

Congenital Absence of Nasal Cartilage: A Case Report and Review of Literature

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Abstract

Introduction: Congenital absence of nasal cartilage in isolation, or as part of a syndromic condition, is an extremely rare phenomenon and is poorly described in the literature. Without normal anatomical landmarks and surgical planes, reconstruction of these anomalies can be extremely challenging. In this report, we describe the workup and unique surgical challenges involved in reconstructing a 17 year old female with congenital absence of nasal cartilage. Specifically, we discuss the successful implementation of the Tasman technique, using diced cadaveric rib graft and fibrin sealant to create a custom dorsal onlay graft.

Methods: Case report and literature review. The patient's pertinent history, clinical findings, and radiologic studies are examined.

Results: The case is of a 17 year old female who presented to a tertiary medical center's outpatient facial plastics and reconstruction department seeking surgical consultation regarding her nasal deformity. Her complaints were both cosmetic and functional in nature, reporting chronic nasal congestion as her primary concern. On exam, she appeared to lack both upper and lower nasal cartilages, as well as cartilaginous septum. Her bony septum was felt to be intact. Additionally, she appeared to have maxillary deficiency. A CT sinus was ordered which revealed absent nasal cartilages, hypoplastic nasal bones, and a reduced nasal aperture. Her maxillary sinuses were well developed and well aerated. She was later taken to the operating room, where she underwent a functional rhinoplasty, which included the use of cadaveric rib graft and a fibrin sealant to create a custom dorsal onlay graft and complete build of her nasal cartilage. She has been seen in the clinic post-operatively and reports satisfaction, both from a function and cosmetic standpoint.

Conclusion: Congenital absence of nasal cartilage is a rare phenomenon, presenting challenges for both the patient and the reconstructive surgeon. In this article, we describe the challenges associated with undertaking such a reconstruction. Specifically, we describe successful implementation of fragmented cadaveric rib graft and Tisseel to create a custom dorsal onlay graft.

Introduction

Congenital absence of nasal cartilage is a rare phenomenon that can take place in isolation or as part of a syndrome, including Apert, Fraser, and Binder Syndromes. Embryologically, the nose begins its development during the 4th week of gestation with the migration of the nasal placodes. Specifically, the nasal septum begins its development during week 5, however, it is not until the 10th week that the primitive tissues begin their differentiation into cartilage and bone that will eventually form the foundation of the nose. The absence of these structures can have a devastating effect on both cosmesis and function of the nose.

The shape and integrity of the nose is reliant upon several soft tissue structures. A strong understanding of the physics behind these structures allows the facial plastic surgeon to alter the shape, appearance, and function of the nose by making precise and calculated manipulations during functional rhinoplasty. By the same token, surgeons who do not respect the importance of these structures, or err in the alteration of these nasal components risk unfavorable outcomes.

The nasal tip is theorized to be supported by three major and six minor support structures. The major supports include: (1) the size, shape, strength, and resilience of the lower lateral cartilage, (2) the attachment of the medial crural foot plate to the caudal border of the quadrilateral cartilage, and (3), the attachment of the upper lateral cartilage to alar cartilages. The minor supports include: (1) dorsal cartilaginous septum, (2) the interdomal ligaments, (3) the nasal spine, (4) the membranous septum, (5) attachment of alar cartilage to overlying skin and musculature, and (6) the sesamoid complex. Even the most modest changes made to any of these support systems can have large consequences on both the form and function of the nose. Take it one step further, in the the case of our patient, and imagine the devastating effects of lacking the majority of these supporting structures.

One recent technique used for nasal reconstruction that has been described in the literature is known as the Tasman technique. Using this approach, a facial plastic surgeon can drastically improve or augment the nasal dorsum, from radix to tip. The procedure involved dicing cartilage, either obtained as an autograft or cadaveric, and reshaping it using a modified syringe and tissue sealant to create a custom dorsal onlay graft. Although only recently described and sparsely found in the literature, the technique does show promise, with both pleasing cosmetic results and low resorption rates up to 9 months postoperatively.

This technique can be customized in patients requiring both small and large dorsal reconstructions, such as saddle-nose deformity. In this case report, we describe employing the Tasman technique to reconstruct the nose of a patient with congenital absence of nasal cartilages.

Case Report

This is a 17 year old female who presented to the clinic for evaluation of her nasal deformity. She expressed difficulty with nasal breathing. Her past medical history also including obstructive sleep apnea. She denied any previous past surgical history, medications, and allergies. She had a short history of smoking tobacco and marijuana, but denied alcohol use. Of interest, the patient did report being adopted from a foster home, but had that her biological mother used both alcohol and illicit drugs during the time of pregnancy.

Figures 1 shows the patient preoperatively. Preoperative CT of the sinuses (Fig. 2) revealed absent nasal cartilages, hypoplastic nasal bones, and a reduced nasal aperture. Her maxillary sinuses were well developed and well aerated. The patient was taken to the operating room for functional rhinoplasty with creation of a nasal septum and dorsal onlay graft.



