5-FU + fibrin glue group (37.5 percent vs. 0 percent, P = 0.020). The adhesion formation score was significantly higher in rats of the 5-FU group than in the other groups. Bursting pressures were also significantly lower in the 5-FUgroup than in the other groups (P < 0.001). Rats in the 5-FU + fibrin glue group developed significantly more marked neoagiogenesis than rats in the other groups. Rats in the 5-FU + fibrin glue group also presented significantly more fibroblast activity than those in the 5-FU group. (P = 0.004) CONCLUSIONS: The immediate postoperative, intraperitoneal administration of 5-FU inhibited wound healing. However, when the colonic anastomoses were covered with fibrin glue, the injection of 5-FU had no adverse effects on the healing of the anastomoses.

Full Text:

Not Available

Effects of Tisseel and FloSeal on primary ischemic time in a rat fasciocutaneous free flap model.

Authors: Partsafas AW, Bascom DA, Jorgensen SA, Wax MK

Publication Date: 2004

Abstract:

OBJECTIVES: Free flaps are the technique of choice for reconstruction of defects resulting from extirpation of tumors of the head and neck. Advances in microsurgical technique have resulted in success rates of greater than 95%. Numerous intraoperative factors, ranging from technical issues to topically applied agents, can complicate the outcome of microsurgical free tissue transfer. Synthetic tissue adhesives and hemostatic agents are playing an ever-increasing role in reconstructive surgery. The safety of these factors in free flap surgery has not been ascertained. STUDY DESIGN: Animal Care Committee live rat model. METHODS: Male Sprague-Dawley rats were divided into three groups: group I, Control; group 2, FloSeal; group 3, Tisseel. In each group, a 3 x 6 cm ventral fasciocutaneous groin flap based on the left superficial epigastric artery was elevated and the experimental material applied beneath the flap and around the flap pedicle prior to suturing of the flap back to the wound bed. The experimental materials consisted of 0.2 mL saline in the control group, 0.5 mL FloSeal, and 0.2 mL Tisseel. In phase I of this study, the effect of each treatment on flap survival was assessed by survival at postoperative day 4. In phase II of the study, the effects of these agents on ischemic tolerance was investigated. Five rats in each treatment group were exposed to ischemic times of 6, 8, 10, and 12 hours. Survival of the flap was assessed 7 days after reversal of the ischemia. Probit curves and the critical ischemic time (CIT50) were calculated. RESULTS: All flaps survived the 2-hour period of ischemia and were viable at postoperative day 4. Flap survival from group 1 (Control), group 2 (FloSeal), and group 3 (Tisseel) at the various ischemic times was as follows: at 6 hours, 80%, 80%, and 80%, respectively; at 8 hours, 80%, 80%, 60%; at 10 hours, 60%, 33%, 40%; at 12 hours, 20%, 20%, 0%. The CIT50 for the Control, FloSeal, and Tisseel groups was 9.4, 9.0, and 7.0 hours, respectively.CONCLUSIONS FloSeal, a thrombin-based hemostatic agent, and Tisseel, a fibrin glue, displayed no adverse effect on flap survival in this model.

Full Text:

Not Available

[Local chemotherapy by a sustained-release preparation with fibrin seal against the operative wound in head and neck cancer]. [Japanese]

Authors: Kubota T, Matsui K, Ohtani M, Takasaki S

Publication Date: 1995

Abstract:

Fibrin seal has been used for hemostasis and sealing in operative field of tumors in the head and neck. The authors applied it for drug preparation and tried a local chemotherapy to treat residual and disseminated tumors of cellular level in the operative wound using 5-FU. The drug release rate in this therapy in vitro study was 50% after 24 hrs. When injected to rats bearing Yoshida sarcoma, it exhibited a marked antitumor effect compared to the control group given 5-FU alone. This therapy is easy to make the dosage adjustment and can apply drugs directly to the tumor residue at the high concentration. It will be clinically a useful adjuvant therapy for radiotherapy, surgery or chemotherapy.

