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Case report

ADOLESCENT NASAL DEFORMITY FROM NEONATAL IATROGENIC TRAUMA: SURGICAL RESTORATION VIA FAT AND CARTILAGE GRAFTING: A CASE REPOR

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Abstract

Defects of the nasal complex can cause significant functional and psychosocial impairment whether acquired or congenitally inherited. Iatrogenic nasal deformities are uncommon complication of supportive care in neonates. Poor placement, insufficient immobilization of the cannula or prolongated nasopharyngeal intubation can result in injury to the nasal lining and can lead to aplasia of the nasal cartilage.

We present the case of a 17-year-old female who developed an iatrogenic nasal deformity following prolonged nasotracheal intubation as a premature neonate at seven months gestation, necessitating a three-month NICU stay. On examination, right nostril asymmetry and breathing difficulties were noted. During open rhinoplasty, agenesis of the medial and lateral crura of the right lower lateral cartilage was discovered - an anatomical deficiency creating a significant reconstructive challenge.

Our surgical approach employed two stages: first, fat grafting to restore soft tissue volume and contour; second, autologous cartilage grafting from the septum (with options including conchal cartilage or dorsal hump cartilage) to reconstruct the undeveloped lower lateral cartilages. This method successfully restored nasal symmetry and improved airway function. The case underscores the importance of recognizing iatrogenic cartilage damage in patients with neonatal airway interventions and illustrates effective staged reconstructive strategies for such rare but impactful deformities.

Keywords: iatrogenic nasal deformity; neonatal nasotracheal intubation injury; agenesis of medial and lateral crus of lower lateral cartilage; reconstruction with fat and cartilage graft; rhinoseptoplasty

Introduction

Nasotracheal intubation in preterm or low birth-weight neonates can lead to serious nasal complications, particularly affecting the alar cartilage. Prolonged pressure from a nasopharyngeal tube may cause ischemic necrosis, eventually resulting in alar agenesis or collapse of the lower lateral cartilage[1]. Pressure necrosis from ill-fitted or inadequately immobilized tubes can erode the nasal lining and underlying cartilage, leading to agenesis of alar structures. In neonates, the nasal framework is fragile - characterized by thin, poorly calcified cartilage - making it highly susceptible to pressure injury during intubation[2].

Surgical correction typically involves autologous cartilage grafting, with donor sites including the lower lateral cartilage, conchal cartilage, septum, dorsal nasal hump, helical rim, and composite grafts from the conchal area[3]. Often, such cartilage deficiencies are discovered

incidentally during rhinoplasty procedures performed for aesthetic purposes or post-traumatic reconstruction.

Case report

We present the case of a 17-year-old female patient who came to the University Clinic for Plastic and Reconstructive Surgery in Skopje, North Macedonia due to asymmetry of the nasal alae, nasal tip deformity and breathing difficulties. The patient reported that the nasal deformity originated from the placement of a nasotracheal tube immediately after birth. She was born prematurely at 32 weeks of gestation from a twin pregnancy, with a birth weight of 980 grams, and required mechanical ventilation for approximately three months. Her twin sister required mechanical ventilation for only two weeks; she was born with a birth weight of 1100 grams and she did not have any problems.

Physical examination revealed asymmetry of the nasal alae and nasal tip. The right nostril appeared significantly narrowed or flattened, with a reduced or absent alar rim indicating loss of structural support. The underlying lower lateral cartilage was either missing or markedly thinned on the affected side, causing the nostril to lose its natural curve and volume. There was a nostril wall weakens that collapse inward during inhalation which indicated that there was external valve weakness. The patient also reported persistent nasal obstruction with airflow restriction, and she complained of functional and aesthetic problems (Figure 1).

We set an indication for a two-phase surgical reconstruction. The patient underwent surgery for both functional and aesthetic outcomes.

Fig 1. Preoperative views of the patient: (A) front view; (B) base view; (C) profile right view; (D) profile left view

The first phase consisted of autologous fat grafting. The initial procedure involved autologous fat grafting (lipofilling) to enhance nasal contour and support. Fat was harvested from the lower abdomen, a site chosen for both its ample fat volume and patient comfort. After meticulously preparing the area, approximately 50 mL of tumescent solution was infiltrated, and we waited about 25 minutes to allow for adequate vasoconstriction before initiating the gentle fat harvest. After 25 min, the fat was harvested and injected with a small (2-3 mm) blunt cannula approximately 3 ml into the nasal tip, right alar region, and both internal and external nasal valves. This technique aimed to correct soft tissue deficiencies and improve nasal symmetry and airway function (Figure 2).

