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SURGICAL CORRECTION OF POST-TRAUMATIC NASAL DEFORMITY: A CASE REPORT WITH ANTHROPOMETRIC ANALYSIS

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ABSTRACT

Background: Post-traumatic deformities of the external nose represent a complex clinical challenge in facial plastic surgery due to the combined involvement of osteocartilaginous structures and functional impairment of nasal breathing. Such deformities are frequently associated with deviation of the nasal axis, disruption of dorsal aesthetic lines, tip asymmetry, and airway obstruction, requiring a comprehensive and individualized surgical approach.

Objective: To evaluate the effectiveness of comprehensive septorhinoplasty in the correction of post-traumatic nasal deformity using objective anthropometric analysis.

Methods: A clinical case of a patient with post-traumatic nasal deformity was analyzed. Preoperative and postoperative assessments were performed using standardized photographic anthropometry in frontal, basal, and lateral projections. Key parameters included nasal axis alignment, symmetry of dorsal

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aesthetic lines, tip projection and rotation, nasolabial angle, and nostril symmetry. Surgical correction involved a comprehensive septorhinoplasty approach, including septoplasty with restoration of the L-strut, medial and lateral osteotomies, dorsal reconstruction with spreader grafts, and tip refinement using structural techniques.

Results: Postoperative evaluation demonstrated significant improvement in all assessed anthropometric parameters. Nasal axis deviation was corrected with successful centralization. Symmetry of dorsal aesthetic lines was restored, and the nasal dorsum achieved a straight and harmonious contour. Tip projection and rotation were improved, resulting in normalization of the nasolabial angle from approximately 85–90° preoperatively to 95–100° postoperatively. Basal view analysis confirmed restoration of nostril symmetry and normalization of the basal triangle. No postoperative complications were observed.

Conclusion: Comprehensive septorhinoplasty is an effective and reliable method for the correction of post-traumatic nasal deformities. The use of a structural surgical approach combined with objective anthropometric assessment allows for predictable restoration of both aesthetic harmony and functional outcomes.

Introduction

Post-traumatic nasal deformities represent one of the most challenging problems in facial plastic and reconstructive surgery, as they involve both aesthetic disfigurement and functional impairment of nasal airflow. Injury to the osteocartilaginous framework frequently leads to deviation of the nasal axis, disruption of dorsal aesthetic lines, asymmetry of the nasal tip, and narrowing of the internal nasal valve, ultimately compromising both facial harmony and respiratory function [1,2].

The complexity of post-traumatic deformities lies in the combined involvement of bony and cartilaginous structures, as well as the frequent presence of septal deviation, which plays a key role in both aesthetic deformity and functional obstruction. Failure to adequately address septal pathology has been associated with a high risk of residual deformity and recurrence following rhinoplasty [3].

Modern rhinoplasty techniques have evolved toward a structural approach, emphasizing restoration of the nasal framework rather than simple reductive

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procedures. This approach includes septoplasty with preservation of the L-strut, controlled osteotomies for repositioning of the nasal bones, and the use of grafting techniques such as spreader grafts to reconstruct dorsal aesthetic lines and improve internal nasal valve function [4,5].

In addition, refinement of the nasal tip using suture techniques and structural support (e.g., columellar strut grafts) plays a crucial role in achieving long-term stability and aesthetic balance. Proper management of the nasal tip is essential, as inadequate support may lead to postoperative ptosis and unsatisfactory outcomes [6].

Objective evaluation of surgical results has become increasingly important in contemporary practice. Anthropometric analysis using standardized photographic documentation allows for quantitative assessment of nasal proportions, including nasal axis alignment, dorsal aesthetic lines, tip projection, and nasolabial angle. This method provides reproducible and clinically relevant data for both preoperative planning and postoperative outcome assessment [7].

Despite advances in surgical techniques, the correction of post-traumatic nasal deformities remains technically demanding and requires a comprehensive, individualized approach. Therefore, detailed clinical case analyses combined with objective anthropometric evaluation are essential for improving surgical strategies and outcomes.

CASE PRESENTATION

A patient presented with complaints of post-traumatic nasal deformity, facial asymmetry, and dissatisfaction with nasal aesthetics. The patient reported a history of nasal trauma followed by progressive deformity of the external nose.

On clinical examination, deviation of the nasal axis to the right was observed, accompanied by asymmetry of the dorsal aesthetic lines and irregularity of the nasal dorsum. The nasal tip demonstrated decreased projection and rotation, with mild ptosis. Basal view analysis revealed nostril asymmetry, suggesting involvement of the caudal septum. The nasolabial angle was reduced to approximately 85–90°.

