SEALFOAM™ polysaccharid hemostat - observation of its application in the surgical management of vascular malformations

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1. Introduction:

Vascular malformations (VMF) are congenital disorders that arise from erroneous vascular morphogenesis. Their origin lies in early embryologic development, namely in vasculogenesis, so that they are all present – even if not necessarily visible – at birth. Capillary malformations are visible in neonates; lymphatic malformations are usually seen in the nursery or become visible within the first year of life, and a small number appear in childhood. Venous malformations may be noted at birth or they manifest during childhood or adolescence. Arteriovenous malformations are often visible at birth but display their high-flow signs characteristically during childhood or adolescence.

In general, VMFs grow commensurately with the child whereas certain types may expand suddenly. For example, venous malformations distend with intravascular thrombosis. Venous and arteriovenous malformations may emerge or enlarge during puberty or pregnancy, meaning coincidentally with hormonal changes, or following trauma. The surgical management of VMFs is necessary to prevent the VMF from erupting, which would result in a greater venous bleeding. Today, the operation of VMFs has become one of several interdisciplinary modular concepts. In most centers surgical approaches utilize different tactics and techniques that are adopted based on the pathologic form and type of the malformation. Special skills and experiences are necessary to carry out the appropriate surgical strategy, and most authors propose that the required operative technique should be dictated by the location and type of malformation and associated findings.

Intralesional bleeding during the resection process, especially in high-volume venous

malformations, can sometimes become a critical issue since conventional techniques of bleeding control would lead to an additional laceration of these thin-walled vascular sacs and result in an even greater (unstoppable) bleeding.

Bleeding out of intraosseous cavernous components cannot be handled with bipolar or monopolar coagulation or ligation techniques. In such situations an effective hemostat is necessary for bleeding control.

2. Case series:

Three patients presenting with comparable venous malformations underwent surgical resection using SealFoam hemostat. The patients were operated under general anesthesia.

Patient 1: male, 25 years of age, infiltrating venous malformation of the neck.
Patient 2: male: 21 years of age, infiltrating venous malformation of the left leg with bone involvement.
Patient 3: female, 34 years of age, diffuse venous malformation of the abdominal wall.

The lesions were of extratruncular, diffuse, infiltrating type and due to their anatomical distribution all lesions had to be resected without tourniquet use.

After skin incision the lesions typically were exposed throughout the infiltrated tissue components (i.e. muscle, bone, fascia, skin, nerves etc.) and resection plans were

defined. Due to the extensive, infiltrative pattern an intralesional resection and therefore a translesional preparation under bleeding control was necessary. Following Belov´s principles of translesional resection clamps were used wherever feasible.

In all three cases at least two high-volume connections throughout the deep resection plans were identified. In one case such channel was connected to an intraosseous component of the lesion.

Under meticulous suction these bleeding sources were covered by SealFoam hemostat by the surgeon. This procedure was simply conducted by digital pressing of an appropriately dimensioned piece of the hemostat onto the source of bleeding with gentle pressure. SealFoam attached to the lesion immediately. After pressing for 30 seconds, the wound was rinsed with normal saline solution leaving just the wound-SealFoam-clot. This additional procedure prevented potential pressure of the hemostat onto very sensible tissues like the liver and also from sticking to the surgeon´s gloves.

During the ongoing surgical procedure of complete removal of the venous malformation and also wound closure no dislocation of the hemostat or onset of bleeding could be observed.

The postoperative course in all patients was uneventful, especially no postoperative bleeding or hematoma was observed.

3. Conclusion

In conclusion, SealFoam hemostat is a highly effective rapid hemostatic product in the resection of such highly vulnerable lesions like venous malformations. Its use in this very specific and thus demanding field regarding intraoperative bleeding complications may point towards its applicability and efficacy in comparable surgical procedures. Furthermore, SealFoam hemostat proved to be highly effective and reliable in the management of both venous and arterial bleedings, especially of bleedings out of intraosseous caverns. The intraoperative handling is more practicable and easier to use compared to other hemostats since SealFoam is a ready to use product which can be applied without any further components.