Rhinology Online

CASE REPORT

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Resection of intracranial nasal dermoid sinus cyst by endoscopic-assisted open rhinoplasty approach*

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Rhinology Online, Vol 2: 59 - 63, 2019

http://doi.org/10.4193/RHINOL/19.005

***Received for publication:** February 5, 2019

Accepted: March 18, 2019

Published: March 20, 2019

Abstract

Background: Nasal dermoid sinus cysts (NDSC) are infrequent congenital midline lesions. Complete removal is the treatment of choice. When there is intracranial involvement, the traditional surgical approach requires a bicoronal flap and frontal craniotomy.

Case report: A 17-year-old male presented with a midline nasal dorsum mass. The radiological exams revealed a cystic lesion within nasal dorsum with intracranial extension through a patent foramen caecum into a bifid crista galli. Total macroscopic resection was performed through an endoscopic-assisted open rhinoplasty approach. The patient remains asymptomatic and free of recurrence after 20 months follow-up.

Conclusion: This case demonstrates the feasibility of an endoscopic-assisted open rhinoplasty approach for successful resection of NDSC, avoiding a frontal craniotomy and the significant morbidity associated herewith.

Key words: nasal dermoid sinus cyst, congenital nasal lesion, midline nasal lesion. intracranial extension, endoscopic surgery

Introduction

Nasal dermoid sinus cysts (NDSC) are infrequent congenital midline lesions. It has been suggested that their origin is due to an incomplete involution of ectodermal and mesodermal remnants, in the ventral midline fusion area, during embryonic development [(1)]. Typically, these lesions appear as a little depression in the nasal midline, in the nasal dorsum or columella, from birth or shortly after. However, the cyst could be located anywhere between the nasal opening and the skull base. They can reveal themselves with a sebaceous discharge, soft tissue infections or even with cranial osteomyelitis [(2)]. Furthermore, an intracranial extension has been described in 5-45% of the cases, increasing the risk of severe complications such as intracranial abscesses, cerebrospinal fluid leakage (CSFL) or meningitis [(3,4)]. Surgical complete excision of the cyst and their openings are the workhorse of the treatment of these masses. Open craniofacial approaches are the most common procedure described in the literature [(5,6)]. These approaches are usually associated with a frontal craniotomy when an intracranial extension exists [(2,3,6)]. With the evolution of surgical techniques, more conservative procedures have been described trying to reduce mobility and improve the aesthetic results [(4)]. Open or closed rhinoplasty approaches, alone or with endoscopic-assistance, have been successfully used to complete resection with better aesthetics results [(7-9)]. However, intracranial involvement has been described as a limiting factor for this type of less invasive approaches [(10)]. To the best of our knowledge, only one case of a NDSC with intracranial involvement treated with an endoscopically assisted rhinoplasty approach has been described in the literature [(4)]. During the procedure, they performed a superior partial septectomy, in order to create a drainage pathway into the nasal cavity to control possible recurrence with in-office flexible endoscopy. However, resecting septal mucosa might compromise a potential donor site for a pedicled flap in case of CSFL. Moreover, the follow-up was only 6 months.

This report describes the endoscopic resection of an intracranial

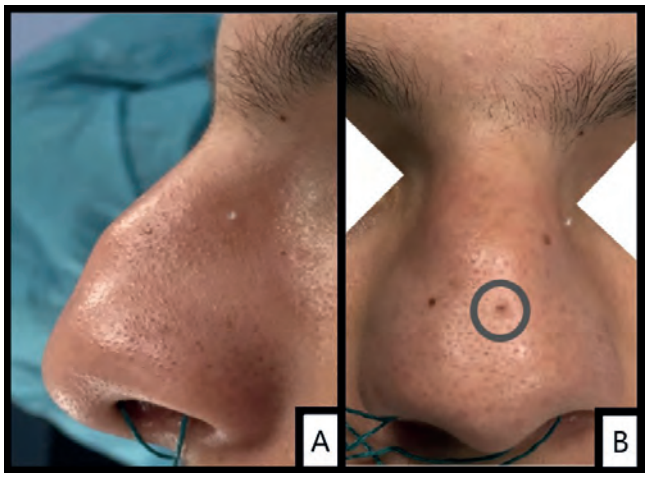

Figure 1. Preoperative left lateral (A) and frontal (B) view of the nose of the patient. A grey circle depicts the opening of the nasal dermoid sinus cyst (NDSC) in the frontal view.

