

# Fat Graft for Reconstruction in Skull Base Surgery: Long-term Results Ovanes Akobyan MD; Yury Shulev City Hospital #2, North-West State Medical University, Saint-Petersburg, Russia.

### Introduction

The use of free fat graft is a widely applied technique in skull base surgery for reconstruction of basal dural defects. However, graft integration into CSF spaces, dural repair strength and evolution of graft size in postoperative period has not been sufficiently studied. The goal of this study is the analysis of the results of free fat graft usage.

#### Methods

At the beginning of our research there was an experiment with the purpose to investigate the principles of early graft integration and to evaluate watertight durability closure. Fat and fascial grafts at dural reconstruction were compared. Then histomorphological study was conducted.

The clinical part included 450 patients with different skull base tumors. The mean age was 43.4 (29-80 years). Fat grafts were used to occlude the defects: sphenoid sinus, ethmoid sinus, mastoid air cells. MRI was performed in 7 days after operation and in the long-term after it. Graft size and MRI signal intensity were measured. The mean follow-up was 74 months (12-120 months).



Engraftment into skull base defect. A. 1 day after surgery -"fat plug" effect. B. 7 days after surgery - first sings of revascularization. C and - 14 days after surgery - complete biological integration of fat graft.

#### Results

Experimentally fat graft provides the most watertight durability closure compared with fascial graft. Histological study showed complete physical graft integration in 1 day after surgery; beginning of vascularization - in 7 days; complete biological graft integration - in 14 days. Serial MRI study showed the mean graft size reduction to 71.6% after 1 month; to 38.3% after 3 years and 35.9% after 10 years. 7.8% of patients had fibrous graft transformation, 1.1 % - graft lysis, 0.4% - graft infection. There were no cases of lipoid meningitis detected. The rate of CSF leak was 2%. All cases of CSF leak were noticed in the first 5 days after surgery.



decreasing during the first year up to thirty nine percent of previous size.



We compared evolution of graft in two groups of patients with small (less 29.6 mm3) and big (more 29.6 mm3) graft sizes. There is no significant difference in MRIevolution in both groups.



A case of big (43.7 mm3) graft evolution that we used after extended transbasal approach. A;B - graft integration in seven days. ; - complete biological graft integration in one year (22.1 mm3). E.F - final graft sizes in five years (19.6 mm3).



A case of small (19.2 mm3) graft evolution. A - graft integration in seven days. C - complete biological graft integration in one year (9.2 mm3). D - final graft sizes in 7 years (4.3 mm3).



A case of fibrous graft transformation. B - one year after surgery. C - two years after surgery.



A case of graft lysis. B - 3 months after surgery. C - one year after surgery.

Figure 9



A case of mucocele formation.

## Conclusions

Fat graft serves as an effective dural watertight closure and helps to decrease CSF leak rate. Analyzing the fate type of fat graft we can speak of natural and complicated evolutions. Natural evolution can be typical and atypical. Typical evolution provides complete biological graft integration. Atypical evolution is fibrous graft transformation or graft lysis.