Nothing

Maximization of the sealing effect of fibrin glue in aortic surgery

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Publication Date: 2020 Jan;68(1):18-23.

Abstract:

Objectives:Fibrin glue is used to reinforce anastomosis in aortic surgery. There has not yet been a consensus on how it should be applied optimally. This study aimed to define the optimal condition of applying fibrin glue. Methods:In experiment 1, we determined the optimal condition for spraying fibrin glue using an expanded polytetrafluoroethylene graft within a needle hole. The length and area of the fibrin cap within the hole were measured. In experiment 2, methods for applying fibrinogen were assessed by comparing brushing and spraying. In experiment 3, swine aorta segments sutured with a Dacron graft were divided into the following three groups: nothing was applied; fibrinogen was sprayed and rubbed using brush. The aorta was clamped and blood was infused from an occlusion catheter inserted into the graft. The pressure at the first appearance of blood leak was recorded. Results:In experiment 1, among the four groups divided by the pressure and distance of spraying, the fibrin cap area in the group with 0.075 MPa and 2-cm spray distance was significantly larger than that in the group with 0.15 MPa and 2 cm ($P < 0.01$). In experiment 2, the fibrin cap area in the brushing group was significantly larger than that in the spraying group ($P < 0.05$). In experiment 3, the capacity to resist endoluminal pressure was higher in the brushing and combined spraying group compared with that in the sequential combined spraying group ($P < 0.01$). Conclusions:The brush and spray methods showed excellent hemostatic outcomes.

The using of sealants in pancreatic surgery: A Systematic Review

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Abstract:

Background:POPF derives from the pancreatic stump, which follows pancreatic resection and the pancreatoenteric anastomosis following pancreaticoduodenectomy. Since 1978 sealants have been used in pancreatic surgery to prevent pancreatic fistula after resection of the pancreatic head and tail or for the management of trauma and the treatment of low-output pancreatic fistula. Different types of fibrin sealants have been evaluated for their potential to reduce the occurrence of POPF. Methods:A

systematic search of the electronic literature was performed using PubMed, Cochrane Library, and Scopus databases to obtain access to all publications, especially clinical trials, randomised controlled trials, and systematic reviews concerning fibrin sealants pancreatic surgery. Searching for "fibrin sealants pancreas," we found a total of 73 results on Pubmed, 61 on Scopus, and 14 on Cochrane Library (148 total results). Results:Eighteen studies were found on literature, following the criteria already described, concerning the use of fibrin sealants in pancreatic surgery. All articles described were published in the period between 1989 and 2019.Most of these were single centre studies. A total of 1032 patients were enrolled in this review. In the studies, sealants were used to reinforce pancreatic anastomoses and for the occlusion of the main pancreatic duct. Conclusion:CR-POPF is a fearful complication of pancreatic surgery; among the possible solutions to reduce the risk of onset, sealants were used on the pancreatic stump; today the sealants should be considered such as an option to reduce the CR-POPF, but the routine use in clinical practice has to be validated.

Staple Line Reinforcement During Laparoscopic Sleeve Gastrectomy: Absorbable Monofilament, Barbed Suture, Fibrin Glue, or Nothing? Results of a Prospective Randomized Study

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Publication Date: 2016 Feb;20(2):361-6.

Abstract:

Background:Laparoscopic sleeve gastrectomy (LSG) is associated with serious complications, such as staple line (SL) leaks and bleeding. In order to prevent the occurrence of these complications, surgeons have advocated the need to strengthen the staple line. The aim of this randomized controlled study was to compare the efficacy of three different ways of strengthening of the SL in LSG in preventing surgical post-operative complications. Methods:Between April 2012 and December 2014, 600 patients (pts) scheduled for LSG were prospectively randomized into groups without SL reinforcement (group A) or with SL reinforcement including fibrin glue coverage (group B), or oversewn SL with imbricating absorbable (Monocryl™; group C) or barbed (V lock®) running suture (group D). Primary endpoints were post-operative leaks, bleeding, and stenosis, while secondary outcomes consisted of the time to perform the staple line reinforcement (SLR) and total operative time. Results:Mean SLR operative time was lower for group B (3.4 ± 1.3 min) compared with that for groups C (26.8 ± 8.5 min) and D (21.1 ± 8.4 min) ($p < 0.0001$). Mean total operative time was 100.7 ± 16.4 min (group A), 104.4 ± 22.1 min (group B), 126.2 ± 18.9 min (group C), and 124.6 ± 22.8 (group D) ($p < 0.0001$). Post-operative leaks, bleeding, and stenosis were recorded in 14 pts (2.3 %), 5 pts (0.8 %), and 7 pts (1.1 %), respectively, without statistical difference between the groups. Conclusion:Our study suggests that SLR during LSG, with an imbricating or non-imbricating running suture or with fibrin glue, is an unrewarding surgical act with the sole effect of prolonging the operative time.

