

Rising Trends: Literature Review of Rib Cartilage Grafting Overview in Rhinoplasty

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ABSTRACT

Rhinoplasty, commonly known as 'nose job' is one of the most common facial plastic surgeries. It is a highly versatile procedure to enhance nasal aesthetics, improve functionality, or both. Nowadays, various techniques for reforming the nose structure depend on each patient's condition and preference. Autogenous graft, which site is from the patient itself, is now commonly used. Rib cartilage is an increasingly popular autogenous graft material due to its plenty of supply and strength. This study aims to provide a comprehensive overview of rib cartilage grafting in rhinoplasty, covering critical aspects such as pre-procedure evaluation, surgical techniques, postoperative care, and potential complications.

Keywords: rib cartilage; grafting; rhinoplasty.

INTRODUCTION

Rhinoplasty is a common facial plastic surgery procedure for both cosmetic and functional purposes. Cosmetic rhinoplasty aims to enhance the nose's look, while functional rhinoplasty aims to enhance ventilation and/or repair an injured nose's form. The nose's structure and its purpose are intertwined [9]. Rhinoplasty is said to be one of the most frequent plastic surgery procedures, with a number reaching 160 procedures of rhinoplasty in a private plastic surgery clinic between 2008 and 2016. There are many popular options regarding the material for rhinoplasty grafting, such as implants, septal cartilage, auricula cartilage, and rib cartilage. The volume and tensile strength of rib cartilage are advantageous and considered the gold standard. It maintains a solid structure and adequate support for the soft tissue [6]. This literature review helps to broaden the understanding of the latest favorite graft, which is rib cartilage grafting. Although being a frequent source of grafting, there are complications related to its different harvesting methods.

RHINOPLASTY

Definition of Rhinoplasty

Rhinoplasty, commonly known as 'nose job' is a known procedure in reforming the nose to reach the aim of appearance or breathing. Rhinoplasty offers patients opportunities to enhance youth and beauty by reforming their nose structure [6].

Other explanations regarding the purpose of rhinoplasty are for gender affirmation and traumatic or oncologic reconstruction. Advancing from the early understanding of nasal anatomy, further development of techniques is produced, merging cartilage grafting and suture correction [4].

Procedures of Rhinoplasty

Rhinoplasty may be done by nonsurgical and surgical techniques. Those two options are chosen based on the aim and the process the patient feels comfortable with. Non-surgical rhinoplasty mostly uses fillers, whilst surgical rhinoplasty requires reshaping of the nose structure whether with open or closed procedures. Both of the options have their advantages and disadvantages and need the skills of a professional. Surgical rhinoplasty is also advantageous for patients who desire permanent results. It may be more expensive and require additional procedures by plastic surgeons. Numerous techniques exist for surgical rhinoplasty that can be tailored to the patient's preferences. Surgical rhinoplasty serves both cosmetic and functional purposes [10].

Grafting in Rhinoplasty

The basis of a structural approach to grafting in rhinoplasty is composed of conservative resection, framework remodeling, and prudent use of grafts for augmentation.

Grafts are utilized to repair compromised support parts and to bring about desired alterations. Grafting, which can be done for structural or cosmetic reasons, is a crucial part of both primary and revision rhinoplasties. Grafts can be categorized based on their type, number, location, shape, or function [9].

- *Autogenous graft*

Autogenous grafts are extracted from the patient and consist of cartilage, bone, and various soft tissues including perichondrium and temporalis fascia. When available, septal cartilage is widely regarded as the finest grafting material. Septal cartilage is straight and resilient, with the same biochemical composition as the rest of the nose. Septal cartilage is less rigid than rib cartilage, and some surgeons may value structural integrity more highly. In general, conchal cartilage is denser and more flexible than septal cartilage. The entire segment is curved, which could be advantageous in certain locations. Due to its volume and strength, the rib cartilage graft is the procedure of choice for comprehensive nasal reconstruction. The harvesting of rib cartilage has several disadvantages, including donor site morbidity, graft deformation, and graft calcification. Rib cartilage calcification is greater in older patients. This calcified cartilage is less susceptible to deformation, but it is more difficult to harvest and carve, and its absorption by the body is less predictable [9].

