NEW COMPOSITE HEMOSTATIC SYSTEM MEMBRANE IN LIVER SURGERY

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Relevance: Achieving a hemostatic effect by physical methods of influencing the wound surface and bleeding vessels of the parenchyma is rational, mainly with its shallow and superficial injuries. To stop bleeding from parenchymal vessels with a diameter of more than 1.0 mm, an increase in the exposure and power of energy exposure is required, which inevitably leads to damage to the stromal elements of the organ and increases the area of parenchymal necrosis to a depth of 4-8 mm, and the resulting coagulation scab often serves as a substrate for infection and recurrent bleeding. Physical methods of hemostasis during operations on parenchymal organs do not meet the requirements of the "ideal method", which should be accompanied by minimal or no blood loss, minimal necrosis of the parenchyma and a reduction in the operation time. In this regard, the development of fast-acting, safe, efficient and economical hemostatic materials is of great clinical and social importance.

Materials and methods: model of parenchymal bleeding in large animals (dogs, pigs) was developed with an assessment of the effectiveness of a domestic coating – a composite plate. After removing the wool cover from the anterior abdominal wall, an upper-middle-median laparotomy was performed. After diluting the wound edges with a dilator, the right lobe of the liver was removed into the surgical field. Using an abdominal scalpel, the liver parenchyma with an area of up to 3x4 cm was damaged with the development of mixed bleeding. Subsequently, a hemostatic sponge (control) or a hemostatic plate (experiment) was applied to the wound surface of the liver and held until complete hemostasis occurred. The reliability of hemostasis was assessed by monitoring the wound condition for 30 minutes.

Control. The hemostatic sponge made from bovine collagen produced by Turon Silk Pharm LLC is a porous plate of light yellow color. A 3x4cm fragment of the liver was used to stop bleeding from the liver. After drying the wound surface of the liver, the sponge was immediately applied and pressed against the wound. For 2 minutes, the sponge was held by hand. Subsequently, due to the lack of adhesive ability, the sponge was retained on the surface of the liver by swabbing with a gauze cloth.

The results of using a hemostatic sponge showed that even with a 5-minute exposure, only partial hemostasis from capillary vessels was achieved. While small venous vessels continued to bleed. In 2 cases, blood began to flow out through a blood-soaked hemostatic sponge, which served as the basis for removing the sponge and applying another one. After repeated use of the sponge, hemostasis was achieved within 6 minutes. It should be noted that no dense adhesion of the sponge to the wound surface of the liver occurred during 30 minutes of observation. This circumstance does not exclude the risk of recurrent bleeding at a later date.

About. Modeling of a 3x4 cm planar liver wound was performed as described above. Bleeding was achieved, which had the character of mixed with copious impregnation of gauze napkins. After drying the liver wound with a napkin, a 4x5cm hemostatic plate was immediately applied to it. In the process of contact of the plate with blood, it became more flexible and made good contact with the uneven wound surface.

After fixation for 30 seconds, adhesion to the wound surface occurred with a complete stop of bleeding. Over time-at least 30 minutes-the plate was a transparent coating that resembled a Glisson's capsule in nature. The wound surface was viewed through the film, which eliminated the risk of hematoma accumulation under the film surface. Thus, the use of a hemostatic plate for liver damage makes it possible to achieve complete adhesion to the wound surface within a short time (0.5-1 minute) with a complete stop of bleeding. The effect of hemostasis is stable with minimizing the risk of recurrent bleeding.

Discussion: The conducted experimental studies allowed us to develop the first Russian composite hemostatic film for use in surgery of parenchymal organs, which includes several layers based on biologically absorbable polymer derivatives (cellulose, viscose and calcium), the combination of which ensures local hemostatic efficiency of the implant. The hemostatic preparation in the form of a finely dispersed powder is made of water-soluble cellulose derivatives and has the property of causing hemostasis within a few seconds, has the ability to actively absorb moisture, and has a high adhesive ability to wet tissues. The collagen film is made from purified medical grade collagen and has weak antigenic properties. The film has a weak adhesive ability and therefore does not adhere to the surgeon's hands when used. It has the property of biodegradation for 3-4 weeks.

With active bleeding from the surface of the parenchymal organ, active arterial bleeding from large vessels is initially stopped using available methods (coagulation, stitching). Subsequently, the surface of the organ is drained and with continued bleeding from small venous and capillary vessels, a hemostatic film is applied to the wound surface with an active layer and held for 1-2 minutes. The degree of pressure corresponds to the pressure in the bleeding vessel. Due to the high adhesion of the powder to the wet surface of fabrics, no additional actions are required to fix the film.

Conclusions: The conducted experimental studies made it possible to develop the first Russian composite hemostatic film for use in kidney surgery, which includes several layers based on biologically absorbable polymer derivatives (cellulose, viscose, and calcium), the combination of which ensures local hemostatic efficiency of the implant.

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