Journal club

Tracheobronchial transplantation with a bioartificial nanocomposite

This proof-of-concept study describes the transplantation of a tracheobronchial airway with a stem-cell-seeded bioartificial nanocomposite in a 36-year-old man presenting with symptoms consistent of a recurrent primary mucoepidermoid cancer. He had previously been treated with debulking surgery and postoperative radiation. The tumour extension was deemed unresectable, thus, transplant with artificial biomaterial was offered.

The distal trachea and proximal bronchi were resected for complete tumour removal. The airway was replaced with a synthetic bioartificial nanocomposite, tailor-made in the shape of the patient's airway. The graft was seeded with autologous bone-marrow cells and cultured in a bioreactor for 36 h prior to transplantation. An extracellular like matrix and proliferating cells were noted within the graft following incubation. To augment the regeneration process, the patient received granulocyte colony-stimulating factor and epoetin β subcutaneous injections for 2 weeks postoperatively. No major complications were encountered and the patient remained asymptomatic and tumour-free 5 months later. Postoperative investigations suggested integration and remodelling of the transplanted material. Biopsies demonstrated vessel formation and epithelialisation. In addition, up-regulation of miR-34/449 micro-RNA, epoetin-receptor expression and anti-apoptotic genes and an increase in the number of plasma components contributing to regeneration were seen.

This study demonstrates the feasibility of tailor-made bioengineered synthetic transplants in patients. However, further long-term studies are needed to ensure transplant effectiveness, efficacy and safety.

► **Jungebluth P**, Alici E, Baiguera S, *et al.* Tracheobronchial transplantation with a stem-cell-seeded bioartificial nanocomposite: a proof-of-concept study. *Lancet* 2011;**378**:1997–2004.

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