Immunosorbent

Aprotinin in fibrin tissue adhesives induces specific antibody response and increases antibody response of high-dose intravenous application.

Authors: Scheule AM, Beierlein W, Wendel HP, Jurmann MJ, Eckstein FS, Ziemer G

Publication Date: 1999

Abstract:

BACKGROUND: In cardiac operations, aprotinin therapy is used either locally as a component of commercially available fibrin tissue adhesives, intravenously, or combined. Our aim was to examine the formation of aprotinin-specific antibodies with regard to the application mode. METHODS: Sera of 150 patients who had undergone cardiac operations and were receiving aprotinin therapy for the first time were sampled before the operation and at medians of 3.5 and 13.3 months after the operation. Aprotinin-specific IgG including all subgroups and aprotinin-specific IgE were analyzed. Aprotinin was given locally (as contained in fibrin sealant; n = 45; median dose, 6000 KIU), intravenously (n = 46; 2.000 x 10(6) KIU), and combined (n = 59; 2.012 x 10(6) KIU). RESULTS: At 3.5 months, the prevalence of aprotinin-specific IgG antibodies was 33% (15/45 patients) after local, 28% (13/46 patients) after intravenous, and 69% (41/59 patients) after combined exposure (P =.0001). At 13.3 months, the prevalence of aprotinin-specific IgG antibodies was 10% (4/41 patients) after local, 31% (13/42 patients) after intravenous, and 49% (28/57 patients) after combined exposure. Total aprotinin dose was similar in patients who were antibody positive and negative. Before the operation, no aprotinin-specific antibodies were detected. Aprotinin-specific IgE were not found after the operation. CONCLUSION: Local aprotinin contact induces a specific immune response and reinforces that of intravenous exposure. The antibody spectrum is identical to the immune response induced by intravenous exposure. Any exposure should be documented. For use in cardiac operations as a hemostyptic, the necessity itself and alternatives for aprotinin as a stabilizing agent merit consideration.

Fibrin sealant, aprotinin, and immune response in children undergoing operations for congenital heart disease.

Authors: Scheule AM, Beierlein W, Wendel HP, Eckstein FS, Heinemann MK, Ziemer G

Publication Date: 1998

Abstract:

OBJECTIVE: Most commercially available fibrin sealants contain aprotinin in doses of 1500 kallikrein inactivator units per milliliter. They are used in many operative disciplines. An elevated risk of hypersensitivity reactions exists at reexposure to aprotinin. Our aim was to examine the immunogenic

potency of aprotinin as a fibrin sealant content. METHODS: We investigated 49 children with operatively treated congenital heart disease. All patients received aprotinin only topically as contained in fibrin sealant. Serum samples were drawn preoperatively, 1 week, 2 weeks, 6 weeks, and approximately 1 year after operation. They were analyzed for aprotinin-specific immunoglobulin G antibodies with a standard enzyme-linked immunosorbent assay and a fluorescence enzyme immunoassay for aprotinin-specific immunoglobulin E antibodies. RESULTS: At 1 week, 2 weeks, 6 weeks, and 1 year, we found prevalences of 8% (2 of 26), 8% (2 of 24), 6% (3 of 49), and 0% for aprotinin-specific Immunoglobulin E, and for aprotinin-specific immunoglobulin G 8% (2 of 26), 17% (4 of 24), 39% (19 of 49), and 12% (5 of 41). The doses of aprotinin given did not differ significantly in antibody-negative and antibody-positive patients; no significant factors could predict the immune response. CONCLUSIONS: Our findings show the existence of a subgroup of patients who had aprotinin-specific antibodies develop after topical aprotinin application. Any use of aprotinin must be carefully documented. If aprotinin use is planned in patients who previously underwent a surgical procedure, preexposure to aprotinin in any form must be sought to avoid unexpected anaphylactic reactions. The necessity itself and alternatives for aprotinin as a stabilizing agent in fibrin sealants merit consideration.

Immunization by bovine thrombin used with fibrin glue during cardiovascular operations. Development of thrombin and factor V inhibitors.