NDSC via an open rhinoplasty approach with 20-month follow up, in which a minimally invasive wide surgical exposure and ideal aesthetic results were accomplished. Additionally, a surgical plan was designed to repair endoscopically, in situ, a possible CSFL if dura was infiltrated or accidentally damaged.

Case report

A 17-year-old male presented with a midline nasal dorsum mass. He reported an associated small sinus in his nasal dorsum, with intermittent sebaceous discharge since his early childhood. There was no history of previous soft tissue infections or meningitis. Clinical examination showed a broad bony nasal radix with a fluctuating mass on the midline above upper lateral cartilages region. On the nasal dorsum skin, there was a small sinus opening without current discharge (Figure 1).

The computed tomography scan revealed a cystic lesion within the nasal septum. The sinus extended from the nasal dorsum

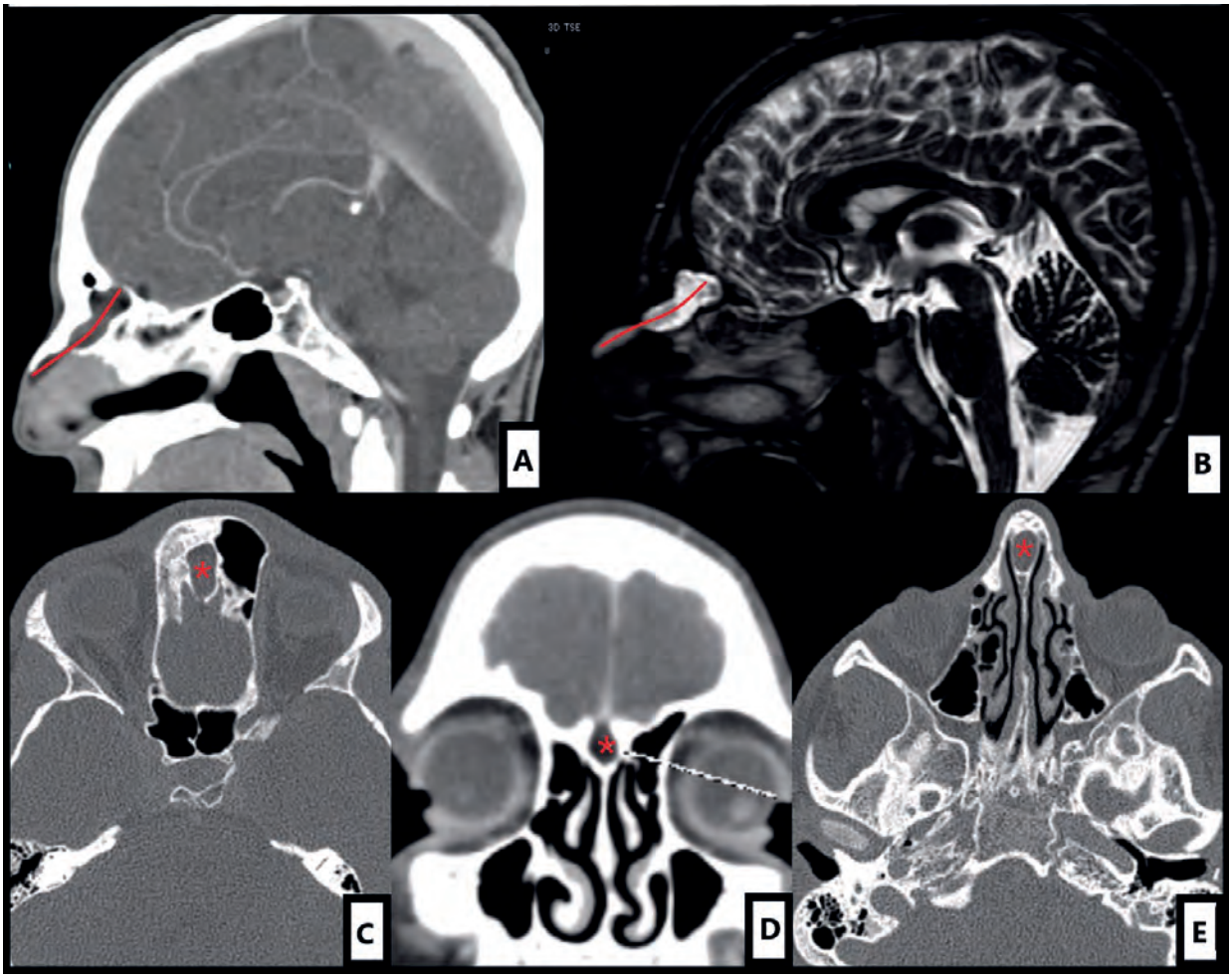

Figure 2. Preoperative computed tomography (CT) scan and magnetic resonance imaging (MRI). The red line shows the tract of the cyst, from the nasal dorsum through a foramen caecum into a bifid crista galli (intracranial component), in a sagittal view of a CT scan (A) and a MRI (B). Red asterisk shows the superior limit of the cyst in the bifid crista galli in an axial (C) and coronal (D) plane of the CT scan. In addition, red asterisk shows the perpendicular plate of the ethmoid remodelled by the cyst in an axial plane (E) of the CT scan.

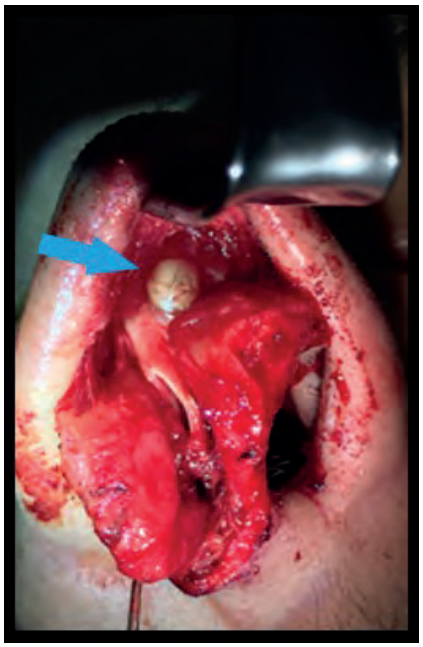

Figure 3. External view of the cyst through the open rhinoplasty approach.

