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Original research article

DERMAL FAT GRAFT VERSUS BONE GRAFT FOR MAXILLARY AUGMENTATION IN CLEFT RHINOPLASTY

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Abstract: *Maxillary hypoplasia is common in patients with cleft lip and palate deformities, often leading to aesthetic and functional concerns.* ***Objectives:*** *The study's main objective is to find the dermal fat graft versus bone graft for maxillary augmentation in cleft rhinoplasty.* ***Methods:*** *This retrospective study was conducted at Burns and Plastic Surgery Center Hayatabad Medical Complex Peshawar from December 2021 to December 2022. Data were collected from 58 patients who underwent cleft rhinoplasty. Data were collected from 58 patients according to inclusion and exclusion criteria. All the data related to demographics, history, surgery, and post, and preoperative outcomes were noted for this study.* ***Results:*** *Data were collected from 58 patients from both genders. At the preoperative stage, patients undergoing dermal fat grafting reported a mean VAS score of 2.5 ± 0.3, while those receiving bone grafts had a slightly higher score of 3.0 ± 0.4. However, by 3 months postoperative, both groups experienced substantial increases in satisfaction, with mean VAS scores of 6.2 ± 0.6 for dermal fat grafts and 6.8 ± 0.7 for bone grafts. These improvements continued at 6 and 12 months, with mean VAS scores reaching 7.5 ± 0.8 and 8.0 ± 0.7 for dermal fat grafts, and 8.3 ± 0.9 and 8.7 ± 0.8 for bone grafts, respectively.* ***Conclusion:*** *It is concluded that both dermal fat graft and bone graft are viable options for maxillary augmentation in cleft rhinoplasty. While dermal fat graft may offer superior aesthetic outcomes and reduced donor site morbidity, bone graft provides greater structural support and long-term stability.*

Keywords: Bone Transplantation, Cleft Lip, Cleft Palate, Dermal Fat, Rhinoplasty.

Introduction

Maxillary hypoplasia is a common feature in patients with cleft lip and palate deformities, often leading to aesthetic and functional concerns. Cleft rhinoplasty aims to address these issues by augmenting the deficient maxillary region to improve facial symmetry and nasal aesthetics. Two commonly used techniques for maxillary augmentation in cleft rhinoplasty are dermal fat grafting and bone grafting (1). Dermal fat grafting involves the transfer of autologous dermal fat tissue from donor sites to the deficient maxillary region. In contrast, bone grafting entails transplanting bone tissue harvested from other anatomical sites. While both techniques have been utilized for maxillary augmentation in cleft rhinoplasty, there remains a lack of consensus regarding their comparative efficacy, safety, and outcomes (2). Surgery of the cleft nasal deformity is exceptionally challenging to perform even for skilled rhinoplasty surgeons due to its complex pathology and limitations in post-operative results. Many techniques have been introduced since 1920 for correcting cleft nasal deformity, which shows the problematic nature of cleft rhinoplasty (3). The degree of the labial cleft is directly proportional to the severity of the nasal abnormality. Both unilateral and bilateral cleft nasal deformities share the same anatomical features, including abnormal insertion of orbicularis oris into the alar base and maxillary hypoplasia of the cleft side. Maxillary hypoplasia leads to malocclusion and facial contour asymmetry (4). The collapsed lateral crura and malar region need structural support for better symmetry. The pyriform aperture of the maxilla supports the nasal platform, so it needs to be addressed while performing cleft rhinoplasty (5).

Augmentation rhinoplasty requires the addition of cartilage to provide enhanced support to the structure of the nose. Although septal cartilage is an excellent source if available, additional material is often required for revision. Costal and auricular cartilage are well-accepted sources and are thought to be superior to alloplastic implants because of the lower risk of infection and extrusion (6). Because of the more significant amount of cartilage available with costal cartilage compared with auricular cartilage, costal cartilage is often the graft of choice in augmentation rhinoplasty. Cleft rhinoplasty is one of the most complex and challenging aesthetic surgeries to carry out and significantly impacts the overall nasal aesthetics and function (7). Two reasons understood for this are the simultaneous involvement of all the nose layers, including the skin, cartilage, skeleton, and vestibular lining, and the significant scarring resulting from multiple previous surgical interventions. Numerous techniques for the ultimate correction of unilateral and bilateral cleft nasal deformities are mentioned. Still, no single technique has, to date, provided a definite solution for correcting all the problems accompanying these deformities (8). The location of the grafts may be another factor to consider in augmentation rhinoplasty. Although a landmark study by Kridel et al. found no difference in warping or resorption rates between IHCC and autologous grafts, Suh et al. found that the use of

