The Journal of Laryngology & Otology (2017), ***131***, *529–533*.

doi:10.1017/S0022215117000639

MAIN ARTICLE

Donor site morbidities resulting from conchal cartilage harvesting in rhinoplasty

M Y LAN[1,2], J P PARK[3,4], Y J JANG[3,4]

[1]*Department of Otolaryngology, Taipei Veterans General Hospital, Taiwan,* [2]*School of Medicine, National Yang-Ming University, Taipei, Taiwan,* [3]*Department of Otorhinolaryngology, Asan Medical Centre, Seoul, South Korea, and* [4]*College of Medicine, University of Ulsan, Seoul, South Korea*

Abstract

Objective: Conchal cartilage is frequently used in rhinoplasty, but donor site morbidity data are seldom reported. This study aimed to investigate the complications of conchal cartilage harvesting in rhinoplasty.

Methods: A retrospective chart review of 372 patients who underwent conchal cartilage harvesting for rhinoplasty was conducted. Data regarding patient demographics, types of nasal deformities, graft usage and complications were analysed.

Results: A total of 372 patients who underwent conchal cartilage harvesting for rhinoplasty were enrolled. The harvested conchal cartilage tissues were used in a variety of applications: tip graft, dorsal graft, septal reinforcement and correction of nostril asymmetry. Nine cases (2.4 per cent) with donor site morbidities were identified, including four cases (1.1 per cent) with keloids and five cases (1.3 per cent) with haematomas.

Conclusion: Conchal cartilage harvesting is a safe and useful technique for rhinoplasty, with a low complication rate. However, patients should be informed about the possibility of donor site morbidities such as keloids and haematomas.

Key words: Conchal Cartilage; Keloid; Hematoma; Rhinoplasty; Morbidity

Introduction

Autologous cartilage is widely used in rhinoplasty and possesses several characteristics of an ideal graft. It is easy to shape and can be readily harvested from the patient. Moreover, autologous cartilage usually lacks local tissue reaction and is relatively resistant to resorption.[1–3] Autologous cartilage can be harvested from the septum, auricle or rib. Septal cartilage is the most commonly used site, followed by conchal and costal cartilage.[2] When septal cartilage is not available or is insufficient, conchal cartilage represents an ideal alternative source for autologous cartilage.[4–6]

Conchal cartilage can be used in several applications in rhinoplasty, such as a tip graft, dorsal graft, radix graft or columellar strut.[5,7] The histological characteristics of its elasticity and inherent curvature make conchal cartilage the ideal graft for tip surgery, including onlay graft, shield graft and lateral crural graft.[8] It also has been successfully used for correcting nasal valve collapse and for partial dorsal augmentation.[8]

Although conchal cartilage is a favourable graft in rhinoplasty, complications, such as haematoma, keloid formation and ear deformity, can still arise.[2–4,8] However, little information regarding the incidence of donor site morbidities has been reported to date.[3,4,9] This article aimed to investigate the incidence of donor site complications associated with conchal cartilage harvesting in rhinoplasty.

Materials and methods

Patients

This was a retrospective medical records review of 372 patients who underwent conchal cartilage harvesting for rhinoplasty at Asan Medical Centre between March 2002 and December 2013. The study was approved by our Institutional Review Board and informed consent was obtained from all patients. The post-operative follow-up period ranged from 2 to 66 months (mean, 12.7 months). Data regarding patient demographics, types of nasal deformities and complications were collected.

Surgical techniques

All rhinoplasties were performed by the senior author (YJJ). All patients were operated under general anaesthesia, except four patients who underwent surgery under local anaesthesia. Most patients underwent an

Accepted for publication 17 January 2017 First published online 20 March 2017

TABLE I
DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF STUDY COHORT

Characteristics	Male	Female	All patients	*p*
Patients (*n* (%))	247 (66.4)	125 (33.6)	372 (100)	
Age (mean±SD; years)	33.81 ± 11.64	34.32 ± 11.93	34.0 ± 11.7	0.533
Revision rhinoplasty (*n* (%))	32 (8.6)	34 (9.1)	66 (17.7)	0.001
External nasal deformities (*n* (%))				
– Deviated nose	178 (47.8)	75 (20.2)	253 (68)	
– Hump nose	58 (15.6)	24 (6.5)	82 (22)	
– Low profile nose	43 (11.6)	35 (9.4)	78 (21)	
– Combined deformities	11 (3)	13 (3.5)	24 (6.5)	
– Nasal tip deformity	2 (0.5)	4 (1.1)	6 (1.6)	
– Nasal bone fracture	3 (0.8)	2 (0.5)	5 (1.3)	
– Cleft lip nose deformity	3 (0.8)	0	3 (0.8)	

SD = standard deviation

open rhinoplasty technique. Only seven patients underwent an endonasal approach. Most patients received the posterior approach for the conchal cartilage harvesting, while some received the anterior approach.

