Does the tumescent liposuction affect the viability of Adipose-Derived Stem Cells?

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Abstract

Objectives:
Adipose tissue is easily accessible and abundant source of stem cells and can be harvested during liposuction. Aspiration of liposuction alone does not significantly alter the viability of Adipose Derived Stem Cells (ADSCs). However, liposuction is usually performed under general anaesthetic with infiltration of local anaesthetic fluid. That is why the aim of this study was to assess the influence of anaesthetic fluid on ADSCs viability.

Methods:
Adipose tissue was collected during liposuction. Briefly, ADSCs were isolated by collagenase digestion (0.075%, 30 min in 37°C) and followed centrifugal separation. Cells were cultured in DMEM/HAM’S F-12 medium supplemented with 10% fetal bovine serum (FBS) and 1% antibiotic. After 14 days, cells were seeded on 24-wells plate (1x10⁴ cells/well) and cultured in complete medium for 24 h. Then cells were exposed on anaesthetic fluid (NaCl 0.9%, Adrenaline 0.1%, Articaine hydrochloride 4%, Natrium bicarbonicum 8.4%) for 1 hour. Cells in control were cultured in complete medium. The viability of cells was assessed by MTT assay.

Results:
ADSCs in control had a regular shape and size. Cells were elongated and spindle-shaped, with numerous cytoplasmatic lamellipodia. After incubation with anaesthetic fluid decrease in cell number, compared to control was observed. Cells began to detach from the well surface. The viability of examined cells was 57.6% and was much lower comparing to control.

Conclusions:
Incubation of ADSCs with anaesthetic fluid significantly decreased their viability. It can be a limitation of adipose tissue as a source of stem cells. There is a necessary to optimize the method of adipose tissue collection for tissue engineering and regenerative medicine purposes.