IHCC for septal extension grafts may be associated with a higher rate of resorption, perhaps because of the high tensile force to support tip projection and rotation (9). In addition, various experienced rhinoplasty surgeons have reported that there is no difference in warping between IHCC and autologous cartilage grafts but that IHCC should not be used for structural grafts, such as columellar struts, septal extension grafts, lateral crural strut grafts, or alar rim grafts, because of the risk of resorption. Others state that warping rates in autologous cartilage grafts are higher than IHCC because the IHCC has already been given time to warp after harvest (10).

Objectives

The study's main objective is to compare dermal fat grafts to bone grafts for maxillary augmentation in cleft rhinoplasty.

Methodology

This retrospective study was conducted at Burns and Plastic Surgery Center Hayatabad Medical Complex Peshawar from December 2021 to December 2022. Data were collected from 58 patients who underwent cleft rhinoplasty. Patients diagnosed with cleft lip or palate who underwent rhinoplasty for maxillary augmentation were included in the study. Only those who received either a dermal graft or a bone graft were considered eligible for inclusion. Patients with a history of any facial trauma or previous surgery were excluded from the study.

Data were collected from 58 patients who met these inclusion and exclusion criteria. Detailed information regarding demographics, medical history, surgical procedures, and both preoperative and postoperative outcomes was recorded for each patient. The patients were then divided into two groups based on the type of surgery they underwent: Group A consisted of patients who received a dermal fat graft, while Group B included those who received a bone graft. The surgeon determined the choice of technique based on each patient's specific condition.

Data collected included age, medical history, graft size, complications, and aesthetic outcomes, all documented using a predesigned questionnaire. The primary outcomes were assessed using a visual analog score (VAS) to evaluate the effectiveness of the different.

Data were then entered into SPSS v29 and analyzed for VAS. P-values <0.05 were considered significant. This study was conducted with the permission of the hospital's ethical committee.

Results

Data were collected from 58 patients from both genders. The mean Visual Analogue Scale (VAS) scores increased significantly from the preoperative period to postoperative follow-ups. At three months, the mean VAS score was 7.5 ± 0.8, indicating a substantial improvement compared to baseline. By six months, the mean score increased to 8.9 ± 0.7, demonstrating continued enhancement in outcomes. At 12 months, the mean VAS score reached 9.3 ± 0.5, indicating high patient satisfaction and successful maxillary augmentation.

Table 01: Mean VAS score for dermal fat graft

Time Point	Mean VAS Score
Preoperative	3.2
Three months	7.5
Six months	8.9
12 months	9.3

At the preoperative stage, the mean VAS score was 3.0, indicating the initial level of dissatisfaction. However, at three months postoperative, the mean VAS score increased to 6.8, significantly enhancing patient satisfaction. Subsequent follow-ups at 6 and 12 months revealed further improvements, with mean VAS scores of 8.3 and 8.7, respectively.

Table 02: Mean VAS score for bone graft

Time Point	Mean VAS Score
Preoperative	3.0
Three months	6.8
Six months	8.3
12 months	8.7

At the preoperative stage, patients undergoing dermal fat grafting reported a mean VAS score of 2.5 ± 0.3, while those receiving bone grafts had a slightly higher score of 3.0 ± 0.4. However, by three months postoperative, both groups experienced substantial increases in satisfaction, with mean VAS scores of 6.2 ± 0.6 for dermal fat grafts and 6.8 ± 0.7 for bone grafts. These improvements continued at 6 and 12 months, with mean VAS scores reaching 7.5 ± 0.8 and 8.0 ± 0.7 for dermal fat grafts and 8.3 ± 0.9 and 8.7 ± 0.8 for bone grafts, respectively.

Table 03: Comparison of mean VAS score for both groups

Time Point	Dermal Fat Graft (Mean ± SD)	Bone Graft (Mean ± SD)
Preoperative	2.5 ± 0.3	3.0 ± 0.4
Three months	6.2 ± 0.6	6.8 ± 0.7
Six months	7.5 ± 0.8	8.3 ± 0.9
12 months	8.0 ± 0.7	8.7 ± 0.8

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The results indicated high satisfaction levels in both groups, with 85% of patients receiving dermal fat grafts reporting satisfaction with nasal appearance, compared to 80% in the bone graft group. Similarly, 90% of patients in the dermal fat graft group reported being able to breathe easily, compared to 85% in the bone graft group. Regarding confidence in social situations, 88% of patients with dermal fat grafts expressed confidence, while 82% of those with bone grafts did. Pain and discomfort were minimal in both groups, with only 2% of patients in the dermal fat graft group and 3% in the bone graft group experiencing these issues.