skin, through a small defect between upper lateral cartilages, beneath nasal bones to the nasal radix. Posteriorly and cranially, the cyst extended intracranially through a patent foramen caecum into a bifid crista galli. The magnetic resonance imaging (MRI) showed contact with the dura in the midline of the crista galli roof, but there were no signs of intradural extension (Figure 2).

Operative technique

Mid-columellar and marginal incisions were performed as an open rhinoplasty aproach. Nasal skin was raised until visualization of the cyst (Figure 3). Septal bilateral mucoperichondrial flaps were elevated and preserved. With an endoscopic-assisted view, the cyst was followed through all its tract, though the foramen caecum into a bifid crista galli (Figure 4A). This dissection was assisted by neuronavigator, especially in the intracranial area (Figure 4B). Superior part of the quadrangular cartilage and the perpendicular plate of the ethmoid were remodeled in a cup shape due to the mass. The cyst was carefully detached from the dura by cold dissection and monopolar cautery. Septal mucoperichondrial flaps were available to perform an anterior ethmoidal artery pedicled flap. However, they were repositioned since no dural defect with CSFL was found during the surgery. The sinus of the nasal dorsum was cannulated and completely excised around a probe.

The patient had an uncomplicated course after the surgery and was discharged 2 days after the surgery. The histopathologic exam was consistent with a NDSC. One-year postoperative MRI (Figure 5) showed no evidence of residual cyst. The patient remains asymptomatic and free of recurrence after 20-month follow-up.