Authors: Berruyer M, Amiral J, Ffrench P, Belleville J, Bastien O, Clerc J, Kassir A, Estanove S, Dechavanne M

Publication Date: 1993

Abstract:

Brief case histories of three patients aged 58, 38, and 44 years are reported. All underwent cardiovascular operations. Subsequently hemostasis test abnormalities developed between the seventh and eighth postoperative days after exposure to bovine thrombin used with fibrin glue. These were characterized by an increased activated partial thromboplastin time (64 to 147 seconds), prothrombin time (19 to 24 seconds), bovine thrombin time (> 120 seconds) and a markedly reduced factor V level (< 10% in two patients and 16% in the third patient). A patient plasma dilution of 1 in 200 with a normal plasma pool was necessary to correct bovine thrombin time. No fast-acting or progressive inhibitor against factor V could be detected by coagulation tests, and fresh frozen plasma perfusion had no effect. Plasmapheresis was performed preventatively to avoid bleeding, and factor V levels stabilized at around 50% after two to four exchanges. Immunologic studies showed that the inhibitors were directed not only against bovine factors but also against human ones. Therefore factor V decrease could have been the result of rapid clearance from the circulation of complexes formed with a nonneutralizing inhibitor that is not detected by clotting tests. These antibodies were purified by standard methods and immunoaffinity. Fast immunization could be explained by a prior sensitization to bovine thrombin exposure during previous operations. It is suggested that bovine thrombin used with fibrin glue contains small amounts of factor V and may be responsible for these abnormalities. This is in agreement with previous literature reports. However, these described neutralizing factor V inhibitors, which were easily detected.

Controlling bone morphogenetic protein diffusion and bone morphogenetic protein-stimulated bone growth using fibrin glue.

Authors: Patel V.V., Zhao L., Wong P., Kanim L., Bae H.W., Pradhan B.B., Delamarter R.B.

Publication Date: 2006

Abstract:

Study Design. An in vitro and in vivo study. Objective. To evaluate the ability of fibrin glue to limit diffusion of recombinant human bone morphogenetic protein (rhBMP)-2 and its ability to protect spinal nerves from rhBMP-2 stimulated bone growth. Summary of Background Data. Studies have shown bone morphogenetic protein (rhBMP-2) stimulated bone growth can encroach on the spinal canal and nerves, causing neural compression. More recently, rhBMP-2 use in the cervical spine has been associated with life-threatening swelling. Fibrin glue has been used as a biologic carrier but has not been evaluated for its ability to limit rhBMP-2. Methods. In phase 1 of the study, rhBMP-2 soaked absorbable collagen sponges (ACS) were encapsulated in fibrin glue and immediately incubated in physiologic lactated ringers solution at 38deg;C. Samples of solution were tested for rhBMP-2 concentration. In phase 2 of the study, rats were surgically treated with laminectomy and placement of rhBMP-2/ACS versus laminectomy and placement of fibrin glue before placement of rhBMP-2/ACS. After 8 weeks, animals were euthanized and imaged using micro-computerized tomography. Results. The diffusion study showed a significant limitation in rhBMP-2 diffusion when encapsulated in fibrin glue. The laminectomy study revealed blockage of bone formation by fibrin glue and protection of the spinal canal. Conclusions. Fibrin glue can limit the diffusion of rhBMP-2, and, thus, it can be used to help protect the spinal canal and nerve roots from rhBMP-2 stimulated bone growth. ©2006, Lippincott Williams & Wilkins, Inc.

Comparison of fibrin glue and vicryl sutures in conjunctival autografting for pterygium surgery.

Authors: Wang X., Zhang Y., Zhou L., Wei R., Dong L.