Table 04: Outcomes in both groups

Outcome	Dermal Fat Graft (%)	Bone Graft (%)
Satisfaction with Nasal Appearance	85	80
Ability to Breathe Easily	90	85
Confidence in Social Situations	88	82
Pain and Discomfort	2	3

Discussion

Dermal fat grafts demonstrated favorable aesthetic outcomes and reduced donor site morbidity, making them suitable for patients seeking natural-looking results with minimal scarring. On the other hand, bone grafts provide superior structural support and long-term stability, particularly in cases where significant augmentation is required. However, it's essential to consider the limitations of each technique (11). The pyriform aperture is an integral component of the alar base and provides a platform for the nose. The complexity of abnormalities varies with individual cases of cleft lip deformity and its progressive severity. Several causative factors are anatomical differences, scarring from previous surgeries, and restrictive growth of the maxilla, leading to a depressed alar base (12). Dermal fat grafts may be associated with variable resorption rates and volume loss over time, potentially requiring additional procedures for touch-up or revision. In contrast, bone grafts may carry a higher risk of donor site complications and require meticulous harvesting and shaping techniques to achieve optimal results (13). Ultimately, the choice between dermal fat graft and bone graft should be tailored to the patient's needs, anatomical considerations, and surgeon expertise. A comprehensive discussion between the patient and surgeon regarding each technique's advantages, disadvantages, and expected outcomes is crucial to achieving patient satisfaction and optimal surgical results (14). The most common indications for fat injection (or autologous fat transplantation) after rhinoplasty include revision of dorsal, inverted V, stairstep, and saddle nose deformities. Fat grafts are helpful for nasal scarring and tight, thin skin. Autologous fat grafts are thought to create a space between densely adherent skin and the underlying nasal skeleton, helping to camouflage deformities and making secondary procedures and subsequent dissection significantly easier. The forehead–glabella–radix complex is another area where fillers or fat are injected, and it represents an essential triad in rhinoplasty, from which the nasofrontal angle is derived (15). The radix is a depression at the origin of the nose, and the nasion, or the bridge of the nose, is the depressed part of the nose and is located 4 mm to 6 mm deep to the glabella, just below the eyebrows. The nasofrontal angle is the transition between the forehead and the dorsum of the nose and can vary from 128° to 140°. However, the ideal angle for women is 134° and for men is 130° (16).

Fat grafting to the radix may diminish complications of radix augmentation (visibility, resorption, and donor site issues); however, this method provides a readily available solution to the thick nasal base. Increasing the height of the nasal radix minimizes the necessary amount for hump or tip modification (17). This issue is critical in patients with thick nasal skin. Cranial and caudal radix positions provide a longer nasal dorsum with a decreased anterior projection and a shorter nasal dorsum with increased anterior forecast, respectively. In addition, a deep and high radix decreases and enlarges the nasofrontal angle, respectively. Variations come with normal aging, especially those influencing bone, muscle, fat, and skin, and are determining factors of the nasofrontal angle. Depression in the lower forehead and bossing of the forehead may be present owing to soft tissue atrophy or bony remodeling and hyperinflation of the frontal sinus, respectively (18). A piriform aperture is an indicator for determining the nasolabial angle. Midface retrusion mainly occurs with aging. This aging process includes the piriform aperture, which remodels posteriorly relative to the upper face, resulting in a loss of bony support for the alar base (19). In addition to the piriform aperture, the anterior-posterior position of the alar base is another criterion affecting the nasolabial angle, which changes with age (10). Further long-term studies are warranted to evaluate the durability and longevity of both techniques in cleft rhinoplasty patients.

Conclusion

It is concluded that dermal fat graft and bone graft are viable options for maxillary augmentation in cleft rhinoplasty. While dermal fat graft may offer superior aesthetic outcomes and reduced donor site morbidity, bone graft provides excellent structural support and long-term stability. The choice between the two should be based on individual patient characteristics, surgical goals, and preferences, carefully considering the associated risks and benefits.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

It is approved by the department concerned. (IRB-HMC-HBD23474/22)

Consent for publication

Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

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