Discussion and literature review

NDSCs are congenital nasal midline lesions which appear in 1 in 30,000 live births [11]. Although the NDSC is one of the most common congenital nasal masses in the midline, they represent

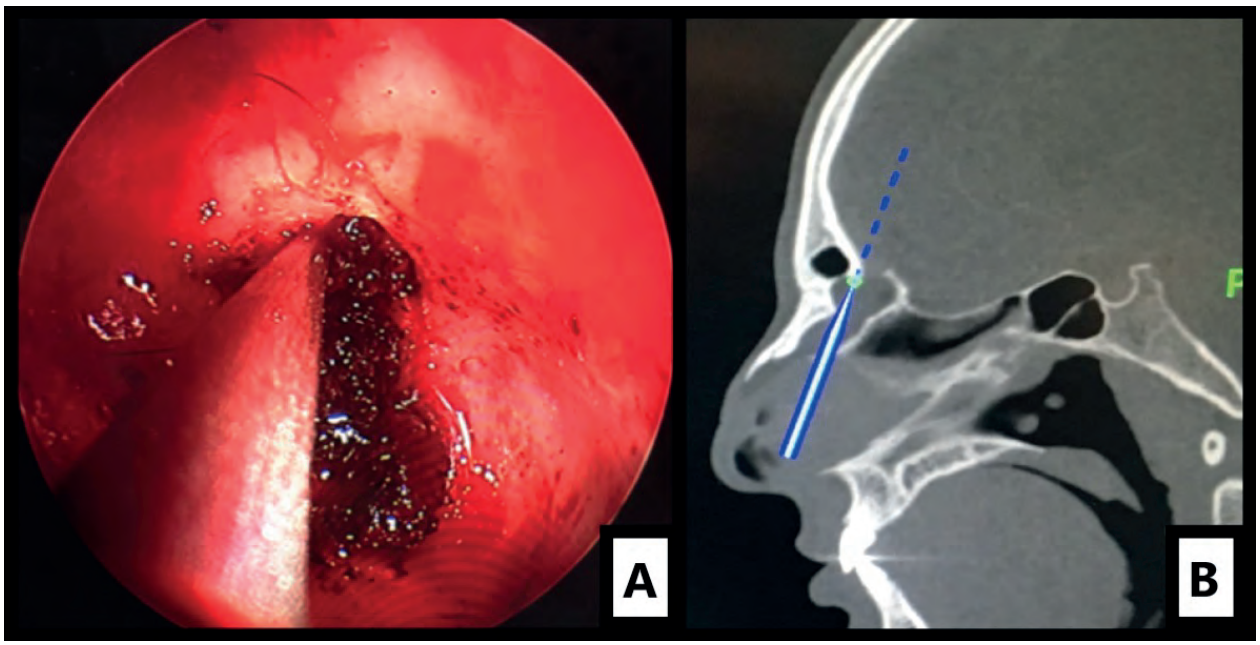

Figure 4. Neuronavigation pointer is inserted into the bifid crista galli (A) in contact with the coagulated dura, indicating the superior limit of the cyst in the sagittal view (B).

