An animal model study for repair of tracheal defects with autologous stem cells and differentiated chondrocytes from adipose-derived stem cells.


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Abstract

BACKGROUND:

Stenosis of trachea with mucosal and cartilage lesions is a challenging problem in tracheal surgery. Owing to ease of harvest and abundance, adipose-derived stem cells (ADSCs) are attractive and increasingly used in tissue engineering. The aim of this study was to evaluate the repair of trachea with autologous stem cells and differentiated chondrocytes from adipose-derived stem cells in an animal model.

METHODS AND MATERIAL:

Six canine ADSCs were isolated and proliferated in monolayer culture and CD44; CD90 markers were investigated by flow cytometry. ADSCs were seeded in alginate beads and were differentiated into chondrocytes by TGF-β3. Cartilage-specific markers with reverse transcriptase polymerase chain reaction were demonstrated in differentiated cells. These differentiated cells and stem cells in alginate scaffold were separately transferred to a defect created in canine's trachea. After 8 weeks, the healing and cartilage formation in the trachea was evaluated by histological methods.

RESULTS:

We identified formed cartilage pieces and chondrocytes with lacuna and extracellular matrix in defects implanted with differentiated cells, but in other groups, staining of the sections did not show the presence of cartilage in the engineered tracheal wall.

CONCLUSION:

We showed that cartilage-engineered from differentiated adipose-derived stem cells in alginate biodegradable scaffold could repair tracheal cartilage defects.

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