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Prolonged vital cartilage graft preservation using tissue culture methods

J. Bujía[1], J.M. Osete[3], A. Medina[3], C. Sprekelsen[3], E. Wilmes[1] and C. Hammer[2]

[1] Department of Otorhinolaryngology, Head and Neck Surgery, Ludwig Maximilians-University, Munich, Germany
[2] Institute of Surgical Research, Ludwig Maximilians-University, Munich, Germany
[3] Department of Otorhinolaryngology, Head and Neck Surgery, University of Murcia, Spain

Summary. Cartilage grafting is one of the most commonly performed procedures in plastic surgery. Since storage of both autologous and allogenic cartilage is necessary, different preservation methods have been used with varying success. The use of chemical preservation procedures such as formaldehyde, Merthiolate or Cialit lead to a loss of viability of the graft. This work presents a study of the cell viability of cartilage grafts stored in different solutions (saline, RPMI 1640 and DMEM) for 100 days. Cartilage immersed in saline solution lost 50% of its viability after a storage period of 6 days, after 30 days no viable cells could be observed. In contrast to this, cartilage immersed in tissue culture media retained its viability (>80%) during the whole storage period. No differences were found between either culture medium. The results of these experiments suggest that viable cartilage tissue can be successfully stored over a long period of time using tissue culture procedures.

Key words: Cartilage grafting – Tissue culture – Preservation

The repair of skeletal defects with autografts is still a problem in reconstructive surgery; especially because in many cases the possibility of a delayed or late cartilage grafting procedure is necessary. In these circumstances as well as in multistage reconstructive procedures, cartilage and cryoprotectants were partially unsuccessful [9]. On the other hand, tissue culture procedures have been successfully applied to skin growth and preservation for skin grafting in humans [1, 10, 11].

The aim of this work was to study the possibility of maintaining viable cartilage grafts for a longer period of time using tissue culture procedures.

Material and methods

Samples

Human cartilage samples ($n=9$) were obtained during routine surgical procedures on the nasal septum. The samples were cut into fragments of 5 × 2 mm. The following types of media supplemented with antibiotics (penicillin 100 µg/ml, streptomycin 100 µg/ml and amphotericin B 2.5 µg/ml) were used:

- Sterile normal saline 0.9% isotonic solution.
- Culture medium RPMI 1640 with L-Glutamine (Seromed, Berlin, Germany) supplemented with 10% of fetal calf serum (FCS, Boehringer-Mannhein, Mannheim, Germany).
- Culture medium Dulbecco's MEM with 4,500 mg glucose/l (Gibco, Eggenstein, Germany) supplemented with 10% of fetal calf serum.

The samples were evaluated after a period of 100 days. Samples were obtained every 10 days for assessment of cell viability.

Determination of the cartilage viability