Application of polyglycolic acid sheets and basic fibroblast growth factor to prevent esophageal stricture after endoscopic submucosal dissection in

pigs

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Publication Date: 2023 Nov;58(11):1094-1104.

Abstract:

Background:Endoscopic submucosal dissection (ESD) has been the first-line treatment for early-stage esophageal cancer. However, it often causes postoperative stricture in cases requiring wide dissection. Basic fibroblast growth factor (bFGF) reportedly has anti-scarring effects during cutaneous wound healing. We hypothesized that suppressing myofibroblast activation will prevent stricture after esophageal ESD. Methods:We resected a complete porcine esophagus circumference section by ESD. To investigate the preventive effect of bFGF on esophageal stricture formation after ESD, we endoscopically applied bFGF-soaked poly-glycolic acid (PGA) sheets onto the wound bed after ESD and fixed them by spraying fibrin glue (PGA + bFGF group), PGA sheets alone onto the wound bed and fixed them by spraying fibrin glue (PGA group), or nothing (control group). After removing the esophagus on day 22, we evaluated the mucosal constriction rate. Results:Compared with those in the control group, esophageal stricture was significantly reduced in the PGA + bFGF group, and the areas stained with α-SMA and calponin-1 antibodies were significantly inhibited in the PGA + bFGF and PGA groups. The thickness of the fibrous layer in the PGA + bFGF group was uniform compared to that of the other groups. Thus, PGA + bFGF inhibited the development of unregulated fibroblasts in the acute phase, leading to uniform wound healing. Conclusions:Stenosis after esophageal ESD is related to fibrosis in the acute phase. Administration of PGA and bFGF suppresses myofibroblast activation in the acute phase, thereby preventing esophageal constriction in pigs.

Study of a novel three-dimensional scaffold to repair bone defect in rabbit

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Publication Date: 2014 May;102(5):1294-304.

Abstract:

Both decalcified bone matrix (DBM) and fibrin gel possess good biocompatibility, so they are used as scaffolds to culture bone marrow mesenchymal stem cells (BMSCs). The feasibility and efficacy of using compound material being made of decalcified bone matrix and fibrin gel as a three-dimensional scaffold for bone growth were investigated. BMSCs were isolated from the femur of rabbit, then seeded in prepared scaffolds after incubation for 28 days in vitro. In vivo: 30 New Zealand White Rabbits received bone defect in left radius and divided three treatment groups randomly: (1) BMSCs/decalcified bone matrix/fibrin glue as experimental group; (2) decalcified bone matrix/fibrin glue without cells as control group; (3) nothing was implanted into the bone defects as blank group. The observation period

of specimens was 12 weeks, and were analyzed bone formation in terms of serum proteomics (2D-PAGE and MALDI-TOF-TOF-MS), hematoxylin-eosin (HE) staining, ALP staining, and Osteopontin immunofluorescence detection. The experimental group present in three peculiar kinds of proteins, whose Geninfo identifier (GI) number were 136466, 126722803, and 126723746, respectively, correspond to TTR protein, ALB protein, RBP4 protein, and the histological inspections were superior to the other group. The content of osteopontin in experimental group was significantly higher than control group ($p < 0.05$). The overall results indicated that a combined material being made of BMSCs/decalcified bone matrix/fibrin glue can result in successful bone formation and decalcified bone matrix/fibrin glue admixtures can be used as a scaffold for bone tissue engineering.

Conjunctival and Limbal Conjunctival Autograft vs. Amniotic Membrane Graft in Primary Pterygium Surgery: A 30-Year Comprehensive Review

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Publication Date: 2023 Jun;12(3):1501-1517.

