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MORPHOLOGICAL CRITERIA FOR SELECTING A LOCAL HEMOSTATIC AGENT IN LIVER TRAUMA

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Introduction:

The selection of an appropriate local hemostatic agent in liver surgery must account for more than its immediate clinical hemostatic efficiency. While rapid and reliable bleeding control is essential, the agent's long-term morphological impact on the injured tissue plays a decisive role in patient outcomes. This includes potential risks such as biliary aggression, bile extravasation, coagulation necrosis, excessive inflammatory infiltration, and the development of coarse subcapsular fibrosis. Particularly in anatomical zones closely associated with the biliary tree, the use of a morphologically aggressive agent can provoke persistent inflammation, impair regenerative capacity, and lead to deformation of the liver capsule. Such complications may compromise not only the structural integrity of the liver but also its functional recovery, thereby increasing the likelihood of postoperative morbidity. Evidence from recent morphological studies indicates that certain agents—especially those based on oxidized cellulose or collagen—may trigger intense fibroblastic activity, resulting in accelerated but non-physiological scarring and disruption of the beam-sinusoidal architecture. In contrast, agents demonstrating high biocompatibility, stable adhesion, and minimal mechanical irritation often facilitate a soft and physiological pattern of morphogenesis. This is characterized by uniform granulation tissue formation, preserved microvascular framework, and absence of biliary infiltration, ultimately promoting complete and structurally sound tissue repair. Therefore, the decision-making process for selecting a local hemostatic agent should integrate both its clinical performance and its histopathological footprint, ensuring not only immediate bleeding control but also optimal conditions for long-term tissue regeneration and functional preservation.

Objective:

To determine the morphological profiles of different hemostatic agents in liver trauma and establish criteria for selecting the optimal one.

Materials and Methods:

Eighty Wistar rats underwent blunt or incised liver injury, treated with Surgicel®, TachoSil®, Biatravm®, or BloodSTOP IX. Morphological evaluation was performed on days 3, 7, and 14, assessing inflammatory response, granulation tissue dynamics, fibrosis degree, and presence of biliary components.

Results:

Surgicel® and TachoSil® induced marked inflammation, coagulation necrosis, and fibrosis. Biatravm® led to accelerated scarring and capsular deformation. BloodSTOP IX provided a mild morphogenetic pattern, preserved tissue architecture, minimized inflammation, and avoided biliary aggression.

Conclusion:

The morphological profile of BloodSTOP IX supports its recommendation as a reference local hemostatic agent, especially in anatomically biliary-sensitive liver zones.