Fig 1: Preoperative images



Fig 2: Preoperative CT scan



Fig 3: Post-operative images, 2 months

Surgical Technique

The goal of the surgery was to perform a functional rhinoplasty as well as create a completely new cartilaginous skeleton.

The patient was draped and sterilized in normal fashion and bilateral marginal and transcolumellar incisions were created. After a soft tissue flap was raised, underdeveloped lower lateral cartilages were identified. The plane was further developed and revealed absence of upper lateral cartilages. The nasal bones also appeared infantile. An incision was made between the lower lateral cartilages. No septal angle could be appreciated. Mucosal flaps were raised and dissected posterior to the bony septum. There was complete absence of cartilaginous septum.

We then proceeded with the nasal reconstruction portion of the case. Three dorsal augmentation grafts were created from cadaveric cartilage. Soft tissue of the nose was sutured to these grafts to increase the size of the nasal vestibule. Next, we proceeded with Tasman technique. A 5cc syringe was carefully cut diagonally along its long axis with a 15 blade scalpel. Cadaveric cartilage was diced into pieces of 0.5 mm or less. They were placed in the modified syringe along with Tisseel fibrin sealant and left to formulate. It was then used as a dorsal onlay graft along the dorsum from the radix to the nasal tip. Finally, a caudal strut was fashioned and sutured down to the maxilla. The nasal skin was redraped and all incisions were closed in normal fashion. Steri strips and an Aquaplast cast were carefully applied and left in place until her first follow up in the office.

Discussion

Congenital absence of nasal cartilage is a rare entity, but one that has a profound impact on both function and cosmesis of the nose. The goal of this case report is to outline the novel use of the previously described Tasman technique for nasal reconstruction in a patient with congenital absence of nasal cartilages.

Using autologous or cadaveric cartilages grafts for dorsal reconstruction is not a new concept, however, the technique has evolved greatly over the years. Originally, cartilage was harvested from either septum, auricle, or sometimes both, and placed as grafts along the dorsum. Results were variable and postoperative graft warping and limited graft material were quoted in the literature to be the main problems associated with this technique. Costal cartilage allowed for ample graft material, however, fashioning the graft was tedious and often yielded unsatisfactory results. There were also issues with graft migration postoperatively.

The first version of the "Turkish Delight" graft used diced cartilage wrapped in Surgicel. Although this method showed great promise with large dorsum reconstructions, it was not without its own set of problems, most notably, variable rates of graft resorption. Temporalis fascia eventually replaced Surgicel and showed some improvement, but did not completely resolve the issue of graft resorption. The theory proposed was that revascularization of the diced cartilage was delayed due to the barrier created by a layer of surrounding avascular tissue.

The Tasman technique looked to overcome this problem, and has shown good results in several small case series, both in its technique and cosmetic outcome, as well as its longevity and onset of viability. There are no reports in the literature that describe applying this technique to patients with congenital absence of nasal cartilages. Unfortunately, at this time, our patient has only been followed for 2 months at this point (Fig 3), however, the results are satisfactory thus far. On her last outpatient visit, she was noted to have improvement to her nasal breathing, minimal graft resorption, and mild tip asymmetry. She is set next to follow up at 6 months and we will continue to monitor her grafts integrity.

Conclusion

This report details the novel use of the Tasman technique in the reconstruction in a patient with absence of nasal cartilages, including nasal septum and upper lateral cartilages. Using diced cadaveric costal cartilages and Tisseel fibrin glue, we fashioned a semisolid dorsal onlay graft that was used to provide the patient with greater nasal bridge and tip projection. Although, at this time, our follow up is only 2 months, her postoperative results are satisfactory. Additional follow ups will be necessary to determine the graft's long term integrity.

Resources

1. Sheen, Jack H. "The ideal dorsal graft: a continuing quest." *Plastic and reconstructive surgery* 102.7 (1998): 2490-2493.
2. Baker, Shan R. "Diced cartilage augmentation: early experience with the Tasman technique." *Archives of facial plastic surgery* 14.6 (2012): 451-455.
3. Tasman, Abel-Jan, Pierre-André Diener, and Ralph Litschel. "The diced cartilage glue graft for nasal augmentation: morphometric evidence of longevity." *JAMA facial plastic surgery* 15.2 (2013): 86-94.
4. Erol, Ö. Onur. "The Turkish delight: a pliable graft for rhinoplasty." *Plastic and reconstructive surgery* 105.6 (2000): 2220-2241.
5. Elahi, Mohammed M., et al. "Nasal augmentation with Surgicel-wrapped diced cartilage: a review of 67 consecutive cases." *Plastic and reconstructive surgery* 111.3 (2003): 1309-18.