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## BETTER THE DEVIL YOU KNOW? COMPARISON OF DECELLULARISED MATRICES AGAINST CLINICAL ALTERNATIVES FOR DEFECT CLOSURE IN A RABBIT MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA

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**Aim**: Gore-Tex® is a widely used durable patch for repair of congenital diaphragmatic defects yet may cause complications. Alternative xenografts such as Surgisis® (Cook) are decellularised porcine small intestinal submucosa (SIS) and should be constructively remodeled over time. Early reherniation has however been reported1. We wondered whether the matrix or decellularization (decel) process led to failure. We compared diaphragmatic reconstructions using SIS and decel porcine diaphragm (DPD), processed with a comparable decel protocol, to Gore-Tex in a fast-growing rabbit model (Eastwood, BAPS2016).

**Methods**: Experiments were approved by the institutional animal ethical committee. Twenty-three 6-weeks-old rabbits underwent intubation, left subcostal laparotomy and 3*3cm hemi-diaphragmatic excision. Defect closure was with a 3,5*3,5cm patch of (a)Gore-Tex® (n=10; fig.1a), (b)Surgisis® (n=6; fig.1b) or (c)DPD (n=7; fig.1c). Rates of herniation or eventration, uniaxial biomechanical testing, and histology (macrophages, foreign body giant cells (FBGC)) of the mesh-tissue interface (IF) were studied until 90days. Decel matrices were compared to Gore-Tex (Fisher-exact testing).

**Results**: Eighteen (78%) rabbits survived to 90days with a mean increase in weight of 140 % (range: 94-183%). There was mesh failure in all decellularised matrices ($p<0.001$). There was frank reherniation of abdominal contents in 14% of Gore-Tex group (n=1), 71% in SIS (n=5;fig.1e) and 25% with DPD (n=1). Eventration was not observed in the Gore-Tex group, yet in SIS (n=2 (29%)) or DPD (n=3 (75%); $p<0.05$) (fig.1f). Biomechanical testing was only possible with Gore-Tex, decel tissues failing during preload. Decellularised matrices were replaced by thin fibrous tissue, almost acellular at the mesh centre. Gore-Tex induced a more vigorous inflammatory response than decel implants.

**Conclusion**: Reconstructions with natural matrices processed with a comparable decellularization process, are more likely to fail than Gore-Tex repairs. Outcomes in our fast-growing rabbit model nicely correlate to described clinical outcomes and should be used to evaluate new patches prior clinical translation.

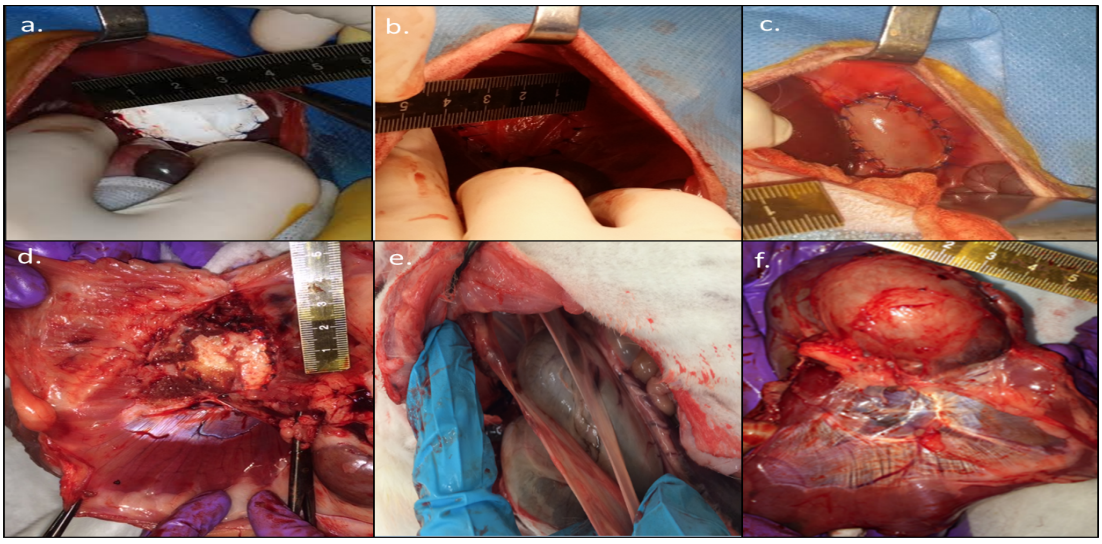


**Figure 1:** Patches at implant a) Gore-Tex b) SIS c) Porcine diaphragm and following 90 days d) Gore-tex e) SIS f) porcine diaphragm in a growing rabbit model of diaphragmatic hernia