P064 DURABLE REPAIR OF PRIMARY AND RECURRENT INCISIONAL HERNIA BASED ON BIOMECHANICAL PRINCIPLES

Regine Nessel1, Thorsten Löffler2, Johannes Rinn3, Lösel Philipp4, Samuel Voss5, Vincent Heuveline6, Matthias Vollmer2, Johannes Görich7, Liung Al-Hileh1, Friedrich Kallinowski8

1Klinikum Am Gesundbrunnen, General, Visceral and Pediatric Surgery, Heilbronn, Germany, 2Hospital Eberbach, General and Visceral Surgery, Eberbach, Germany, 3Klinik Bergstrasse, General and Visceral Surgery, Heppenheim, Germany, 4Interdisciplinary Center for Scientific Computing, Engineering Mathematics and Computing Laboratory, Heidelberg, Germany, 5Otto von Guericke University Magdeburg, Laboratory of Fluid Dynamics and Technical Flows, Magdeburg, Germany, 6Hamburg University of Technology, Hamburg University of Technology, Biomechanics, Hamburg, Germany, 7General, Visceral and Transplantation Surgery, University Hospital Heidelberg, General, Visceral and Transplantation Surgery, Heidelberg, Germany, 8University Hospital Heidelberg, Heidelberg, Germany

Aim: Durable composite constructions of polymers follow specific mechanical principles. Can incisional hernia can be repaired durably based on biomechanical principles considering the abdominal wall a polymer composite?

Material and Methods: Biomechanical principles of the reconstruction of the abdominal wall were analyzed ex vivo with cyclic loading common in material sciences. The resulting GRIP concept was clinically applied. The tissue quality of the individual patient was assessed with computed tomography at rest and during Valsalva’s maneuver. Hernia meshes with high GRIP factors (Progrip, Dahlhausen Cicat) were used. All patients received single-shot antibiosis. Patients were discharged after full ambulation was achieved.

Results: A total of 163 patients (82 males and 81 females) were treated for incisional hernia. Primary hernia was repaired in 119, recurrence in 44 patients. Recurrent hernia was significantly larger (median 161 cm² versus 78 cm²; $p = 0.00714$) resulting in a 30 % lower mesh defect area ratio. Redo-surgery took significantly longer (median 229 min versus 150 min; $p < 0.00001$) as recurrent disease is more likely to require transversus abdominis release (70 % versus 47 %). GRIP tended to be higher in recurrent repair ($p = 0.01828$). Complication rates (15 %) and duration of hospitalization were the same (6 days; $p = 0.28462$). After one year, no recurrence was detected in either group. Pain levels were equally low in both groups (median NAS = 0 at rest and under load, $p = 0.88866$).

Conclusions: Incisional hernia can be repaired safely and durably based on biomechanical principles.