

Innovation Session (cont.)

i7

XENOGENEIC DECELLULARIZED OESOPHAGEAL TRANSPLANTATION IS ACHIEVABLE IN A LARGE ANIMAL MODEL

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Purpose:

Decellularization of oesophagi for use as tissue engineering scaffolds is well described in several species, but successful implantation in animal models of oesophageal replacement has been more challenging. The purpose of this study was to discover whether decellularized porcine oesophageal scaffolds could be successfully implanted orthotopically in a rabbit model.

Methods:

Piglet oesophagi were harvested from new born piglets. Oesophagi were decellularised using detergent enzymatic treatment, to produce scaffolds with adequate DNA extraction whilst maintaining mechanical properties suitable for implantation. In New Zealand White rabbits, under general anaesthetic a 2 cm section of cervical oesophagus was resected. A 2 cm section of decellularised porcine scaffold was then implanted orthotopically and 2 anastomoses performed using 6.0 PDS®(Ethicon) over a 6F nasogastric tube (NGT). Bio absorbable PDS stent (4mm x 20mm) were used to avoid early collapse. Animals were fed via a stamm gastrostomy and then orally. Animals were sacrificed at humane end points.

Results:

Anaesthetic and surgery was well tolerated in all animals and gastrostomy insertion overcame initial problems with oral feeding and NGT maintenance. Stent usage led to improved oesophageal patency and allowed drinking orally from day 4. At sacrifice there was no evidence of anastomotic leak and good scaffold integration. Histology (fig 1) demonstrated no sign of rejection of the decellularized xeno-transplanted scaffold and good in growth of cells into the scaffold from the native oesophagus at the anastomoses.

Conclusions:

Implantation of decellularized porcine oesophageal scaffolds is possible in a rabbit model with encouraging early functional and histological outcomes and does not appear to trigger an immunogenic response. Use of decellularized xenogeneic material could be considered for repair of newborn congenital malformations where autologous or decellularized human tissue cannot be obtained.



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Figure 1. Histology of implanted scaffold.