Preoperative evaluation was performed using standardized photographic anthropometry in frontal, basal, and lateral projections (Figures 1–2). Objective

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assessment demonstrated deviation of the nasal axis, disruption of dorsal aesthetic lines, decreased tip projection, and asymmetry of the basal structures.

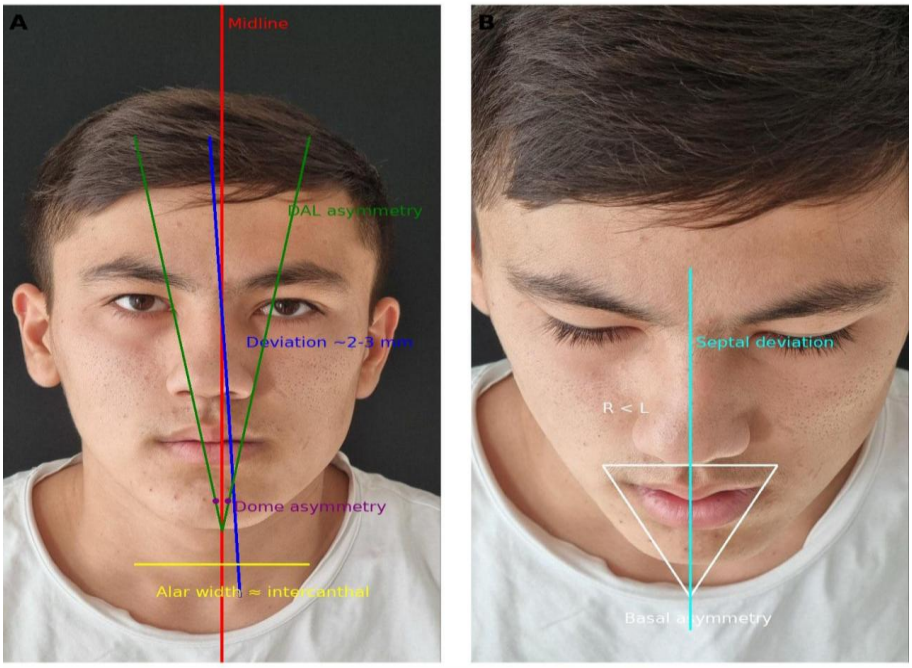

Figure 1

Figure 1. Preoperative anthropometric assessment of post-traumatic nasal deformity. (A) Frontal view reveals right-sided deviation of the nasal axis (~2–3 mm), disruption of dorsal aesthetic lines, and asymmetry of the dome complex. The alar base width approximates the intercanthal distance. **(B)** Basal view demonstrates asymmetry of the nostrils (R < L), distortion of the basal triangle, and caudal septal deviation contributing to overall nasal asymmetry.

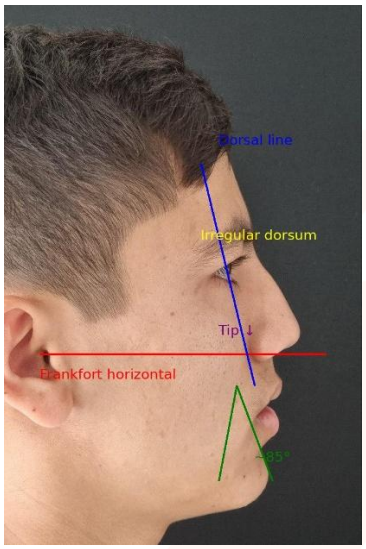

Figure 2

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Figure 2. Preoperative lateral anthropometric assessment of a patient with post-traumatic nasal deformity. The nasal dorsum appears irregular with deviation from the ideal dorsal aesthetic line. Tip ptosis is evident, accompanied by decreased rotation and projection. The nasolabial angle is approximately 85°, which is below the normal range for males (95–100°), indicating inadequate tip support.

A comparative anthropometric analysis was conducted to quantify preoperative deformities and to provide a baseline for postoperative evaluation (Table 1).

Table 1. Comparative anthropometric assessment before and after surgical correction

Parameter	Preoperative	Postoperative	Assessment
Nasal axis	Deviation to the right (~2–3 mm / 4–6°)	Centered (≤2–3°)	Normalization
Dorsal aesthetic lines (DAL)	Asymmetric	Symmetric	Restored
Nasal dorsum	Irregular, post-traumatic deformity	Straight	Corrected
Nasal tip	Ptosis, decreased rotation	Increased rotation, centered	Improved
Tip projection	Insufficient	Increased	Optimized
Nasolabial angle	~85–90°	~95–100°	Normalized
Columella	Deviated	Midline position	Centered
Nostrils	Asymmetric (R < L)	Symmetric	Corrected
Basal triangle	Distorted	Symmetric	Restored
Alar base	Moderately widened	Harmonized	Balanced

Comparative analysis demonstrates normalization of nasal axis alignment, restoration of dorsal aesthetic lines, improvement in nasal tip projection and rotation, and correction of nostril asymmetry following surgery.

