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Case report

Closure of a Nasal Bridge Defect Using a Mandibular Bone Block

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ABSTRACT

BACKGROUND: The surgical closure of pneumatized structures can be challenging due to formation of air fistulas in absence of a hard tissue base. The cortical bone block of the mandibular linea obliqua is an easy to harvest bone graft, commonly used in augmentation of the alveolar ridge. We present a case in which a traumatically caused defect of the nasal bridge was successfully closed after bony reconstruction using a retromolar elevated bone block.

CASE SUMMARY: A 69-year-old female patient presented with midfacial fractures along the Le Fort I plane on both sides, the nasal framework and the left nasoorbitoethmoidal complex with involvement of the orbital floor. Two weeks after initial reduction and osteosynthesis as well as closure of soft tissue damage along the nasal radix a penetrating defect into the nasal cavity was detected. In subsequent surgeries, the defect was successfully closed using a cortical bone block of the mandibular linea obliqua, showing a stable wound closure even ten months after surgery.

CONCLUSION: The mandibular bone block can not only be used to augment the alveolar ridge, but presents a viable alternative to treat hard tissue defects in the entire facial region.

Keywords: Facial fractures; Reconstructive surgical procedures; Bone transplantation; Mandible; Autografts

1. Introduction

The surgical closure of defects in pneumatized structures, from tracheostomy sites to oroantral fistulas, can be challenging due to the lack of a hard tissue base, the size and location of the defect, previous operations, or a lack of patient compliance. In pre-prosthetic dentoalveolar surgery, the intraorally elevated cortical bone block of the mandibular linea obliqua is an established procedure for autologous augmentation of the edentulous alveolar process (Khoury & Hanser, 2019). We present a case in which a traumatically caused defect of the nasal bridge was successfully closed after bony reconstruction using a retromolar elevated bone block.

2. Case presentation

A 69-year-old female patient was transferred to the Department of Craniomaxillofacial Surgery at Münster University Hospital. She reported having fallen at home the previous day. A CT scan performed in the emergency department revealed a complex midfacial fracture with fracture lines along the Le Fort I plane bilaterally, the nasal framework, and the left naso-orbito-ethmoidal complex, with involvement of the orbital floor (**Figure 1**). Accompanying soft-tissue injuries in the regions of the nasal root and upper lip had already been closed primarily in the emergency department. No other sequelae of trauma, particularly intracranial or ophthalmological, were identified. The medical history included chronic nicotine abuse, arterial hypertension, chronic obstructive pulmonary disease, and hypercholesterolaemia. Clinical findings included a mobile midface and moderate epistaxis. In the subsequent operation under general anaesthesia, reduction and osteosynthesis were performed using titanium miniplates along the Le Fort I plane via an intraoral approach. The left infraorbital rim was reconstructed using a miniplate via the existing infraorbital wound (**Figure 1**). The nasal framework was elevated via a closed transnasal approach, followed by tamponade through both nostrils and external splinting with a Denver splint. The postoperative course was uncomplicated, and the patient was discharged promptly in good general condition.

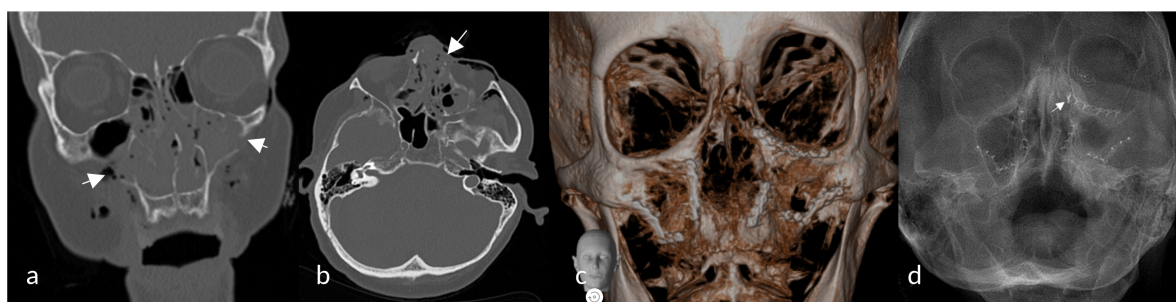


Figure 1. Fracture along the Lefort-I plane (a) and the left nasoorbitoethmoideal complex (b); initial osteosynthesis using miniplates along the midfacial pillars and along the left infraorbital rim (c) and postreconstructive radiographic control of graft placement (d).

The nasal splint was removed during the postoperative follow-up examination two weeks later. Marked wound dehiscence on the left nasal bridge was observed (**Figure 2**). The defect extended into the nasal cavity. After two weeks of local antiseptic pretreatment, the defect was closed surgically using a caudally based nasolabial flap under local anaesthesia (Ultracain D-S, Sanofi Aventis, France).

Despite a further three-day tamponade of the left nostril and close clinical follow-up, an approximately 7×10 mm dehiscence of the left nasal bridge, extending into the nasal cavity, developed again ten days postoperatively. Assuming that primary wound closure had been prevented by the lack of a bony base and the resulting constant airflow, which led to fistula formation, the defect was revised. To separate soft-tissue wound healing from the nasal cavity while simultaneously creating a hard bony base, a retromolar bone block was transplanted into the defect under general anaesthesia. It was secured with a titanium screw and covered with a collagen membrane (**Figures 1 and 2**). The soft-tissue defect was again covered using a caudally based nasolabial flap. This time, wound healing was uncomplicated, although delayed in the area of the defect (**Figure 2**). Apart from slight hypoaesthesia adjacent to the retromolar and infraorbital incision lines, no complications occurred during follow-up until 10 months postoperatively.