- *Homogenous graft*

The most commonly used homografts are irradiated ribs for structural grafting and acellularized dermal matrix for soft tissue augmentation. Historically, the resistance of these grafts, derived from human cadavers, to resorption and deformation has been less predictable than that of autogenous tissue. However, experiences have been varied [1].

- *Alloplastic graft*

Alloplasts have grown in popularity in recent years due to their lack of an additional donor site, plentiful supply, and ability to be patient-specific and maintain a reliable morphology without resorption concerns. Expanded-porous polytetrafluoroethylene (e-PTFE; Gore-Tex), porous high-density polyethylene (PHDPE; Medpor), polyester fiber mesh (Mersilene), and silicone are the most frequently used implant materials [1].

RIB CARTILAGE GRAFTING

Outcome goals

Rib cartilage graft is considered favorable due to its plentiful material that is required when firm support is needed in rhinoplasty. In secondary rhinoplasty, congenital or posttraumatic abnormalities, and primary rhinoplasty, which need more structural support, rib cartilage grafting is beneficial for dorsal augmentation. Rib cartilage can create grafts with a good amount of form, length, and flexibility [2]. Revision surgery mostly uses rib cartilage grafting, among other autologous materials [7].

Procedural approach

- *Site of harvesting*

The most used area for harvesting is on the 5th to 8th rib. The chosen site is preferably the longest and straightest cartilaginous part [2]. However, another research stated that there is no specific guidance on choosing sites for rib graft harvesting. The chosen sites vary in each procedure, depending on personal preference. The left rib is commonly avoided due to its position near the cardiac which may cause injury or misdiagnosis as cardiac pain [7].

- *Operation*

Before the surgery, the patient is anesthetized generally and in a supine position [2]. An innovation that is simple and safe in harvesting cartilage is a cold light source. With this option, the duration of the procedure is within 30 to 60 minutes. The healing process is complete in 6 to 30 months of follow-up post-surgery [11]. There are two commonly used methods for removing the rib bone and cartilage. It is optional to do a full cut or partially by taking the central or superficial part of the rib [7]. Rib cartilage grafting can be used hybridly for tip augmentation, dorsal augmentation, and septal reconstruction. This combined use of graft has minimal issues and produces a natural-looking result [5].

- *Postprocedural*

To reduce post-operative discomfort, local anesthetic is given at the end of the surgery procedure. Patients can be held in a surgical ward for 23 hours of observation before being released the next day, or directly discharged home after. For rhinoplasty patients whose osseocartilaginous structure was excessively removed in a prior surgical procedure, rib cartilage grafting is frequently used during secondary rhinoplasty [2].

Complication

Rib cartilage harvesting may produce donor site morbidity, such as pneumothorax, that is caused by the tear in the pleura. Removing only the central part of the cartilage may be an option to reduce the complication risk. Limiting the size of the incision or choosing an inframammary incision can help reduce the chance of scarring [3]. Graft warping is the most frequent recipient site morbidity. Compared to donor-site infections, recipient-site infections were far more frequent. In many investigations, standard postoperative antibiotics were given. Other complications may also be found such as warping, resorption, pleural tear, seroma, graft fracture, and donor site pain [8].

CONCLUSIONS

Rib cartilage is a common choice of grafting due to its strength and abundant supply. The procedure requires surgical techniques. Rib cartilage is included in autogenous graft as it is derived from the patient. This graft of choice may be used as a primary or secondary intervention. It is preferable that the rib cartilage graft is taken on the right side, between the 5th and 8th rib. There are various choices of techniques for using rib cartilage grafting.

Although it is favorable, there are several complications such as warping, pneumothorax, and infection.

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