Publication Date: 2017

Abstract:

Purpose: To compare clinical parameters and the tear levels of inflammatory cytokines between pterygium surgery using sutures or fibrin glue. Methods: Fifty-six patients with primary pterygium were divided into the suture group and the glue group, in which the autograft was secured with 10-0 Vicryl sutures and fibrin glue, respectively. A questionnaire, slit-lamp examination, Schirmer test, and visual acuity test were performed in all participants. Real-time quantitative PCR (q-PCR) was used to analyze the expression of genes in pterygium and healthy conjunctival tissues. Based on the qPCR results and literature reports, five inflammatory cytokines, including hepatocyte growth factor (HGF), fibroblast growth factor 2 (FGF2), transforming growth factor-beta1 (TGF-beta1), matrix metalloproteinase 2 (MMP2), and tumor necrosis factor-alpha (TNF-alpha), were selected, and their protein levels were

measured with enzyme-linked immunosorbent assay (ELISA) in patient tears before surgery as well as at postoperative day 1, 7, and 30. Results: There are 28 patients in either the suture or the glue group. The average duration of surgery was 20.17 +/- 3.23 min for the glue group and 32.42 +/- 4.47 min for the suture group (p = 0.000). Visual acuity in both groups was improved (p = 0.002) after the surgical procedures. There were more symptoms in the suture group than in the glue group at postoperative day 7 (p = 0.002). Postoperative symptoms disappeared in both groups at 1 month after surgery. Recurrence was observed in one case in the glue group and in two cases in the suture group at the 6 month postoperative follow-up (p = 0.714). In comparison to the preoperative levels (4.33 +/- 0.43 ng/ml for the suture group; 4.20 +/- 0.26 ng/ml for the glue group), the levels of TNF-alpha in tears increased in the suture group (5.02 +/- 0.49 ng/ml, p = 0.016) and decreased in the glue group (3.84 +/- 0.35 ng/ml, p = 0.052) on postoperative day 1. The glue treatment induced higher HGF production (4.78 +/- 1.25 ng/ml) than the suture treatment (3.04 +/- 1.18 ng/ml) at postoperative day 1 (p = 0.020). Higher levels of TGF-beta1 in the glue group were detected at postoperative day 1 (3.71 +/- 0.18 ng/ml) and postoperative day 30 (4.50 +/- 0.51 ng/ml), compared to those in the suture group, respectively (2.74 +/- 0.21 ng/ml, p = 0.000 for day 1; 3.36 +/- 0.96 ng/ml, p = 0.017 for postoperative day 30).Conclusions: Fibrin glue is effective and safe for attaching conjunctival autografts with an easy surgical procedure, shortened operating time, and less postoperative discomfort. In the early postoperative period, the protein expression of inflammatory cytokines implicates that fibrin glue may induce accelerated healing and subdued inflammation on the ocular surface compared to sutures.

Circulating cytokines in patients undergoing tonsillectomy with fibrin glue.

Authors: Stiller-Timor L., Goldbart A.D., Segal N., Amash A., Huleihel M., Leiberman A., Tal A., Holcberg G., Puterman M.

Publication Date: None

Abstract:

Objective: Fibrin glue is used as a haemostatic agent or as a sealant. The aim of this study is to objectively evaluate the efficacy of the use of fibrin glue Quixil - a human surgical sealer - in tonsillectomy, for the reduction of post-operative inflammatory response. Study design: A prospective randomized single-blind study. Methods: The study was performed on 40 consecutive patients undergoing adenotonsillectomy (T&A;). Patients were randomly assigned to one of two sub-groups: a study group and a control group. The tonsillar beds of patients in the study group were coated with fibrin glue (Quixil, OMRIX biopharmaceuticals) at the end of the operation; the patients in the control group were treated for hemostasis without the use of fibrin glue. Complete blood counts and circulating pro-inflammatory cytokines (assayed by specific immunoassay - ELISA) were assessed in samples drawn pre- and 16 h post-tonsillectomy. Results: Forty patients (aged 5.8 +/- 2.4 years) were consecutively enrolled; 45% (18) of the patients were treated with fibrin glue, 55% (22) were not. Compared to controls, Quixil-treated patients demonstrated a reduction in post-tonsillectomy circulating leukocytes (29.2% vs. 45.4%, p < 0.05), neutrophiles (28.3% vs. 42.1%, p < 0.05), IL-6 (+1% vs. +42%, p < 0.05), and TNF-alpha (+8% vs. +26%, p < 0.05. Conclusions: Intra-operative fibrin glue therapy is associated with decreased immediate inflammatory response following T&A.; Further studies are warranted to assess long-term outcome. Level of evidence: 1B.

