Proteases in human pancreatic juice degrade both liquid and carrier-bound fibrin sealants in vitro.

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Abstract:

Background: Fibrin sealants are used in a variety of surgical procedures mainly to control bleeding and to reinforce suture lines. Furthermore, these products are frequently applied to enhance tissue sealing for purposes other than induction of hemostasis in procedures including liver, lung, and pancreatic surgery. We have previously shown that fibrin sealants are unstable in the presence of human bile, and this observation may explain the lack of efficacy of fibrin sealants to avoid bile leak-related complications following liver surgery. Fibrin sealants have been used in pancreatic surgery for almost 35 years with the main aim of preventing fistula formation as a consequence of leakage of pancreatic juice. However, the clinical efficacy of this approach is still unclear. Aims: Here we investigated the stability of commercially available liquid and carrier-bound fibrin sealants in the presence of pancreatic fluid using in vitro experimentation. Methods: Fibrin clots were generated in vitro from two commercially available liquid fibrin sealants and exposed to saline or human pancreatic fluid. Degradation of clots was assessed by weighing clots or by examination of release of fibrin degradation products. Also, pancreatic fluid was exposed to the carrier-bound fibrin sealant Tachosil, and stability of the sealant was assessed qualitatively and quantitatively by measuring fibrin- and collagen degradation products. Results: Clots generated from liquid fibrin sealants degrade rapidly in pancreatic fluid, but not in normal saline, as evidenced by a rapid reduction in clot weight and release of fibrin degradation products. Exposure of Tachosil to pancreatic fluid results in rapid degradation of both the fibrin and collagen part of the sealant, as evidenced by release of fibrin- and collagen degradation products and a visual inspection of sealant integrity. Protease

inhibitor cocktails or individual serine protease inhibitors reduce breakdown of both liquid sealants and Tachosil, and a collagenase inhibitor reduces breakdown of Tachosil. Conclusions: Proteases present in pancreatic juice effectively degrade both liquid and carrier-bound fibrin sealants in vitro. These results may imply that the use of these products in pancreatic surgery with the aim to prevent fistula formation as a result of leakage of pancreatic fluid may serve limited purpose.