Full Text:

Not Available

[Antitumor effect of MMC mixed in Beriplast P]. [Japanese]

Authors: Yano K, Matsuoka H, Baba H, Konoe S, Seo Y, Saito T, Tomoda H

Publication Date: 1995

Abstract:

We attempted to mix an anticancer drug. MMC, with a fibrinogen preparation, Beriplast P (B. P.). First, we examined how MMC was gradually released from its mixture. As the result, its release depended on the MMC concentration in B. P., and the release rate of 1.0 mg MMC from 100 microliters B. P. was 1.6 mg/30 min. Second, we examined the safety of the conjugated drug for normal tissue, because MMC is one of anticancer drugs causing serious damage to normal tissue. When the conjugation of 100 microliters B. P. and below 1.6 mg MMC was coated within one square centimeter, the drug was safe for the endothelium of artery and vein, and the intestinal wall. Third, we attempted an experiment on both the antitumor effect and the role of survival prolongation of the conjugated drug in a mouse carrying a malignant tumor. MMC conjugated with Beriplast P had a highly antitumor effect, which caused necrosis in the cancer cells in unstable conditions. Also, its conjugation drug could inhibit the growth of cancer cells in stable conditions, and prolonged the survival period. From these results, the mixture of MMC and B. P. was found to possess an MMC releasing effect, was safe for normal tissues, and showed high antitumor effect with prolongation of the survival period.

Full Text:

Not Available

Treatment of cystic lesions of soft tissue using fibrin sealant.

Authors: Shigeno Y, Harada I, Katayama S

Publication Date: 1995

Abstract:

A new method was devised for treating 29 patients with cystic lesions of the soft tissue (popliteal cysts, bursitis, and ganglia) by injecting a fibrin sealant into the cyst after the aspiration of the contents. During the followup period (mean, 2.2 years), cysts did not recur in 22 (76%) patients. Of the 7 patients with recurrences, 4 were treated again in the same manner and 3 of these cases have not recurred. Additionally, to investigate the healing process in cysts, fibrin sealant was injected into the space between the abdominal muscle and the peritoneum of rats. Specimens were obtained after the rats

were sacrificed at 1, 2, 4, and 8 weeks after injection, and were examined histopathologically. The fibrin sealant was found to be completely resorbed and replaced with organized granulation tissue. In case of multiple failed aspirations to the cystic lesions, this new method is recommended before surgery.

Full Text:

Not Available

Effect of fibrin sealant on perianastomotic tumor growth in an experimental model of colorectal cancer surgery.

Authors: McGregor JR, Reinbach DH, Dahill SW, O'Dwyer PJ

Publication Date: 1993

Abstract:

Viable intraluminal tumor cells can penetrate a clinically intact rodent colonic anastomosis and give rise to perianastomotic tumor growth. The aim of this study was to determine whether transanastomotic cell migration can be prevented by fibrin-based tissue sealant. Following distal colonic transection and reanastomosis with 5/0 silk sutures, Fischer F344 rats were randomly allocated to three experimental groups. In Group A, a circumferential ring of tissue sealant was placed around the serosal surface of the anastomosis; in Group B, sealant was limited to 50 percent of the anastomotic circumference; and, in Group C, no sealant was applied. All rats then had 10(5) Mtln3 carcinoma cells injected into the proximal colonic lumen via a rectal catheter. The incidence of perianastomotic tumor at 21 days was significantly lower in Group A (3 of 14 animals) than in Group B (11 of 16 rats) (P = 0.012; Fisher's exact test) or Group C (10 of 14 rats; P = 0.011). A further experiment demonstrated that sealant did not protect the anastomosis when tumor cells were instilled directly into the peritoneal cavity. A topical carcinocidal action therefore appears unlikely, but our results suggest that a circumferential anastomotic ring of fibrin sealant forms an effective mechanical barrier preventing intraluminal tumor cells from reaching the peritoneal cavity.

