ESOPHAGEAL REPLACEMENT BY A TISSUE ENGINEERED SUBSTITUTE IN A PORCINE MODEL

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INTRODUCTION:

Oesophageal replacement by the colon or the stomach for malignant and benign oesophageal diseases exposes to significant morbidity and mortality.

PATIENTS AND METHODS:

In a porcine model, the success of the 5 cm-long circumferential replacement of the cervical oesophagus by a substitute made of an acellular matrix (SIS) seeded with autologous skeletal myoblast coupled with a human amniotic membrane seeded with autologous oral epithelial cells was assessed. The substitute was matured 2 weeks in the great omentum before esophageal replacement. Eighteen minipigs, (group A (substitute with esophageal endoprothesis, n=6), group B (substitute alone, n=6), group C (endoprothesis alone, n=6) were used. The esophageal endoprosthesis was removed endoscopically at 6 months. Animals were sacrificed sequentially over a 12 month-period. Clinical, endoscopic, radiological and histological outcomes were analysed.

RESULTS:

All animals of group B and C died during the first two months because of refractory esophageal stenosis or endoprothesis extrusion. Nutritional autonomy without endoprosthesis was observed in all animals of group A surviving more than 6 months (n=3). A phenotype similar to native esophagus, consisting in a mature epithelium, submucosal glands and a circular muscular layer, was observed after 9 months.

CONCLUSION:

In this model, the circumferential replacement of the cervical esophagus by a hybrid substitute composed of two different matrix and cellular cell types allowed, under the temporary cover of an esophageal endoprosthesis, the covering of nutritional autonomy and tissue remodeling toward an esophageal phenotype.