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TITLE

A TISSUE ENGINEERING APPROACH FOR TREATING POP USING ENDOMETRIAL MESENCHYMAL STEM CELLS

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ABSTRACT

Our goal is to address problems associated with the use of vaginal mesh for treating Pelvic Organ Prolapse (POP) using a tissue engineering approach. We propose to use autologous mesenchymal stem cells derived from human endometrium (eMSC) delivered on novel polyamide/gelatin composite meshes. MSC are easily obtained and purified from endometrial biopsies from pre- and short-term estrogen-treated post-menopausal women using SUSD2 magnetic-bead cell sorting. We first examined the effect of cultured human eMSC seeded on polyamide/gelatin mesh in a rat fascial defect model, but the eMSC only survived 14 days. Nevertheless, the eMSC increased vascularisation and modulated the macrophage response to promote wound healing, resulting in deposition of physiological, crimped collagen in comparison to scar-like collagen in mesh-only controls. At 90 days, the mesh-tissue complex was biomechanically less stiff in eMSC-treated rats compared with mesh alone, indicating a paracrine action in modulating the tissue response to the mesh. We are also developing an autologous preclinical vaginal surgery model by implanting ovine FACS-sorted CD271+ eMSC purified and cultured from hysterectomy tissue. The eMSC seeded onto polyamide/gelatin mesh (3 x 5 cm) were implanted into parous ewes with weakened vaginal walls as assessed by a modified POP-Q and a novel fibre optic pressure sensor device. Our pilot data from several ewes vaginally implanted with their own eMSC showed they survived longer than in the rat model and possibly engrafted into the vaginal wall. Our tissue engineering approach using autologous eMSC delivered on polyamide/gelatin scaffolds addresses some problems associated with the use of vaginal mesh and may have the potential to improve surgical outcomes for treating POP.

INSTITUTE

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