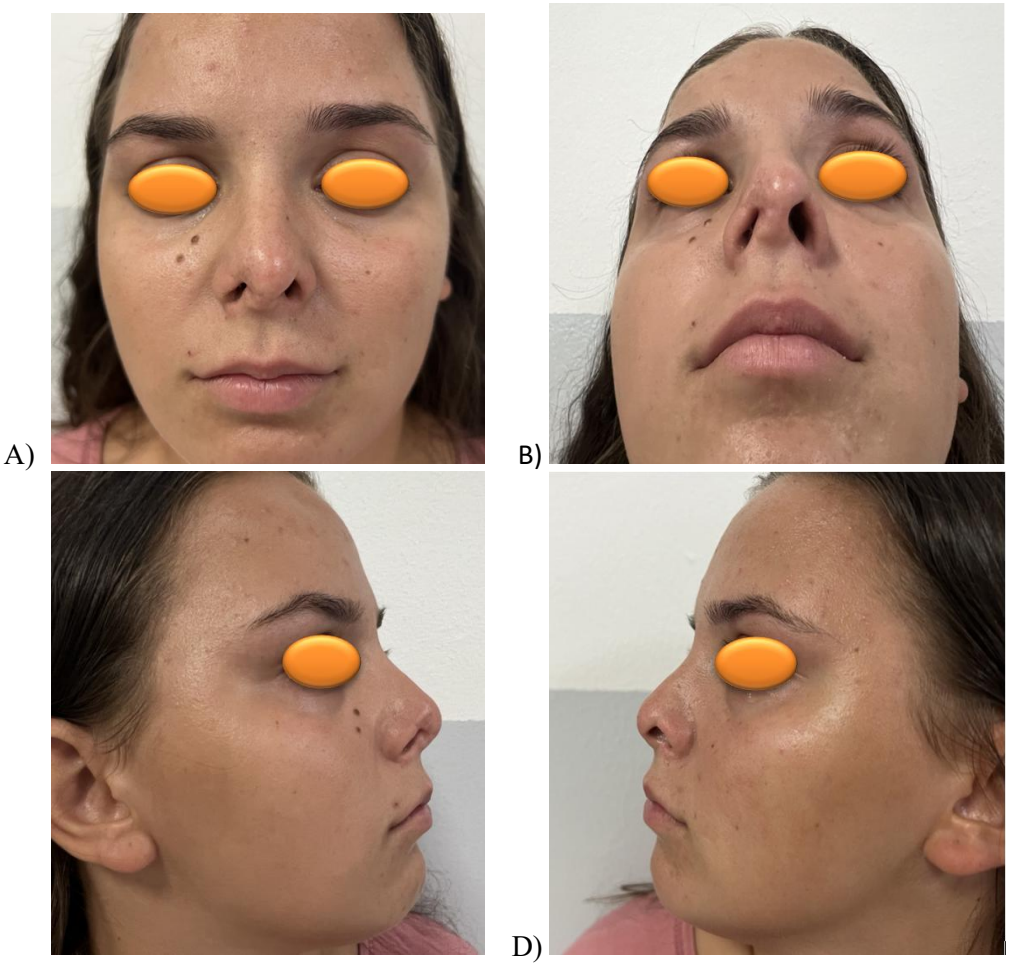

Fig 2. Photos 6 months after first stage of reconstruction - fat grafting/lipofilling: (A) front view; (B) base view; (C) profile right view; (D) profile left view

In the second phase, 6 months after the previous surgery, an open rhinoseptoplasty was performed. During the intervention, an incision was made on the columella and the inside of both nostrils. Open rhinoplasty was started with blunt dissection. During the operation, a complete absence of the medial, lateral crus, and columella of the lower right lateral cartilage was noted. Reconstruction was achieved using autologous septal cartilage graft from nasal septum. These grafts were sculpted and positioned to reconstruct the columella and to form new medial and lateral crura of the right lower lateral cartilage.

This approach restored structural integrity, nasal symmetry, and improved airway patency (Figure 3).

One month after the surgical intervention, the patient showed satisfactory outcomes from both functional and aesthetic perspectives (Figure 4).

