Nasal Alar and Tip Reconstruction Following Mohs Surgery Using Fresh Frozen Cadaveric Cartilage

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Background

Traditionally, autologous cartilage is the primary graft source used for reconstructive rhinoplasties after skin cancer resection. Nasal septum, auricular cartilage and costal cartilage are common options. However, these grafts often present with donor site complications, increased operative time, and expensive costs. Implantation of cadaveric rib cartilage can provide adequate supply and avoid donor site morbidities. Irradiated allografts have been used for nasal defects but report higher rates of infection, resorption, and necrosis.

Research Objectives

To mitigate the deficiencies of autologous cartilage and irradiated allografts, the authors have used fresh frozen, non-irradiated, cadaveric cartilage allografts from the Musculoskeletal Transplant Foundation (MTF). This case series is to demonstrate the safety and feasibility of this novel material in reconstructive rhinoplasty after skin cancer removal.

Methods

We retrospectively reviewed the medical history and operative data of seven patients who underwent reconstructive rhinoplasties after basal cell carcinoma skin cancer resection using fresh frozen costal cartilage. Typically, cartilage allografts were processed and sterilized using irradiation. The fresh frozen cartilage had a process of sterilization without irradiation. The cadaveric cartilages were stored in frozen conditions (-40°C to -80°C), and temperature was maintained using dry ice during shipment. Before use for the implantation, cartilage tissue was thawed in normal saline. Pre and postoperative photographs of the patients were obtained in the standard photo room. Anthropometric measurements were taken on 2D photos to evaluate nose tip projection on patients who underwent nasal tip reconstruction. Adverse events including infection, tissue necrosis, resorption, and difficulty of breathing were evaluated.

Table 1. Patient demographics and medical history

	Patient no.						
	1	2	3	4	5	6	7
Age	79	83	63	65	75	90	74
Sex	Male	Male	Female	Male	Male	Male	Male
Medical history	BCC on right ala	BCC on left ala and nasal tip	BCC on left ala	BCC on right nasal tip	BCC on nasal tip	BCC on left ala	BCC on right ala
Grafts	Alar batten graft	Alar batten graft and nasal tip graft	Alar batten graft	Alar batten graft	Nasal tip graft	Alar batten graft	Alar batten graft
Duration of follow-up	6 months	7 months	1 year	3 months	6 months	5 months	1 year
Complications	no	no	no	no	no	no	Occasionally difficult to breath

Fig 1. Preop and postop photos (7 mons postop)

Results

Of the seven patients that met inclusion criteria, the average age was 75 years (range, 63 to 90) with six males and one female. Average duration of follow-up was 7.4 months (range, 3 to 12 months). Types of grafts used included: Alar batten graft (n=5, 71.4%), nasal tip graft (n=1, 14.3%), and alar batten graft with nasal tip graft (n=1, 14.3%). One postoperative complication was reported (minor difficulty breathing), which did not require revision surgery. Measurements on the 2D photos of the patient who had alar batten graft with nasal tip grafts showed no significant resorption or deviation 7 months after the surgery.

Conclusions

Our case series highlights the low complication rate and cosmetically positive outcomes from using fresh frozen, non-irradiated, cadaveric cartilage allografts for reconstructive rhinoplasties. Decreased donor site complications, operative time, cost, rates of infection, and resorption were observed. In addition, cadaveric cartilage provides younger and higher quality cartilage for the elder population, as well as eliminating the problem of difficulties of wearing hearing aids after a cartilage removal from the conchal bowl. Further investigation involving a larger sample size would add to the existing data supporting the efficacy of fresh frozen cartilage over other grafting materials.

Limitations

- We had a relatively small sample size and short follow up time.
- Further investigation involving a greater number of patients and longer follow up time is needed.

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