Midline Approach to Pediatric Nasofrontal Dermoid Cysts

Timothy Ortlip, MD; Bryan T. Ambro, MD; Kevin D. Pereira, MD, MS

**IMPORTANCE** To highlight the advantages of the vertical midline incision in providing satisfactory cosmesis with complete excision of pediatric nasofrontal dermoid cysts.

**OBSERVATIONS** Retrospective case series of nasofrontal dermoid cysts in 4 patients treated at a single tertiary medical center from June 1, 2010, through July 31, 2012. The mean age at surgery was 2.5 years. The anatomical location of the nasofrontal dermoid cysts differed: (1) supratip extending through the upper lateral cartilages to the cartilaginous septum, (2) upper dorsum and subcutaneous tissue, (3) tip and supratip extending deep to the nasal bones with involvement of the anterior cranial fossae and dura, and (4) nasal tip extending deep to the level of the rhinion and involving the upper lateral cartilages and below the left medial canthus. Preoperative imaging was performed on all patients. There was one case of intracranial extension. All patients underwent surgical excision with the vertical midline incision. Nasal reconstruction was performed with local soft-tissue flaps (1 patient), regenerative tissue matrix (2 patients), and bone dust pate (1 patient). The patient with intracranial involvement also underwent a frontal craniotomy. All lesions were histologically confirmed as dermoid cysts. Mean follow-up was 1.5 years. There were no complications or recurrences. All patients had cosmetically acceptable scars.

**CONCLUSIONS AND RELEVANCE** A vertical midline incision with modifications to excise involved skin provides a satisfactory and cosmetically sound approach to congenital lesions of the nasofrontal region. It affords adequate exposure for complete excision and reconstruction. A multidisciplinary team consisting of a neurosurgeon, facial plastic surgeon, and pediatric otolaryngologist is needed to optimize outcomes.

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**CONFLICTS OF INTEREST** None reported.

**AUTHOR AFFILIATIONS** Department of Otorhinolaryngology–Head and Neck Surgery, University of Maryland Medical Center, Baltimore. Corresponding Author: Kevin D. Pereira, MD, MS, Department of Otorhinolaryngology–Head and Neck Surgery, University of Maryland Medical Center, 16 S Eutaw St, Ste 500, Baltimore, MD 21201 (kpereira@smail.umd.edu).
Methods

A retrospective review of the medical records of 4 pediatric patients who presented with nasofrontal dermoid cysts to a single, tertiary institution from June 1, 2010, through July 31, 2012, was performed. University of Maryland Baltimore Institutional Review Board exemption was obtained for this report. Informed consent was obtained in writing for all surgical procedures and publication of photographs. All 4 patients had a nasofrontal dermoid cyst, 1 with intracranial extension. All patients underwent preoperative imaging. Three patients underwent both CT and MRI, whereas 1 patient underwent MRI alone. All were treated through a vertical midline approach with complete excision followed by local reconstruction. A coronal incision with frontal craniotomy was used in the patient with intracranial extension. All patients received postoperative care and follow-up by their primary surgeon.

Results

We studied 4 patients (2 boys and 2 girls) who presented with a midline nasal mass with cutaneous involvement. The mean age at presentation was 1 year. The mean age at surgery was 2.5 years. The anatomical location of the nasofrontal dermoid cysts differed in each patient: (1) supratip extending through the upper lateral cartilages to the cartilaginous septum, (2) upper dorsum and subcutaneous tissue, (3) tip and supratip extending deep to the nasal bones with involvement of the anterior cranial fossae and dura, and (4) nasal tip extending deep to the level of the rhinion and involving the upper lateral cartilages and below the left medial canthus. All patients underwent MRI, which confirmed a hyperintense lesion on T1- and hypointensity on T2-weighted imaging. In addition, CT revealed an enlarged foramen cecum in the case of intracranial extension (Figure 1A). All 4 patients underwent surgical removal of the lesions with excision of involved skin that used the vertical midline incision. Nasal reconstruction was performed with local soft-tissue advancement flaps (1 patient), regenerative tissue matrix (Alloderm) (2 patients), and bone dust pate (1 patient). The patient with intracranial involvement had an infected lesion on the nasal dorsum (Figure 2). Exposure of the entire lesion was obtained through the midline nasal incision (Figure 3) and a frontal craniotomy. All 4 lesions were histologically confirmed as dermoid cysts. Mean follow-up was 1.5 years. There were no complications or recurrences. All patients had a cosmetically acceptable incisional scar (Figure 4).