Abstract:

Introduction:The purpose of this study is to compare the "real-life" effectiveness of amniotic membrane graft (AMG) and conjunctival (CAT) or limbal conjunctival (LCA) autograft in the management of primary pterygium. Methods:Human-based studies on primary pterygium surgery that were published between 1993 and 2022 with at least 3 months of follow-up were identified, and only those that were retrospective were included. The global recurrence rate of pterygium was assessed for each surgical technique separately. Specific recurrence rates taking into consideration the fixation technique (glue versus sutures) were also measured. Results:35 real-life retrospective subgroups comprising a total of 3747 eyes were included in the final review. The mean global recurrence rates for CAT, LCA and AMG were 7.61%, 5.50% and 9.0%, respectively. Recurrences were less common for patients who received fibrin glue (5.92%, 2.56% and 3.60%) than for those who received sutures (8.99%, 6.03% and 23.0%) for the three groups, respectively. Surgical techniques combining CAT or LCA with AMG yielded an even lower global recurrence rate (1.83%). Conclusion:AMG seems like a reasonable option that could be considered in primary pterygium surgery, especially when glued to the underlying sclera. Combining AMG with other treatment modalities such as CAT or LCA seems to offer an interesting alternative in terms of recurrence.

Use of fibrin glue in preventing pseudorecurrence after laparoscopic total extraperitoneal repair of large indirect inguinal hernia

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Publication Date: 2016 Sep;91(3):127-32.

Abstract:

Purpose:Seroma is among the most common complications of laparoscopic total extraperitoneal (TEP) for especially large indirect inguinal hernia, and may be regarded as a recurrence by some patients. A potential area localized behind the mesh and extending from the inguinal cord into the scrotum may be one of the major etiological factors of this complication. Our aim is to describe a novel technique in preventing pseudorecurrence by using fibrin sealant to close that potential dead space. Methods:Forty male patients who underwent laparoscopic TEP for indirect inguinal hernia with at least 100-mL volume were included in this prospective clinical study. While fibrin sealant was used to close the potential dead space in the study group, nothing was used in the control group. The volume of postoperative fluid collection on ultrasound was compared between the groups. Results:Patient characteristics and the volumes of hernia sac were similar between the 2 groups. The mean volume of postoperative fluid collection was found as 120.2 mL in the control group and 53.7 mL in the study group, indicating a statistical significance ($P < 0.001$). Conclusion:Minimizing the potential dead space with a fibrin sealant can reduce the amount of postoperative fluid collection, namely the incidence of pseudorecurrence.

Adhesive epicardial corticosteroids prevent postoperative atrial fibrillation

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Publication Date: 2010 Oct;3(5):505-10.

Abstract:

Background:Postoperative atrial fibrillation remains a common cause of morbidity. Although epicardial drug delivery can increase efficacy and reduce side effects, it is impractical for postoperative atrial fibrillation because pericardial bleeding/effusion and drainage cause rapid drug elimination. Fibrin glue sprayed on the epicardium is vigorously adherent, allowing an admixed drug to remain in contact with the heart. The purpose of the present study was to evaluate a novel corticosteroid-fibrin glue mixture applied to the atrial epicardium at the time of surgery for prevention of postoperative atrial tachyarrhythmias. Methods and results:Talc was instilled into the pericardium in 15 dogs to simulate postoperative inflammation. Pacemakers were implanted to monitor arrhythmias. A mixture of triamcinolone and fibrin glue (Tisseel) was sprayed onto the atria of the treatment animals (n=9), whereas control animals (n=6) received Tisseel or nothing. After 1 week, pacemaker interrogation quantified postoperative atrial tachyarrhythmias (atrial rate >200 bpm) burden. Excised hearts underwent histological examination and tensile strength testing. postoperative atrial tachyarrhythmias occurred in 100% of control animals but only 33% of treatment animals (P=0.027). The median time (25th percentile, 75th percentile) in tachycardia was 5.5 hours (2.7, 12.6) per day in the control group, compared with 0 hours (0, 0.2) in the treatment group (P=0.001). Severe inflammation was present in 6 of 6 control animals and 1 of 9 treatment animals (P=0.001). The tensile strength of a healing left atriotomy was not significantly different between groups. Steroid levels at the time the animals were killed were very low (median of 0.22 μg/dL [0.18, 0.23]). Conclusions:A mixture of triamcinolone and fibrin glue sprayed onto the atria reduced postoperative atrial tachyarrhythmias and reduced inflammatory cell infiltration. There was no change in the tensile strength of a healing atriotomy and plasma steroid levels were low. Clinical trials of this approach are warranted.