Statistical analyses

Numerical data are presented as means ± standard deviations, and categorical variables are shown as percentages. The Mann–Whitney U test was used to compare non-parametric variables. The chi-square test or Fisher's exact test were used for categorical variables. Statistical analyses were performed using SPSS® version 12.0 software. We used $p < 0.05$ as a threshold for identifying statistically significant differences.

Results

A total of 372 patients underwent conchal cartilage harvesting for rhinoplasty; there were 247 (66.4 per cent) male and 125 (33.6 per cent) female patients. Demographic data for the patients are summarised in Table I. The patients' average age was 33.98±11.73 years (range, 17–74 years). The average age of the male patients was 33.81±11.64 years (range, 18–72 years) and the average age of the female patients was 34.32±11.93 years (range, 17–74 years). This difference in age was not statistically significant ($p > 0.05$). Among all 372 patients, 66 (32 males and 34 females) were revision rhinoplasty cases. The most frequent external nasal deformity was a deviated nose ($n = 253$), followed by hump nose ($n = 82$) and low profile nose ($n = 78$) (Table I).

There were nine patients (2.4 per cent) with donor site morbidities that were observed during the follow-up period, including four patients (1.1 per cent) with keloids (Figure 1) and five patients (1.3 per cent) with haematomas (Figure 2 and Table II). Interestingly, all patients with keloids were young males who underwent the posterior approach. However, there were no statistically significant differences in sex, age or approach method between the patients with and without keloids (Table II).

We treated three of these patients with keloids by surgical excision followed by steroid injection. One patient with a small keloid refused surgical excision and was treated with steroid injection alone. There was residual keloid in two patients, who both required additional treatment. Among five patients with auricle haematoma, including three males and two females, four were treated with incision and drainage, while one was treated with compression alone. There were no cases of post-operative donor site infection.

Discussion

The conchal cartilage is the most favourable tissue for autologous cartilage harvesting for some Asian patients or for revision rhinoplasty patients who have an insufficient amount of septal cartilage for nasal reconstruction.[4–8] It is an option for nasal tip grafting. Its elastic characteristic provides a high degree of flexibility, but without the warping tendency usually apparent in costal cartilage.[10]

The superior cymba and inferior cavum, which are divided by the conchal extension of the helical crus, represent the two components of the conchal bowl.[6] The cavum and the cymba, the widest but thinnest cartilage region, are both excellent options for a tip or alar rim graft.[6] A thicker graft, such as a spreader or columellar strut graft, can be harvested from the extension of the helical crus.[6] In the current study, the conchal cartilage was most frequently used in tip grafting, followed by dorsal grafting, septal reinforcement and the correction of nostril asymmetry. For 50 cases, we used conchal cartilages in more than 1 site for nasal reconstruction.

Only a few papers to date have described the incidence of donor site morbidity resulting from conchal cartilage harvesting (Table III).[3,4,7,9] Complications include hypertrophic scarring, keloids, haematomas, delayed wound healing, infection and asymmetry of the ears.[3,4] Grobbelaar *et al*. reported four complications (9.09 per cent) in their case series: one patient had a hypertrophic scar, two patients had delayed wound healing and one patient had flattening of the ear after surgery.[3] Jovanovic and Berghaus reported

https://doi.org/10.1017/S0022215117000639 Published online by Cambridge University Press

FIG. 1

(a) Anterior and (b) posterior views of the auricle keloid of a patient who underwent conchal cartilage harvesting in rhinoplasty.

FIG. 2

(a) Anterior and (b) posterior views of the auricle haematoma of a patient who underwent conchal cartilage harvesting in rhinoplasty (red arrow indicates haematoma location).