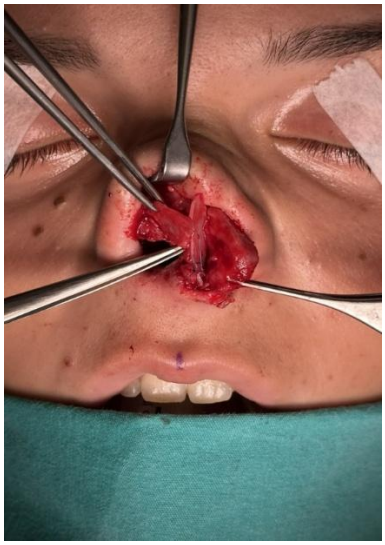

Fig. 3. The intra-operative picture showing the septal cartilage graft sculpted and positioned to reconstruct the columella and to form new medial and lateral crura of the right lower lateral cartilage

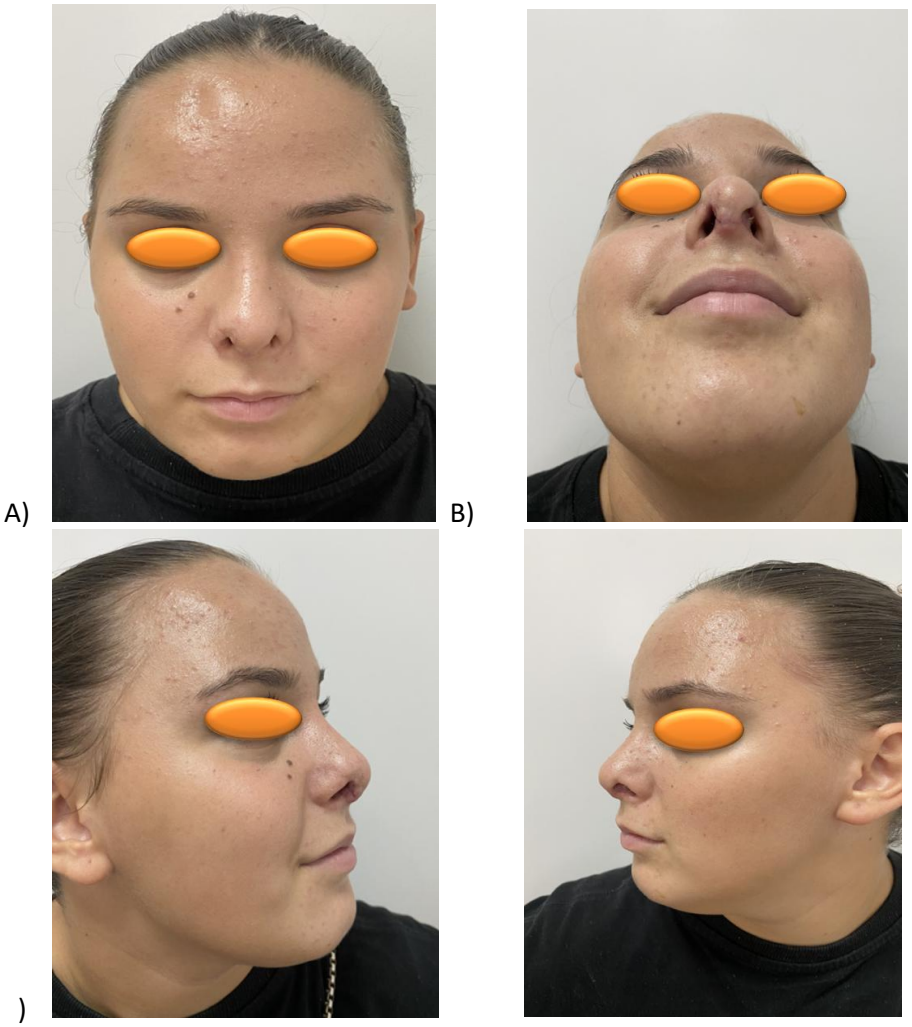

Fig 4. The postoperative outcome following septal reconstruction during an open approach rhinoplasty: (A) front view; (B) base view; (C) profile right view; (D) profile left view

Discussion

Iatrogenic nasal deformities are rare but significant complications in neonatal care, often resulting from prolonged nasopharyngeal intubation or improper fixation of respiratory devices. These conditions can lead to pressure necrosis of the nasal cartilage, causing defects or complete absence of cartilage in affected areas[1,15 -17].