Full Text:

Not Available

[Experimental study on local attachment of Beriplast P membrane including MMC]. [Japanese]

Authors: Takahashi Y, Minami S, Ohta T, Suga T, Fujioka N, Mai M

Publication Date: 1991

Abstract:

We studied the effect of Beriplast P membrane including MMC (2 mg/ml) on human gastric carcinoma implanted in nude mouse (OSS) as a example of a shallow but broad lesion as with an early-stage local recurrence of rectal cancer and superficial gastric cancer. As a result, the resected tumor contact Beriplast P membrane including MMC after 3 days showed continuous necrotic lesions, from 1 to 2 mm in depth. No side effect was observed in nude mice. These results indicated that Beriplast P membrane including MMC is a useful chemotherapy against local cancerous lesion.

Full Text:

Not Available

Hemostatic effectiveness of Fibrin pad after partial nephrectomy in swine.

Authors: Hutchinson RW, Broughton D, Barbolt TA, Poandl T, Muench T, Rockar R, Johnson M, Hart J

Publication Date: 2011

Abstract:

BACKGROUND: Current management of severe surgical or traumatic bleeding is often achieved by manual tamponade or occlusion using devices such as tourniquets or ligatures. There are some clinical scenarios where these options are either marginally effective or impractical. The present study evaluates a new combination device (Fibrin pad) consisting of biologically active components (human thrombin and fibrinogen) delivered to the targeted site by an absorbable synthetic matrix (oxidized regenerated cellulose and polyglactin 910) in a swine severe bleeding model. In this model, severe bleeding can be managed by concurrent use of several currently available treatments, or a more convenient option that offers performance and safety advantages. MATERIALS AND METHODS: Partial nephrectomies were performed on swine and treated with either Fibrin pad (FP) or conventional therapy (CTR)-temporary occlusion of renal artery, electrocautery, SURGIFLO, EVITHROM, SURGICEL NU-KNIT, and PDS II suture). After intraoperative hemostasis was confirmed, the animals were closed and recovered, then survived for 2, 14, or 56 d. RESULTS: Hemostasis was achieved at surgery and maintained in all FP and CTR treated animals. FP was as effective as CTR at establishing durable hemostasis. Treatment with FP did not require temporary occlusion of the renal artery and decreased the total treatment time by half. No animals in either group had complications related to postoperative bleeding at any time during the study. There was no evidence of pulmonary thrombi or evidence of thrombotic complications. No biologically significant adverse local tissue response was present in association with the Fibrin pad at any study interval, and no biologically relevant or consistent changes in blood parameters were identified. CONCLUSIONS: Fibrin pad was as effective as CTR for the primary management of severe bleeding without occlusion of the renal artery and a shorter surgical time. No evidence of a systemic or local adverse response was identified due to exposure to the Fibrin pad.

Full Text:

Not Available

Fibrin sealants in surgical or traumatic hemorrhage. [Review] [28 refs]

Authors: Schexneider KI

Publication Date: 2004

Abstract:

PURPOSE OF REVIEW: Fibrin sealants have been used to control surgical hemorrhage for three decades, and numerous articles have reported their use in a variety of surgical procedures in both animal models and humans. This article reviews the recent literature on fibrin sealants with the specific aim of highlighting the use of fibrin sealants in planned and simulated trauma to provide background for clinicians who may consider using fibrin sealants in specific cases. An overview of the mechanisms of action of fibrin sealants, their indications, and current commercial formulations is also provided. RECENT FINDINGS: Recent studies have evaluated the use of fibrin sealants in vascular surgery, including aortic anastomosis in an animal model, gastrointestinal anastomoses, plastic surgery, urologic procedures including heminephrectomy, and other procedures. SUMMARY: Fibrin sealants continue to be used and evaluated in animal models and surgery. Their use in military settings and in civilian trauma centers, explored for several years, is not reported extensively in the literature. Recent events and the current tempo of military operations dictate that many potential scenarios exist for using fibrin sealants to control traumatic hemorrhage. [References: 28]

Full Text:

Not Available

Comparative study of the hemostatic efficacy of a new human fibrin sealant: is an antifibrinolytic agent necessary?.