SURGICAL TECHNIQUE

A comprehensive septorhinoplasty was performed under general anesthesia using a structural approach aimed at restoring both functional and aesthetic nasal parameters.

The procedure began with septoplasty, focusing on correction of septal deviation and preservation of a stable L-strut to maintain structural support of the nose.

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Particular attention was paid to the caudal septum, which was repositioned to achieve proper alignment along the facial midline.

Subsequently, controlled medial and lateral osteotomies were performed to mobilize and reposition the nasal bones, allowing correction of the deviated nasal axis and restoration of symmetry.

Dorsal reconstruction was carried out using spreader grafts placed between the septum and upper lateral cartilages. This technique facilitated restoration of the dorsal aesthetic lines and improvement of the internal nasal valve function. Refinement of the nasal tip was achieved using interdomal sutures to correct dome asymmetry and enhance tip definition. A columellar strut graft was placed to provide additional support, improve tip projection, and optimize rotation. Hemostasis was achieved, and soft tissues were redraped with careful attention to symmetry. The procedure resulted in restoration of the nasal framework and improved alignment of key anatomical structures.

RESULTS

Postoperative evaluation demonstrated significant improvement in all key anthropometric and aesthetic parameters of the external nose. Frontal analysis revealed complete centralization of the nasal axis, with no clinically significant residual deviation. Symmetry of the dorsal aesthetic lines (DAL) was restored, resulting in a harmonious and balanced nasal contour.

In the lateral projection, the nasal dorsum appeared straight without irregularities, indicating successful correction of post-traumatic deformity. Nasal tip projection and rotation were improved, with restoration of adequate structural support. The nasolabial angle increased from approximately 85–90° preoperatively to 95–100° postoperatively, corresponding to normal values for male patients.Basal view analysis confirmed restoration of nostril symmetry and normalization of the basal triangle. The columella was aligned along the facial midline, reflecting successful correction of the caudal septum. Postoperative outcomes were assessed using standardized photographic anthropometry **(**Figures 5–7**),** which demonstrated consistent improvement across all evaluated parameters.

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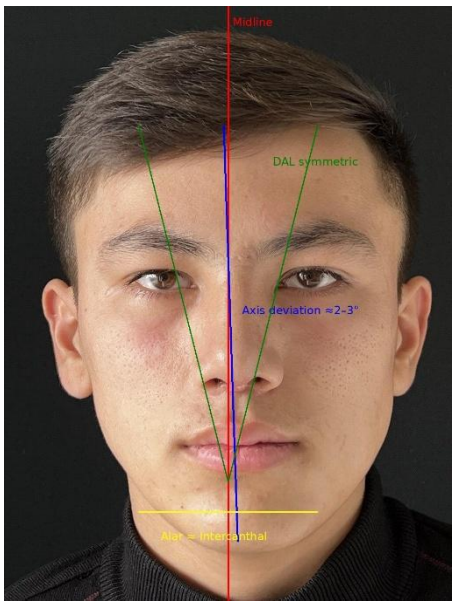

Figure 3

Figure 5. Postoperative frontal anthropometric assessment following septorhinoplasty. The nasal axis is aligned with the facial midline, with only minimal residual deviation (≤2–3°), which is clinically insignificant. Dorsal aesthetic lines are symmetric, reflecting successful reconstruction of the nasal dorsum. The alar base width is proportionate to the intercanthal distance, maintaining facial balance and aesthetic proportions.

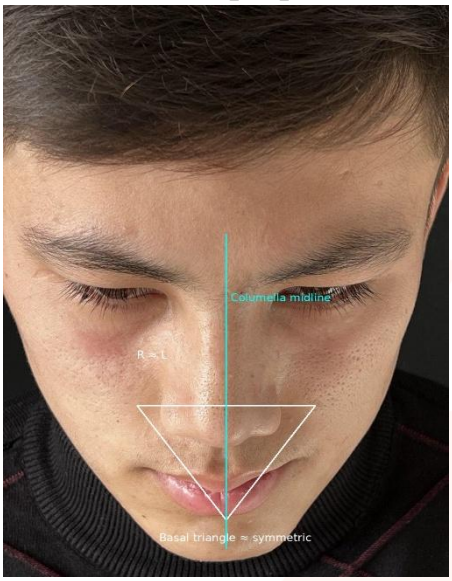

Figure 4

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Figure 4. Postoperative basal anthropometric assessment following septorhinoplasty. The basal view reveals symmetric nostrils (R ≈ L) and a well-defined, nearly equilateral basal triangle. The columella is positioned along the facial midline, reflecting adequate correction of the caudal septum and restoration of tip support. These findings indicate successful re-establishment of nasal base symmetry and structural balance.