Subacromial bursa increases the failure force in a mouse model of supraspinatus detachment and repair

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Abstract:

Background:It has been shown that subacromial bursa (SAB) harbors connective tissue progenitor cells. The purpose of this study was to evaluate the effects of implantation of SAB-derived cells (SBCs) suspended in a fibrin sealant bead and implantation of SAB tissue at rotator cuff repair site on biomechanical properties of the repair in a mouse (C57Bl/6) model of supraspinatus tendon (ST) detachment and repair. Methods:Part 1: Murine SAB tissue was harvested and cultured. Viability of SBCs suspended in 10 μL of fibrin sealant beads was confirmed in vitro and in vivo. Eighty mice underwent right ST detachment and repair augmented with either fibrin sealant bead (control group) or fibrin sealant bead with 100,000 SBCs (study group) applied at the repair site. Part 2: 120 mice underwent right ST detachment and repair and were randomized equally into 4 groups: (1) a tissue group, which received a piece of freshly harvested SAB tissue; (2) a cell group, which received SBCs suspended in fibrin sealant bead; (3) a fibrin sealant group, which received plain fibrin sealant bead without cells; and (4) a control group, which received nothing at the ST repair site. An equal number of mice in each group were killed at 2 and 4 weeks. Specimens underwent biomechanical testing to evaluate failure force (part 1 and 2) and histologic analysis of the repair site (part 1 only). Results:Part 1: The mean failure force in the study group was significantly higher than controls at 2 and 4 weeks (3.25 ± 1.03 N vs. 2.43 ± 0.56 N, P = .01, and 4.08 ± 0.99 N vs. 3.02 ± 0.8 N, P = .004, respectively). Mean cell density of the ST at the repair site was significantly lower in the study group at 2 weeks than in controls (18,292.13 ± 1706.41 vs. 29,501.90 ± 3627.49, P = .001). Study group specimens had lower proteoglycan contents than controls, but this difference was not statistically significant. Part 2: There was no difference in failure force between cell and tissue groups at the 2- and 4-week time points (P = .994 and P = .603, respectively). There was no difference in failure force between fibrin sealant bead and control groups at the 2- and 4-week time points (P = .978 and P = .752, respectively). Conclusion:This study shows that the application of SBCs and SAB tissue at the rotator cuff repair site increases the strength of repair in a murine model of rotator cuff detachment and repair.

Novel endoscopic papillectomy for reducing postoperative adverse events (with videos)

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Publication Date: 2020 Oct 28

Abstract:

Background:Pancreatic adenoma can potentially transform into adenocarcinoma, so it is recommended to be resected surgically or endoscopically. Endoscopic papillectomy is one of the main treatments for papillary adenoma, and bleeding, perforation, and pancreatitis are the most frequent and critical adverse events that restrict its wider use. There is no standard procedure for endoscopic papillectomy yet. The procedure is relevant to postoperative adverse events. Aim:To reduce the postoperative adverse event rates and improve patients' postoperative condition, we developed a standard novel procedure for endoscopic papillectomy. Methods:The novel endoscopic papillectomy had two main modifications based on the conventional method: The isolation of bile from pancreatic juice with a bile duct stent and wound surface protection with metal clips and fibrin glue. We performed a single-center retrospective comparison study on the novel and conventional methods to examine the feasibility of the novel method for reducing postoperative adverse events. Results:A total of 76 patients, of whom 23 underwent the novel procedure and 53 underwent the conventional procedure, were retrospectively evaluated in this study. The postoperative bleeding and pancreatitis rates of the novel method were significantly lower than those of the conventional method (0vs20.75%,P= 0.028, and 17.4%vs41.5%,P= 0.042, respectively). After applying the novel method, the most critical adverse event, perforation, was entirely prevented, compared to a prevalence of 5.66% with the conventional method. Several postoperative symptoms, including fever, rapid pulse, and decrease in hemoglobin level, were significantly less frequent in the novel group (P= 0.042, 0.049, and 0.014, respectively). Overall, the total adverse event rate of the novel method was lower (0vs24.5%,P= 0.007) than that of the conventional method. Conclusion:Patients who underwent the novel procedure had lower postoperative adverse event rates. This study demonstrates the potential efficacy and safety of the novel endoscopic papillectomy in reducing postoperative adverse events.