Authors: Kheirabadi BS, Pearson R, Tuthill D, Rudnicka K, Holcomb JB, Drohan W, MacPhee MJ

Publication Date: 2002

Abstract:

BACKGROUND: Sustained hemostasis by fibrin sealant (FS) is critically important when it is used in trauma surgery. To purportedly delay fibrin degradation and prevent premature hemostatic failure, some FS products added an antifibrinolytic agent (e.g., bovine aprotinin). The purpose of this study was to compare the overall hemostatic efficacy of a new inhibitor-free FS obtained from the American Red Cross (ARC-FS) to a clinically available aprotinin-containing FS preparation (Tisseel). The need for addition of an antifibrinolytic agent was assessed under normal and high-fibrinolytic conditions. METHODS: The abdominal aortas of anesthetized rabbits were transected and anastomosed, end-to

end, using only four interrupted sutures. The suture line was covered with approximately 2 mL of either type of FS and blood flow was restored. Blood loss was absorbed by gauze and measured. All rabbits were recovered and underwent histologic examination 4 weeks after operation. The efficacy of FS was also tested under a high-fibrinolytic state by treating the rabbits with human recombinant tissue plasminogen activator (0.15 mg/kg, 3-hour infusion). The investigators were blinded to the treatment groups. RESULTS: The majority (11 of 12) of deaths occurred because of bleeding at the suture line within 7 days of surgery. Sustained hemostasis by FS (>1 week) was required for normal tissue healing and long-term survival of animals. Application of ARC-FS to the suture line produced immediate hemostasis in 43% of animals (three of seven), with mean blood loss of 4.8 +/- 1.8 mL, and 86% long-term survival. Tisseel application produced immediate hemostasis in 13% of animals (one of eight), with mean blood loss of 26.9 +/- 7.0 mL ($p < 0.05$ vs. ARC-FS) and survival rate of 37% (three of eight). Under high-fibrinolytic conditions, ARC-FS produced immediate and complete hemostasis in seven of eight animals (88%), whereas the Tisseel demonstrated complete hemostasis in one of seven ($p < 0.01$). The ARC-FS rabbits had a blood loss of 1.9 +/- 1.9 mL and survival rate of 75% (six of eight), whereas the Tisseel animals had a mean blood loss of 30 +/- 6.0 mL and survival rate of 43% (three of seven) ($p < 0.01$). No detrimental effect on healing was noted with either product. CONCLUSION: ARC-FS provides effective and secure hemostasis against high-pressure arterial bleeding under both normal and high-fibrinolytic conditions. Addition of an antifibrinolytic agent such as aprotinin is not required to sustain the hemostatic function of this fibrin sealant.

Full Text:

Not Available

The use of fibrin sealant in urology. [Review] [87 refs]

Authors: Shekarriz B, Stoller ML

Publication Date: 2002

Abstract:

PURPOSE: Fibrin sealant has been increasingly applied in various surgical fields, including urological surgery, in the last 2 decades. We determined the safety and efficacy of fibrin sealant in urological surgery and identified areas that need further clinical investigation. MATERIALS AND METHODS: A MEDLINE search of all available literature regarding the use of fibrin sealant was performed. All articles, including experimental animal studies, prospective and retrospective studies, case series and case reports of fibrin sealant for hemostasis and/or other urological applications, were identified and reviewed. RESULTS: Prospective randomized studies in the field of thoracic and trauma surgery show the efficacy and safety of fibrin sealant for hemostasis. Based on these data fibrin sealant has been used successfully for hemostasis during partial nephrectomy and traumatic renal reconstruction. A number of experimental animal studies, case series and case reports show the efficacy of fibrin sealant for ureteral anastomosis, microsurgical vasal anastomosis, fistula repair, circumcision and orchiopexy as well as it use as an adjunct in other areas of reconstruction. CONCLUSIONS: Fibrin sealant is an effective and safe topical agent for controlling surface bleeding during elective and trauma related urological procedures. Using fibrin sealant as an adhesive for reconstruction requires further prospective studies. The introduction of laparoscopic procedures in urology may expand the indications for fibrin sealant as an alternative method of tissue reapproximation. Limiting the routine use of fibrin sealant to procedures with demonstrable benefits is desirable and would lead to a cost saving approach. [References: 87]