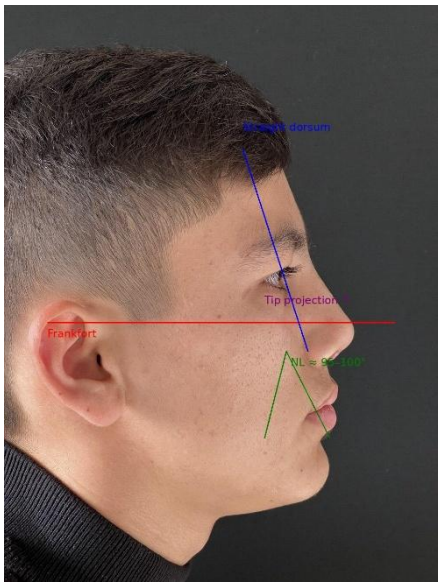

Figure 7. Postoperative lateral anthropometric assessment following septorhinoplasty. The nasal dorsum appears straight with restoration of the dorsal aesthetic line. Tip projection and rotation are increased, indicating improved structural support. The nasolabial angle is approximately 95–100°, within the physiological range for male patients, reflecting adequate tip positioning and rotation.

Importantly, no intraoperative or postoperative complications were observed. The patient reported satisfaction with both aesthetic appearance and nasal function.

DISCUSSION

Post-traumatic nasal deformities represent a complex reconstructive challenge due to the involvement of both bony and cartilaginous structures, as well as their impact on nasal function. In the present case, the deformity included deviation of the nasal axis, disruption of dorsal aesthetic lines, and asymmetry of the nasal tip and base, which is consistent with previously reported patterns of post-traumatic nasal injury [1,2].

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A key principle in the correction of such deformities is the restoration of the nasal septum, which serves as the central supporting structure of the nose. Inadequate correction of septal deviation has been identified as a major cause of persistent deformity and surgical failure [3]. In this case, septoplasty with preservation and realignment of the L-strut allowed for stable centralization of the nasal framework.

The use of controlled medial and lateral osteotomies enabled repositioning of the nasal bones and correction of the deviated nasal axis. This approach is widely supported in the literature as essential for achieving symmetry in post-traumatic cases [4]. The postoperative results demonstrated effective realignment, with only minimal residual deviation (≤2–3°), which is considered clinically insignificant.

Reconstruction of the dorsal aesthetic lines is a critical determinant of successful aesthetic outcomes. The application of spreader grafts in this case contributed to restoration of the dorsal contour and improvement of internal nasal valve function, in agreement with the structural rhinoplasty concepts described by Sheen and later expanded by Toriumi [5,6].

Nasal tip refinement remains one of the most technically demanding aspects of rhinoplasty. In this patient, the use of interdomal sutures combined with a columellar strut graft provided adequate support, resulting in improved tip projection and rotation. This is reflected in the normalization of the nasolabial angle from approximately 85–90° preoperatively to 95–100° postoperatively, which falls within the accepted aesthetic range for male patients [7].

Anthropometric analysis played a crucial role in objectively evaluating surgical outcomes. Quantitative and qualitative improvements were observed across all parameters, including nasal axis alignment, dorsal symmetry, tip projection, and basal configuration. Such objective assessment is increasingly emphasized in modern rhinoplasty literature as a tool for standardizing outcome evaluation [7].

Importantly, no complications were observed in the postoperative period, and the patient reported satisfaction with both aesthetic and functional outcomes. This supports the effectiveness of a comprehensive structural approach in managing post-traumatic nasal deformities.

Despite the successful outcome, this study is limited by its design as a single case report. Further studies with larger patient cohorts and long-term follow-up are required to validate the reproducibility and stability of these results.

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CONCLUSION

Comprehensive septorhinoplasty represents an effective and reliable approach for the correction of post-traumatic nasal deformities involving both structural and functional components.

In the present case, restoration of the nasal septum, precise osteotomies, and application of structural grafting techniques resulted in successful centralization of the nasal axis, re-establishment of dorsal aesthetic lines, and normalization of nasal tip projection and rotation. Objective anthropometric analysis confirmed significant improvement across all key parameters, including the nasolabial angle and basal symmetry.

The findings highlight the importance of a structural and individualized surgical strategy combined with objective outcome assessment. This approach allows for predictable restoration of nasal form and function, ultimately improving both aesthetic outcomes and patient satisfaction.

Further studies with larger cohorts and long-term follow-up are warranted to validate the reproducibility and stability of these results.

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