Discussion

The current standard of treatment for pediatric nasofrontal dermoid cysts is early, complete surgical resection with the primary goal of preventing complications, structural distortion, and recurrence. These masses have the potential to be very complex in nature, and approximately 20% of cases will have intracranial extension. Initial diagnostic testing should be performed with a high suspicion for intracranial involvement. High-resolution, multiplanar imaging is therefore recommended. Positive predictive values in CT and MRI are 85.7% and 100%, respectively. Negative predictive values have been
The preferred first-line study of choice is MRI because of its high soft-tissue resolution, lack of radiation exposure, and cost-effectiveness. The optimal treatment plan will ultimately depend on several factors, including size and location of the lesion, integrity of nasofrontal anatomy, and presence of intracranial extension. Pollock states that surgical techniques should adhere to 4 main principles: they should allow exposure to the mass and associated sinus tract, they should allow access to the skull base, they should provide exposure for reconstruction of the nasal dorsum, and they should result in a cosmetically acceptable scar. Failure to adhere to these principles may result in unsatisfactory cosmetic and functional outcomes. Furthermore, recurrence has been estimated at 50% to 100% if resection is incomplete.

Historically, the vertical midline approach has been widely supported in the literature and was the most commonly used approach, yielding satisfactory results with minimal recurrence. Winterton and colleagues described a retrospective study of 19 patients with pathologically confirmed nasal dermoid cysts at various locations from the glabella to the nasal tip. Eighteen patients underwent surgical excision with the vertical midline elliptical excision with or without a frontal craniotomy, whereas one patient underwent an external rhinoplasty approach. The authors noted adequate surgical scar cosmesis at a mean follow-up of 4.1 years, although this was not objectified. Five documented superficial recurrences required additional surgery.

Throughout the literature there have been scant reports of using techniques, such as the Lynch and gullwing incisions, but these incisions have almost universally resulted in suboptimal cosmetic outcomes compared with other approaches. Alternatively, the closed rhinoplasty and endoscopic approaches have been used but in small lesions without significant cutaneous involvement. Most of the data on these surgical approaches have been described only in small case studies.
The largest study\(^9\) of 42 patients advocates for the open rhinoplasty approach, endorsing superior exposure and cosmesis. In this study, various approaches were used, including the vertical midline incision (18 patients), external rhinoplasty (4 patients), Lynch incision (3 patients), transverse incision (5 patients), lateral rhinotomy (2 patients), endoscopic technique (2 patients), and combined approaches (8 patients). The authors noted improved surgical cosmesis with external rhinoplasty, although there were no objective data or comment on cutaneous involvement. The mean follow-up was 7.5 years, and 5 recurrences were documented, all with the use of different surgical approaches.

Bloom et al\(^{10}\) also published a small retrospective study of 10 patients, advocating for the superior cosmesis of the open approach without recurrence. These patients presented with masses in the glabella (6 patients), dorsum (3 patients), and nasal tip (1 patient). Six of these patients were treated with external rhinoplasty, 3 with the Lynch incision, and the last with a vertical midline excision. Cutaneous involvement or follow-up was not mentioned in this study.

Finally, a retrospective study of 8 patients by Bilkay et al\(^{11}\) found satisfactory cosmesis without recurrence in all patients undergoing open rhinoplasty (4 patients), vertical midline incision (3 patients), and the Lynch incision (1 patient). All of these patients were postoperatively evaluated by the surgeon and parents at a mean follow-up of 4.5 years. Overall, the authors still advocated for the open rhinoplasty, arguing an improved aesthetic result, wider exposure, more control over osteotomies, and better visualization of the cribiform plate.

Overall, the paucity of these lesions precludes large patient populations and data sets for retrospective analysis. Previous literature has adequately documented the advantages and disadvantages of various surgical approaches relative to recurrence rates and complications, although reports of cosmesis and follow-up are inconsistent. Many reviews found a preference for external rhinoplasty because of its superior exposure and cosmesis but did not always document the extent of cutaneous involvement, which still required an elliptical excision along the dorsum.

We agree that external rhinoplasty satisfies Pollock’s 4 principles but think that this approach tends to be more invasive and does not negate an elliptical excision of involved skin along the nasal dorsum. In our experience, minor extension of this excision in the craniocaudal direction allowed for adequate exposure of the mass and sinus tract in its entirety without excess manipulation of unaffected tissue. This held true for our patients, who presented with anatomically distinct regions of the nasoglabella, including the patient undergoing intracranial extension (Figures 1-4). Reconstruction of the nasal dorsum in one patient with a mild soft-tissue defect was achieved with soft-tissue advancement flaps from bilateral nasal sidewalls. Two other patients had moderate soft-tissue loss that required regenerative tissue matrix for augmentation in addition to local tissue advancement. One patient with a bony defect that resulted from the tract that extended between the nasal bones underwent bone dust pate formed from the frontal craniotomy drill-hole sites. In all cases, a functional nasal airway and cosmetically acceptable nasal dorsal shape and midline scar were noted up to 1.5 years postoperatively.

### Conclusions

Many options are available for surgical management of congenital nasal lesions, each with their strengths and weaknesses. Lesions with a visible pit or violation of the overlying skin necessitate superficial excision. Intracranial extension requires a frontal craniotomy and collaboration with a neurosurgical team. In these cases, the vertical midline approach provides wide exposure for excision and reconstruction of lesions in various areas of the nasoglabellar region. This approach also results in a cosmetically acceptable scar. Surgical management should be determined on a case by case basis with a multidisciplinary team.

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**REFERENCES**


**ARTICLE INFORMATION**

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