TABLE II
COMPLICATIONS ASSOCIATED WITH GRAFT USE

Complication	Male (*n* (%))	Female (*n* (%))	All patients (*n* (%))	*p*
Keloid	4 (1.1)	0 (0)	4 (1.1)	0.305
Haematoma	3 (0.8)	2 (0.54)	5 (1.3)	1.0

https://doi.org/10.1017/S0022215117000639 Published online by Cambridge University Press

TABLE III
SUMMARY OF DONOR SITE MORBIDITIES IN DIFFERENT STUDIES

Parameter	Jovanovic & Berghaus[9]	Grobbelaar *et al.*[3]	Wright *et al.*[4]	Han *et al.*[7]	Current study
Year of publication	1991	1997	2007	2008	2017
Total patients (*n*)	32	42	19	16	372
Complications (*n* (%))	2 (6.2)	4 (9.09)	0 (0)	0 (0)	9 (2.4)
Complication types (*n*)					
– Hypertrophic scar	0	1	0	0	0
– Keloid	0	0	0	0	4
– Delayed wound healing	1	2	0	0	0
– Seroma	1	0	0	0	0
– Haematoma	0	0	0	0	5

two complications (6.2 per cent) in their series: one patient had seroma formation and one had a small perforating auricular defect.[9] In the studies by Wright *et al*.[4] and Han *et al*.,[7] no complications were reported for conchal cartilage harvesting in rhinoplasty. In the current study, among 372 patients, there were 9 patients (2.4 per cent) for whom donor site morbidities were observed, including 4 patients (1.1 per cent) with keloids and 5 patients (1.3 per cent) with haematomas. No infections were recorded in our series. To the best of our knowledge, our study reports on the largest series of cases to date to assess donor site morbidities associated with conchal cartilage harvesting in rhinoplasty.Leaving the helical buttress intact in the conchal area to support the remaining cartilage can prevent ear deformities after harvesting conchal cartilage.[3,6–8] Adams suggested that at least 2 mm of the superior outer rim of the concha, 3 mm of the cartilage rim connecting the tragus to the antitragus, and 3 mm distal to the rim of the external auditory meatus should be left intact to prevent a noticeable change in the conchal cavity of the donor ear.[11] Falces and Gorney recommended that the anti-helical ridge must remain unviolated even if the entire concha is removed.[12] In the current study, there were no ear deformities, because we preserved the antihelix, antitragus, inferior crus of antihelix, crus of helix, and the junction of the cavum and external auditory meatus during the surgery.

However, there were still five cases of haematoma in our study. Meticulous haemostasis and a carefully contoured compressive dressing are the two precautionary key steps to prevent post-operative haematoma formation. When such a situation is encountered, the haematoma should be evacuated immediately and then pressure should be reapplied.[3,6,8] However, too much pressure on the bolster dressing over the conchal skin may cause ischaemic injury of the epidermis, which results in discoloration of the conchal skin as was noted in three cases in our study.

We identified four patients with keloids in our present series. A keloid is a type of scar that is thought to be caused by a stimulus that results in the uncontrolled upregulation of collagen and extracellular matrix expression.[13] In our analyses, although there was no statistical difference in the sex of patients with or without keloids, a trend for male predominance was observed. Park *et al*. also found that males with keloids outnumbered females with keloids among their patients who underwent conchal cartilage harvesting.[14] They concluded that male gender was a possible risk factor for keloid formation after conchal cartilage harvesting.

Erol stated that there were no hypertrophic scars or keloid formations in a series of 250 patients who received secondary rhinoplasties after conchal cartilage harvesting using the anterior approach.[15] They proposed that the main advantage of the anterior approach is the preservation of neurovascular structures on the posterior side of the auricle.[15] Keloid formation rates have been reported to range from 0.7 per cent to 11 per cent using the posterior approach for otoplasty.[16] Erol proposed that the absence of subcutaneous fat tissue on the anterior side of auricle skin might be the reason for the reduced incidence of keloid formation on that side compared to the posterior side of the auricle skin.[15] In the current study, we preferred to use a posterior approach in the majority of cases because noticeable scar formations over the anterior surface of auricles were observed in some patients who underwent conchal cartilage harvesting via an anterior approach. Interestingly, patients treated by an anterior approach did not have post-operative keloids in our present series.

- **Conchal cartilage harvesting is a safe technique for rhinoplasty**
- **It is associated with a low incidence of complications such as keloids and haematomas**

The cosmetic deformity caused by the keloid usually results in a significant burden for the patient. However, the treatment of keloids remains challenging, even for an experienced surgeon.[13] The recurrence rate of keloids after surgical excision alone has been reported to be up to 80–100 per cent.[17] Many adjuvant treatments after surgical excision of a keloid have been proposed, including intralesional steroid injection, radiation treatment, laser treatment, pressure therapy and cryotherapy.[18] In the study of Park *et al*., auricular

https://doi.org/10.1017/S0022215117000639 Published online by Cambridge University Press

keloids were successfully treated in 93.3 per cent of patients who underwent surgical excision followed by adjuvant pressure therapy using a pair of magnets; in that series, 6.7 per cent of patients had recurrences.[14] In the current investigation, three patients were initially treated with surgical excision followed by steroid injection, and one patient with a small keloid who refused surgical excision was treated with steroid injection alone. However, residual keloids were observed in two patients who received additional treatments.