Full Text:

Not Available

Sutureless cartilage graft laryngotracheal reconstruction using fibrin sealant.

Authors: Kang DR, Leong H, Foss R, Martin P, Brooker CR, Seid AB

Publication Date: 1998

Abstract:

OBJECTIVE: To determine whether fibrin sealant can replace suture as a means of holding a cartilage graft securely in the trachea. DESIGN: Randomized blinded control study comparing the use of fibrin sealant vs sutures in laryngotracheal reconstruction in ferrets. We compared results at 7 and 30 days. SUBJECTS: Forty ferrets randomized into 2 groups of 20: fibrin sealant and sutures. Within each group, half were studied at 7 days and the rest at 30 days. No ferrets were withdrawn from study because of adverse effects of the intervention. INTERVENTION: A carved costal cartilage graft was placed in the anterior cricoid split incision, and was secured with either fibrin sealant or sutures. All animals were extubated after recovery from anesthesia. Specimens were examined grossly and histologically. RESULTS: All animals survived until humanely killed. The pathologist, unaware of the groupings, measured lumen expansion in millimeters, cartilage graft migration, mucosal in-growth, degree of inflammation, graft integration, and graft viability. The fibrin sealant group had statistically significant (P<.05) better results in mucosal in-growth. In no categories was the suture group better than the fibrin sealant group. In comparing 7-day with 30-day results, the 30-day group had significantly better results in inflammation and graft viability. CONCLUSIONS: Fibrin sealant can be used in place of sutures with improvement in mucosal growth in costal cartilage laryngotracheal reconstruction in the experimental animal model. Use of fibrin sealant (instead of sutures) may result in less surgical trauma and edema, less surgical time, and faster recovery.

Full Text:

Not Available

Fibrin sealant in laparoscopic adhesion prevention in the rabbit uterine horn model.

Authors: De Iaco P, Costa A, Mazzoleni G, Pasquinelli G, Bassein L, Marabini A

Publication Date: 1994

Abstract:

OBJECTIVE: To assess the effects of fibrin sealant on adhesions after laparoscopic surgery. DESIGN: Standardized surgical trauma was induced in 60 female rabbits. The animals were randomized in three groups for different adhesion prevention treatment. SETTING: University research laboratory. INTERVENTIONS: After standardized trauma was induced, group 1 (n = 20) received no treatment, group 2 animals (n = 20) were injected in the abdominal cavity with 60 mL of Ringer's lactate, and human fibrin sealant was applied on the surgical lesions under laparoscopic vision in group 3 (n = 20). MAIN OUTCOME MEASURES: Five weeks after laparoscopy, a laparotomy was performed, and the adhesions were scored. RESULTS: Fourteen of 20 rabbits in the control group (70%) presented postoperative adhesions, 11 of 20 (55%) in the Ringer's group, and 5 of 20 (25%) in the fibrin sealant group. High-score adhesions were seen in 15% of cases in control and Ringer's group and in 5% of cases in the fibrin sealant group. CONCLUSIONS: When used during laparoscopic surgery, fibrin sealant has a preventive effect on de novo postsurgical adhesions. To assess the efficacy in reproductive surgery, a trial on recurrent postsurgical adhesions is required.

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