2.1. Surgical procedure

The bone block was harvested from the left external oblique line in the mandibular retromolar region. Measuring approximately 1×2 cm, the block was elevated as a full-thickness cortical bone block and inserted without being halved in thickness, as is common in dentoalveolar surgery. Sharp edges were smoothed using a rotating diamond bur, and the block was fixed to the paranasal pillar with an 11-mm screw (Medartis GmbH MODUS 2, Basel, Switzerland). The bony reconstruction was covered with a 2×3 cm collagen membrane (Straumann Jason membrane, Basel, Switzerland). The soft-tissue defect was primarily closed using a caudally based, subcutaneously pedicled nasolabial flap.

2.2. Postoperative course

Nicotine patches were used to prevent inhalation of nicotine. Alongside antibiotic prophylaxis with ampicillin/sulbactam (Unacid, Pfizer, New York City, USA) and nasal tamponade to obstruct airflow, this initially resulted in uncomplicated wound healing, allowing discharge on the fourth postoperative day. At the outpatient follow-up examination two weeks later, a granulating dehiscence was detected and treated with moist dressings to promote granulation. The wound closed without further irritation eight weeks postoperatively. During the wound-healing process, the patient was instructed to refrain from inhaling nicotine and blowing her nose.

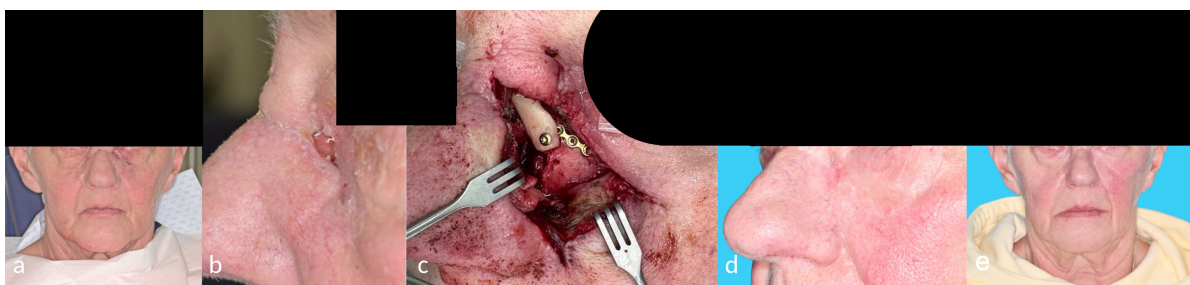


Figure 2. Initial postoperative defect (a, b), intraoperative graft placement (c) and closed defect after 10 months (d, e)

3. Discussion

The successful reconstruction of this pneumatized defect is most likely attributable to the combined use of hard- and soft-tissue reconstruction techniques. Alternatives for bony reconstruction include autografts harvested either from the pelvis (Alshehri et al., 2020) or the calvaria (Azizzadeh & Mashkevich, 2013; Çelik & Aktan, 2019; Emerick et al., 2008), both of which have been described as suitable grafts for use in rhinoplasty. Both procedures are associated with greater surgical expense and more serious potential complications, such as injury to intracranial or abdominal structures, whereas a retromolar bone block may cause sensory disturbances of the inferior alveolar nerve (Khoury & Hanser, 2015, 2019). Alternatively, in this case, soft-tissue-only closure of the defect could have been achieved using a pedicled frontal flap (Longino & Most, 2025). In addition to flap-base detachment as a necessary second procedure, a reduction in quality of life due to temporary disfigurement and difficulty wearing glasses during the healing phase would have been expected. The combined hard- and soft-tissue reconstruction using a retromolar bone block and nasolabial flap thus proved to be a promising approach for comparable defects.

The procedure can be planned using physical examination and cone-beam computed tomography to visualise both the defect and the donor area, both of which are diagnostic modalities frequently available to practitioners. Intraoperatively, no repositioning of the patient or preparation of a second surgical site is necessary. Bone harvesting involves a small approach and minimal surgical effort, allowing the operating time and duration of anaesthesia to be minimised. Since the retromolar block can be harvested without general anaesthesia, treatment under local anaesthesia alone is conceivable for patients at high risk of anaesthesia-related complications or with difficult airways, as well as for those with small defects in accessible anatomical regions such as the nose or frontal sinus.

To the authors' knowledge, this is the first case report of its kind. To establish and standardise the procedure and determine its limitations, further investigations are necessary regarding the selection of suitable defects, considering their size and location.

4. Conclusion

This case shows that intraorally harvested bone can be used not only for augmentation of the alveolar ridge but also for the reconstruction of bony defects throughout the facial region. The graft can be harvested with minimal surgical effort and involves only mild morbidity compared with other autologous replacement options. Limitations of this technique result from the size of the defect and the avascular nature of the graft. The decision to use this procedure for reconstruction should be made only after consideration and exclusion of comparable alternatives.

Acknowledgements: Not applicable

Ethical approval: While no ethical committee was consulted prior to treatment (since this was a standard-of-care procedure), the treatment adhered to the principles of the Declaration of Helsinki and written informed consent was documented prior to intervention.

Consent for publication: Written informed consent was obtained from the patient prior to submission.

Competing interests: The author(s) declare that there are no competing interests related to this work.

Authors' contributions: The author(s) declare that all the criteria for authorship designated by the International Committee of Medical Journal Editors have been met. More specifically, these are: (a) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (b) Drafting the work or revising it critically for important intellectual content; AND (c) Final approval of the version to be published; AND (d) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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