Fibrin sealant treatment of splenic injuries during oesophagectomy

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Abstract

The incidence of 'accidental' splenectomy during oesophagectomy varies from 4 to 42% and leads to an increase in sepsis, anastomotic leakage and mortality. Therefore, preservation of the spleen should be the aim of treatment whenever splenic injury occurs. We describe the use of fibrin glue delivered as a thin film by a spray applicator for rapid and definitive haemostasis of grades 1 and 2 splenic injuries in patients undergoing oesophagectomy.

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1. Introduction

Splenectomy due to accidental operative trauma, caused by excessive traction on the splenic ligaments or misplacement of retractors, accounts for 10-26% of all splenectomies [1]. The incidence of 'accidental' splenectomy due to operative trauma during oesophagectomy varies greatly from 4 to 42% in published series [2-4]. The role of the spleen in modulating immune function is well recognised and the addition of splenectomy to oesophagectomy greatly increases the risk of pneumonia, sepsis, anastomotic leakage and mortality (35.7 vs 8.1%) [3]. Preservation of the spleen is therefore of paramount importance and an attempt at local control should be the first step. Conservative measures such as compression, fulguration, suture, oxidised cellulose or absorbable gelatin sponges are often unsuccessful. We describe the use of fibrin glue for rapid and definitive haemostasis of grades 1 and 2 (Organ Injury Scale Committee, 1989) splenic injuries sustained during oesophagectomy.

2. Technique

Of 50 patients who underwent Ivor Lewis gastro-oesophagectomy at our institution over the last 18 months, 10 (20%) inadvertently experienced grade 1 or 2 splenic injury during mobilisation of the gastric fundus and ligation of the short gastric arteries. All injuries were recognised at the time they occurred and temporary haemostasis was achieved with fibrillar cellulose and compression until mobilisation of the fundus was completed. In all cases, the fibrin sealant (Tisseel, Baxter Healthcare Corp., Deerfield, IL 60015, USA) was reconstituted and warmed in accordance with the manufacturer's guidelines and applied to the splenic laceration with a double-barrelled syringe with a spray applicator from a distance of about 15 cm to create a thin fibrin film (Fig. 1). Rapid haemostasis was achieved in all cases with no recurrent bleeding.

3. Discussion

Fibrin sealant, also called fibrin glue or fibrin tissue adhesive, is a biological haemostatic agent that coagulates and seals upon application and includes a range of products designed to simulate the final stage of the coagulation cascade. The fibrinogen and thrombin components, which are packaged separately, form loosely packed fibrin monomers when mixed together in equal quantities which then polymerise under the influence of factor XIII and calcium chloride to form stable fibrin protofibrils. Through a process of side-to-side aggregation, these protofibrils form enmeshed fibrin filaments of sufficient strength to bridge the defect between wound edges. Aprotinin, a bovine serine protease and kallikrein inhibitor, is also added and increases the resistance to fibrinolysis and promotes clot longevity [5]. To prevent premature activation, the fibrinogen and thrombin elements are separated in a double-barrelled syringe that can be connected to a pressurised gas source (air or nitrogen at 1.5-2 bar). The gas flow dries the surface to which the glue is to be applied and atomises/mixes the 2 components allowing a thin fibrin film to be sprayed on to a large surface area. Fibrin glue can also be delivered as a broad stream or injected into the parenchyma of solid organs.
Fibrin glue has been successfully used in patients with acquired and congenital bleeding disorders, and in procedures with a high risk of operative bleeding. It has also been used for blunt and penetrating abdominal trauma with a reported 86% splenic salvage rate, compared with 50% in historic controls [6,7], and in urological work during open and laparoscopic partial nephrectomy [5]. However, its use has not been previously reported during elective oesophagectomy and it would be expected to decrease the need for splenectomy and blood transfusion.

In summary, topical application of fibrin sealant can rapidly achieve definitive haemostasis of grades 1 and 2 splenic injuries in patients undergoing oesophagectomy. The advantages of avoiding splenectomy in this group of patients are so great that it is important all oesophageal surgeons are aware of its use.

References


Fig. 1. Grade 1 splenic injury (arrowed) before (A) and after (B) application of fibrin glue.