Effect on interleukin-1beta and interleukin-8 levels following use of fibrin sealant for periodontal surgery.

Authors: Pulikkotil S.J., Nath S.

Publication Date: 2014

Abstract:

Background: Fibrin sealant (FS) is a biologically derived tissue adhesive for securing flaps. The aim of the present randomized controlled clinical trial was to compare early wound healing by assessing interleukin-1beta (IL-1beta) and interleukin-8 (IL-8) levels from gingival crevicular fluid (GCF) after using FS and suture for periodontal flap closure. Methods: Thirty selected quadrants in 15 periodontitis patients were randomly assigned to either a test (fibrining) or control group (suturing) for flap closure. IL-1beta and IL-8 were assessed in GCF using enzyme-linked immunosorbent assay (ELISA) before and eight days after surgery. Patients were recalled at 7, 14, 21 days and 3 months after surgery for clinical assessment. Results: There was a statistically significant decrease in IL-1beta (84.82 +/- 77.18, 29.2 +/- 21.97 pg/mul) and IL-8 (57.94 +/- 55.47, 21.82 +/- 21.93 pg/mul) levels in the test side after fibrining while there was an increase in the control side (IL-1beta 31.40 +/- 16.82, 128.8 +/- 45.14; IL-8 31.40 +/- 16.82, 128.83 +/- 45.14 pg/mul) ($p < 0.05$). The change in concentration of IL-1beta and IL-8 following intervention correlated significantly in both the sites. Clinical parameters differed significantly only on the seventh day with less plaque and bleeding on the test sites. Conclusions: Fibrin sealant enhances early wound healing by reducing inflammation after periodontal flap surgery. © 2014 Australian Dental Association.

Pro-osteogenic effects of fibrin glue in treatment of avascular necrosis of the femoral head in vivo by hepatocyte growth factor-transgenic mesenchymal stem cells.

Authors: Wen Q, Zhou C, Luo W, Zhou M, Ma L

Publication Date: 2014

Abstract:

BACKGROUND: Autologous transplantation of modified mesenchymal stem cells (MSCs) is a promising candidate for the treatment of the refractory clinical disease, avascular necrosis of the femoral head (ANFH). Our previous attempts by compounding MSCs with medical fibrin glue to treat ANFH in animal model have achieved excellent effects. However, the underlying molecular mechanism is unclear, especially on the transgenic gene expression. METHODS: Rabbit MSCs were isolated and compounded with fibrin glue. Following degrading of fibrin glue, proliferation, viability, expression of transgenic hepatocyte growth factor gene as well as osteogenic differentiation of MSCs were evaluated together with that of uncompounded MSCs. Fibrin glue-compounded MSCs were transplanted into the

lesion of ANFH model, and the therapeutic efficacy was compared with uncompounded MSCs. One-Way ANOVA was used to determine the statistical significance among treatment groups. RESULTS: Fibrin glue compounding will not affect molecular activities of MSCs, including hepatocyte growth factor (HGF) secretion, cell proliferation and viability, and osteogenic differentiation in vitro. When applying fibrin glue-compounded MSCs for the therapy of ANFH in vivo, fibrin glue functioned as a drug delivery system and provided a sustaining microenvironment for MSCs which helped the relatively long-term secretion of HGF in the femoral head lesion and resulted in improved therapeutic efficacy when compared with uncompounded MSCs as indicated by hematoxylin-eosin staining and immunohistochemistry of osteocalcin, CD105 and HGF. CONCLUSION: Transplantation of fibrin glue-compounding MSCs is a promising novel method for ANFH therapy.

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