Pressure necrosis from improperly placed or secured nasotracheal or nasogastric tubes in neonates can lead to full-thickness alar cartilage loss. This complication is well documented in infants, where delicate nasal tissues are especially vulnerable to sustained pressure. One study highlighted several cases of alar defects and airway stenosis caused by prolonged intubation, emphasizing the need for vigilant care during respiratory support[9]. Another pediatric case described pilot tube erosion resulting in nasal alar necrosis in a young patient[10]. Isolated aplasia or absence of the lower lateral cartilage is uncommon, yet it can mimic deformities seen in preterm infants subjected to prolonged nasal intubation or CPAP. Indeed, research has highlighted a significant incidence of columellar necrosis, alar collapse, and tip depression among infants <1500 g exposed to extended nasal airway devices[1].

The structural integrity of the nasal ala depends on the lower lateral cartilage. Sustained pressure on this area can disrupt vascular supply, causing tissue breakdown and cartilage resorption. Clinically, resultant defects present as alar collapse, asymmetry, and compromised breathing - classic signs of external nasal valve dysfunction, often seen in pediatric airway cases.

The lower lateral cartilage consists of three portions (lateral, middle, and medial crura) which collectively define the nasal tip's shape, projection, and valvular function. Damage or atrophy of these structures leads to characteristic deformities: weakened lateral crura cause alar rim notching and wall collapse, while deficient medial crura results in poor tip support, underprojection, and external valve dysfunction[7]. Clinically, these deformities not only compromise aesthetics but also elevate the risk of airway obstruction.

Multiple techniques of varying complexity have been described for reconstruction of the congenital aplasia or atrophy of lower lateral cartilage with autologous cartilage grafts from the nasal septum and conchal cartilage or allogenic grafts, using open rhinoplasty approach [4,5,6-8] that permits direct exposure of the lower lateral cartilage providing a more accurate diagnosis and surgical intervention.

This case illustrates a synergistic approach: first, soft-tissue preparation via fat grafting; second, definitive structural reconstruction using septal cartilage. Autologous fat grafting is a valuable adjunct in rhinoplasty, particularly for correcting soft-tissue deficiencies. Research demonstrates that structural fat transfer provides several advantages in aesthetic nose surgery and secondary rhinoplasty: it improves skin-soft tissue envelope quality, reduces postoperative bruising and swelling, and is generally safe (zero infection or obstruction reported in some series)[15]. Additionally, fat grafts can create a cushioning layer between skin and skeletal structures, enhancing subsequent surgical manipulation. In our case, the first stage, lipofilling of the nasal tip, alar region, and internal/external valves, not only improved nasal symmetry and volume but likely conditioned the tissue for later surgery.

Six months after fat grafting, open rhinoplasty revealed complete absence of the lower lateral cartilage. Using autologous septal cartilage grafts, we reconstructed the medial and lateral crura and columella to restore tip structure and airway integrity. Septal cartilage remains the gold standard graft material due to its availability, ease of harvest, low complication risk, and long-term stability. Open approach allows precise graft placement and structural verification, consistent with NCBI guidelines[13,14].

At one-month follow-up, the patient exhibited marked improvement in nasal symmetry, tip definition, and airway patency - outcomes that align with established literature on fat and cartilage grafting's combined efficacy. The reconstructive sequence echoes successful

strategies in secondary rhinoplasty, combining soft-tissue priming with definitive structural repair.

Conclusion

Whether congenital or iatrogenic, aplasia of the lower lateral cartilage poses a distinct technical challenge in rhinoplasty. In particular, the risk of nasal cartilage loss following nasotracheal intubation though uncommon must be recognized, especially in susceptible groups such as infants and young children. To mitigate this risk, vigilant attention to tube diameter, secure fixation methods, and limiting intubation duration are paramount.

When cartilage aplasia occurs, the open rhinoplasty approach enables effective reconstruction. As demonstrated in this case, a staged repair strategy - initial autologous fat grafting to restore soft tissue volume and structural support, followed six months later by open rhinoseptoplasty using septal cartilage grafts to reconstruct the lower lateral cartilage, columella, and nasal tip - yielded excellent outcomes. Within a month of the second procedure, notable improvements in nasal symmetry and aesthetic contour were achieved, thereby improving the airway function. It is essential for surgeons to recognize the possibility of iatrogenic nasal deformities or congenital cartilage anomalies and be adequately prepared to reconstruct the lower lateral cartilage during surgical procedures to ensure both functional and aesthetic restoration.

Conflict of interest statement. None declared.

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