A HAEMOSTATIC AGENT DELIVERY SYSTEM FOR ENDOSCOPIC NEUROSURGICAL PROCEDURES.

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The system has been used successfully in endoscopic base of skull surgery and endoscopic surgery within the parenchyma of the brain using tube systems.

Note: The following files were submitted by the author for peer review, but cannot be converted to PDF. You must view these files (e.g. movies) online.

Video 1 Taming Sari Aug2011 Bench low def.wmv
Video 2 Taming Sari pub ver- Surgicell and Fibrillar endo TSS.wmv
TECHNICAL NOTE A HAEMOSTATIC AGENT DELIVERY SYSTEM FOR ENDOSCOPIC NEUROSURGICAL PROCEDURES.

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Abstract
The advent of endoscopic neurosurgery has presented problems with haemostasis due to poor access. We have developed a system which allows the delivery of a variety of haemostatic agents in a more efficacious manner.

The system has been used successfully in endoscopic base of skull surgery and endoscopic surgery within the parenchyma of the brain using tube systems.

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**Introduction**

The rapid expansion of endoscopic procedures for base of skull [1] and intraparenchymal lesions using tube techniques [2,3,4,5,6,7, 9-18] presents surgeons with problems with haemostasis. Conventional bipolar forceps are restricted in their use by poor access for delivery of haemostatic materials such as Surgicel®, Fibrillar® (Johnson & Johnson), Avitene® (Bard) and FloSeal® (Baxter) and are often clumsy and difficult to use [8].

We have designed a system that allows the accurate delivery of a variety of haemostatic agents which keeps it in contact with the bleeding source without the haemostatic agent being washed away by the rapid flow of blood.

**Method**
This system consists of two tubes, an internal tube that is connected to suction and a second external tube that has a larger diameter [fig 1]. Outside the surgical field the internal tube is introduced into the proximal end of the external tube while pushing a neurosurgical pattie into the external tube until the pattie is about 1cm from the distal end of the external tube [fig 2a&b]. Finally any conventionally utilised haemostatic agent like Surgicel®, Fibrillar® or Avitene® is inserted or injected into the distal end of the external tube. The system is now primed and ready for use [fig 3]. Once within the operative field and to control bleeding, the inner tube is pushed forward like a piston driving the haemostatic agent and the backing pattie out thereby compressing the haemostatic agent over the bleeding area. [fig 4a&b] [video 1].

When the system is introduced into the operative field, suction across the pattie ensures that blood will be sucked into the external tube past the haemostatic agent (allowing the blood to mix and activate the haemostatic agent) and pattie. The external tube also protects the haemostatic agent and prevents it from being washed away if haemorrhaging is brisk.

Results

We tested this system in a variety of cases where we encountered brisk haemorrhaging. These occurred from sinus or arterial haemorrhaging during endoscopic pituitary and other anterior skull base endoscopic surgery and intra-parenchymal arterial bleeding during excision of intra-parenchymal lesions using an expandable port in conjunction with an endoscope.
For sinus haemorrhages we were able to stop the bleeding easily by delivering Surgicel or FloSeal using this system but with intra-parenchymal bleeding we required the use of FloSeal in all cases. When brisk bleeding was encountered in anterior base of skull surgery, the system was able to deliver Avitene (in its powder form) to effectively control the bleeding.

We also found that a smaller volume of FloSeal could be used because it was applied more effectively as we were able to introduce the substance directly onto the area of haemorrhage and did not lose a large quantity of the material within the tube provided by the manufacturers and it was not washed away by the rapid flow of blood.

Discussion

Haemostasis during endoscopic procedures can be especially difficult [4,8] because access is usually limited as these operations are performed down a long narrow tunnel. In conventional microsurgery a surgeon would have a suction tube over the area of haemorrhage, removing it to introduce the haemostatic agent usually using a bipolar forceps in one hand followed by placing a pattie over the haemostatic agent using the same forceps and following this to position a suction tube over the pattie to gently compress the area of haemorrhage. In endoscopic surgery these actions require time as the surgeon has to manoeuvre these instruments in and out of a long tunnel and in that short time frame the haemostatic material may be washed away especially...
if the bleeding is brisk. It is also often difficult to apply the haemostatic material accurately to the bleeding point when using conventional tools.

The system we have designed allows the delivery of the haemostatic material with a patty accurately over the site of haemorrhage with the ability to maintain simultaneously compression and suction so making haemostasis more effective. The several actions that are usually required to control bleeding are incorporated into a single device and the entire process can be performed using only one hand. This ability to perform a variety of tasks simultaneously makes this device suitable when used in conjunction with endoscopic surgery.

The device allows us to deliver haemostatic agents for endoscopic procedures more effectively. We are unable to find any similar device that is able to perform haemostasis in such a manner.

References


Figure Legends:

Fig 1: Inner tube with suction attachment and external tube

Fig 2a: Insertion of Internal suction tube with pattie into external tube

Fig 2b: Internal and external tube with visible pattie string.

Fig 3: Loading of haemostatic agent Surgicel® into distal end of system

Fig 4a: Delivery of haemostic agent together with pattie from distal end of system

Fig 4b: Close up view of delivery

Video Legends

Video 1: Taming Sari –Bench Low Def

Video 2: Taming Sari pub ver– Surgicall and Fibrillar Endo
Fig 1 Inner tube with suction attachment and external tube
1507x1004mm (72 x 72 DPI)
Fig 2a Insertion of internal suction tube with into external tube
1507x1004mm (72 x 72 DPI)
Fig 2b Internal tube and external tube with visible pattie string
1507x1004mm (72 x 72 DPI)
Fig 3 Loading of haemostatic agent Surgicel into distal end of system
1507x1004mm (72 x 72 DPI)
Fig 4a Delivery of haemostic agent together with pattie out of distal end
1004x1507mm (72 x 72 DPI)
Fig 4b Delivery of haemostatic agent together with pattie close-up view
1507x1004mm (72 x 72 DPI)