P024  BIOMECHANICAL INFLUENCES TO BE CONSIDERED FOR A DURABLE INCISIONAL HERNIA REPAIR

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Aim: Recurrence indicates a failed repair. Which biomechanical factors have to be considered to reduce failure rates? How can surgeons enhance the interface between mesh and tissue?

Material and Methods: The strength of the mesh-tissue interface was evaluated by cyclic loading. A self-made bench test was used to apply dynamic intermittent strain (DIS) to model preparations in order to evaluate the tissue quality and the material properties of hernia meshes and fixation devices.

The influences and the properties were condensed in coefficients representing their relative strengths. The strain of the individual human abdominal wall were determined with computerized tomography at rest and during Valsalva’s maneuver.

Results: The strain observed in porcine, bovine and human tissue was in the same range. Tissue samples exhibited both brittle and ductile failure patterns. Both the load duration and the peak load increased destruction. Stress concentration elevated failure rates. Regional areas of distortions increase stress concentrations. Hernia repair has to counterract individual strain levels. Measures to improve hernia repair include closure of the defect, use of higher DIS class meshes, increased mesh overlap and additional fixation. In the clinical routine, all measures must be adapted to the individual tissue quality.

Conclusions: Using the conception of GRIP as the gained resistance towards pressure related impacts, a durable hernia repair can be designed from coefficients determined with a bench test or with computerized tomography of the human abdominal wall. Pain levels and hernia recurrence rates can be reduced in incisional hernia repair when biomechanical principles are considered.