Conclusion

Based on our experience with conchal cartilage harvesting in rhinoplasty, we contend that it is a safe and straightforward technique, with a low complication rate. However, patients should still be informed, prior to surgery, about the possibility of donor site morbidities, such as keloids and haematomas, which are associated with this procedure.

References

1 Lovice DB, Mingrone MD, Toriumi DM. Grafts and implants in rhinoplasty and nasal reconstruction. *Otolaryngol Clin North Am* 1999;**32**:113–41
2 Sajjadian A, Rubinstein R, Naghshineh N. Current status of grafts and implants in rhinoplasty: Part I. Autologous grafts. *Plast Reconstr Surg* 2010;**125**:40e–49e
3 Grobbelaar AO, Matti BA, Nicolle FV. Donor site morbidity post-conchal cartilage grafting. *Aesthetic Plast Surg* 1997;**21**: 90–2
4 Wright ST, Calhoun KH, Decherd M, Quinn FB. Conchal cartilage harvest: donor site morbidities, patient satisfaction, and cosmetic outcomes. *Arch Facial Plast Surg* 2007;**9**:298–9
5 Boccieri A, Marano A. The conchal cartilage graft in nasal reconstruction. *J Plast Reconstr Aesthet Surg* 2007;**60**:188–94
6 Mowlavi A, Pham S, Wilhelmi B, Masouem S, Guyuron B. Anatomical characteristics of the conchal cartilage with suggested clinical applications in rhinoplasty surgery. *Aesthet Surg J* 2010;**30**:522–6
7 Han K, Kim J, Son D, Park B. How to harvest the maximal amount of conchal cartilage grafts. *J Plast Reconstr Aesthet Surg* 2008;**61**:1465–71
8 Jang YJ. Conchal cartilage. In: Jang YJ, ed. *Rhinoplasty and Septoplasty*. Seoul: Koonja Publishing, 2014;171–82
9 Jovanovic S, Berghaus A. Autogenous auricular concha cartilage transplant in corrective rhinoplasty. Practical hints and critical remarks. *Rhinology* 1991;**29**:273–9
10 Boccieri A. Subtotal reconstruction of the nasal septum using a conchal reshaped graft. *Ann Plast Surg* 2004;**53**:118–25
11 Adams WM. Construction of upper half of auricle utilizing composite concha cartilage graft with perichondrium attached on both sides. *Plast Reconstr Surg* (1946) 1955;**16**:88–96
12 Falces E, Gorney M. Use of ear cartilage grafts for nasal tip reconstruction. *Plast Reconstr Surg* 1972;**50**:147–52
13 Song C. Hypertrophic scars and keloids in surgery: current concepts. *Ann Plast Surg* 2014;**7**(suppl 1):S108–18
14 Park TH, Park JH, Kim JK, Seo SW, Rah DK, Chang CH. Analysis of 15 cases of auricular keloids following conchal cartilage grafts in an Asian population. *Aesthetic Plast Surg* 2013; **37**:102–5
15 Erol OO. New modification in otoplasty: anterior approach. *Plast Reconstr Surg* 2001;**107**:193–202; discussion 3–5
16 Furnas DW. Correction of prominent ears by conchamastoid sutures. *Plast Reconstr Surg* 1968;**42**:189–93
17 Cosman B, Wolff M. Bilateral earlobe keloids. *Plast Reconstr Surg* 1974;**53**:540–3
18 Naylor MC, Brissett AE. Current concepts in the etiology and treatment of keloids. *Facial Plast Surg* 2012;**28**:504–12

Address for correspondence:
Dr Yong Ju Jang,
Department of Otorhinolaryngology,
Asan Medical Centre,
University of Ulsan, College of Medicine,
88 Olympic-ro 43-gil,
Songpagu,
Seoul 138-736, South Korea

E-mail: jangyj@amc.seoul.kr

Dr Y J Jang takes responsibility for the integrity of the content of the paper
Competing interests: None declared

https://doi.org/10.1017/S0022215117000639 Published online by Cambridge University Press