

Costal Cartilage Grafts in Rhinoplasty



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KEYWORDS

- Costal cartilage • Rib • Rhinoplasty • Revision rhinoplasty • Grafting in rhinoplasty • Augmentation
- Saddle nose • Spreader grafts

KEY POINTS

- The use of costal cartilage in rhinoplasty carries with it a risk of both donor site and rhinoplasty complications. The decision to use costal cartilage should be made after considering the alternative sources of cartilage grafts.
- After cartilage is harvested, the integrity of the chest wall and the absence of pneumothorax should be confirmed.
- Costal cartilage has a significant risk of warping. Various technical considerations allow the surgeon to take advantage of or to minimize the warping of grafts.
- Pain will be reduced if a muscle-sparing technique is used during the exposure of the rib cartilage segment.
- The intended incision on a female chest wall should be marked with them in an upright position and the incision placed a few millimeters inferior to the inframammary crease.

INTRODUCTION

Rhinoplasty has become increasingly popular and is more frequently performed than in any time in the past. The reasons for this are several. Rhinoplasty was at one time a somewhat secret craft that the most famous practitioners were reticent to share. It has now become the focus of numerous teaching venues with the willing sharing of ideas and techniques. The number of practitioners doing rhinoplasty has therefore increased. The procedure is also being performed on a larger segment of the population. What was initially a procedure that was performed for the generally well-to-do or the significantly afflicted has now become accessible to a larger segment of population.

It is a changing world where rhinoplasty is being performed across many different ethnicities and in many different countries. What was formerly a discipline directed at a western Caucasian population is now frequently performed for multitudes of patients with varied ethnic derivations.^{1,2} Within this spectrum of ethnicities, some patients possess noses that are relatively devoid of firm cartilaginous structure, as in the Asian population, so that grafting materials are frequently necessary even in primary cases.^{3,4}

With a greater understanding of the anatomy and dynamics of rhinoplasty, there has been the introduction of technically more sophisticated corrective maneuvers. The open rhinoplasty technique has made it possible to better recognize abnormalities and deficiencies in structure and as a

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result has ushered in a need for grafting materials to restore and create structure.^{5,6} It has been realized that the application of structure will produce rhinoplasty results that are more enduring. Finally, with this increased surgical activity, there is also an increase in the number of revision surgeries that may require grafting materials.

TREATMENT GOALS AND PLANNED OUTCOMES

Every rhinoplasty procedure has multiple goals. Foremost is the resolution of all the concerns of the patient. The procedure should be safe with a minimal risk of complications. Patient satisfaction with an achievement of the desired esthetic and functional goals is central to a good outcome. Technically, the procedure should be based on sound principles of surgery, healing, and esthetics.

In rhinoplasty, favorable outcomes are achieved as a result of careful analysis, diagnosis, communication, planning, and execution. The assessment of the final result after the use of costal cartilage as a grafting material for the rhinoplasty is not primarily dependent on the desired outcome of the execution of the rib cartilage harvesting but largely on the outcome of the rhinoplasty. The two processes, however, go hand in hand, and thus, both must be executed satisfactorily. The major planning involved is primarily the planning for the rhinoplasty. The harvesting of the rib cartilage is done as an integral step in achieving the rhinoplasty goals. The decision on whether costal cartilage is to be used will depend on several factors. These factors include the availability of alternative donor sites and other patient factors as well as an assessment of the relative morbidity.

Preoperative Planning and Preparation

Through careful preoperative planning, the rhinoplasty surgeon determines which surgical maneuvers are necessary to achieve the desired goals of the surgery. When the restoration or creation of an improved nasal skeletal structure is intended, then the surgeon must determine what may be the optimal cartilage to use and what donor site is to be taken advantage of. Even in the situation of a primary rhinoplasty, there may be inadequate septal cartilage available to do the necessary grafting. Frequently those of Asian and African descent possess noses with a lesser amount of septal cartilage. In the case of revision surgery, when there has been a previous rhinoplasty performed, the paucity of available septal cartilage may be even further compounded. Auricular

cartilage is available in most patients but has limitations regarding elasticity and curvature. Although some authors use cadaver rib cartilage, many will not.⁷⁻¹⁰

The preoperative planning for the use of cartilage grafts in rhinoplasty is centered around the goals of the rhinoplasty. If cartilaginous grafting materials are needed, then a donor site will have to be considered. The reasonably available donor sites are the nasal septum, the ear, and the ribs. The amount of auricular cartilage available to be harvested without causing distortion of the ear is also limited compared with that which might be harvested from the rib cage. In addition, many surgeons are reticent to use auricular cartilage because of its unfavorable biomechanical properties and firm curvatures. The edges of auricular cartilage grafts are also more likely to show dorsal irregularities through an overlying thin skin envelope compared with septal cartilage and rib cartilage grafts.

The large amount of available costal cartilage makes it an attractive source for patients who have a deficient amount of septal or auricular cartilage to be used for grafting. If it is decided to use a costal donor site, several considerations will have to be made. There will have to be a determination about how much cartilage will be needed and what other components of the rib should be included, such as the perichondrium or bone. If it is decided to use costal cartilage, then the procedure will have to be described to the patient. There are some patients who will decline the harvesting of costal cartilage either because of the concern about pain or the remote risk of pneumothorax. The relative risk and benefits will have to be weighed.

When it is determined that costal cartilage will be used, the chest wall should be examined for pre-existing deformity or previous surgery and scarring. The patient's age will have some bearing on whether costal cartilage will be used. In the younger patient, the cartilage may be more prone to warping. On the other hand, in the case of the older patient, there may be calcification of the cartilage, making carving more difficult.^{11,12} Their cartilage however will be less prone to warping.

Gender differences also will potentially come into play as female patients may be more resistant to having a chest wall scar. In the case of the female patient, the scar can be strategically placed just inferior to the inframammary crease, thus camouflaging it. A scar inferior to the inframammary crease will change the location of what rib may be used. In general, the costal cartilage grafts used for rhinoplasty will be harvested from the

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