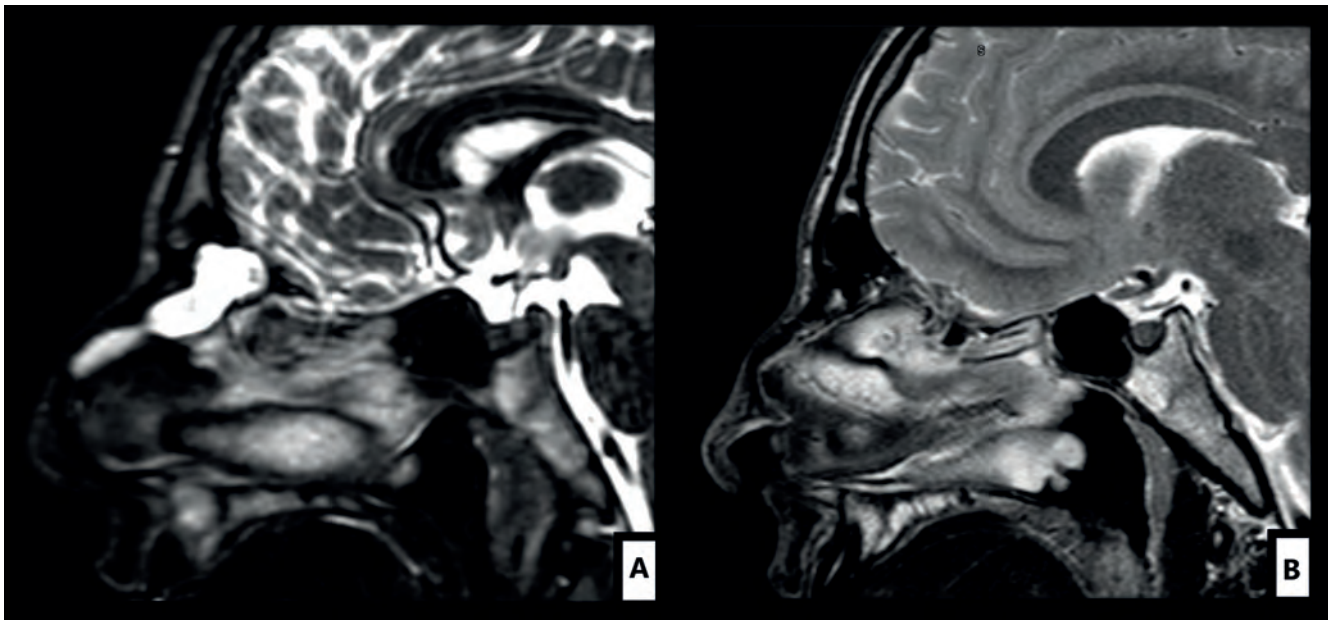

Figure 5. Pre-operative (A) and 1-year postoperative (B) MRI (Sagital view).

only 1-3% of all dermoid cysts [12,13]. However, other midline lesions should be taken into account in the differential diagnosis, such as nasofrontal encephaloceles or gliomas. NDSC typically have a hair protruding from depression, are not pulsatile, do not enlarge with crying and do not transilluminate [13].

One of the main points of the treatment of this congenital lesion is to achieve a complete resection, because incomplete removal has been associated with a high recurrence rate [9]. A variety of techniques have been described to resect these cysts, but traditional treatment is based on open craniofacial approaches. Furthermore, the treatment of choice for intracranial NDSC involves an external nasal incision combined with a bicoronal flap and frontal craniotomy [5,6]. These type of approaches have important aesthetic consequences and could present high morbidity, which should be avoided in the treatment of benign disease. The advancements and the trend toward less invasive techniques stimulated the use of other approaches like rhinoplasty for the treatment of these lesions. This fact allowed to get a complete resection of the NDSC and improve the morbidity with better aesthetics results through an open or closed rhinoplasty [7-9,14]. However, all these new approaches were excluded in cases of intracranial involvement, requiring again more invasive approaches [10,15].

In addition, minimally invasive ENT surgical oncology has made major strides in recent decades with the development of endonasal resections of malignant tumours [16]. This evolution of less invasive techniques, which also improves the view and access to certain areas, allows complete resection without increasing the risk of recurrence but improving aesthetic and functional results [9]. All these techniques continued to have the limitation of intracranial involvement until Seider et al. [4] described in 2016 the first case of NDSC with intracranial involvement resected with endoscopic surgery through an open rhinoplasty approach. However, it must be borne in mind that in these cases, due to intracranial involvement, there is a considerable risk of CSFL. Therefore, it is important to keep as much septal mucosa as possible for a possible repair of a fistula. In our case, although there was no intraoperative CSFL, the entire septal mucosa was preserved, allowing the possibility to perform anterior ethmoidal artery pedicled flaps [17] in case of an unexpected fistula in primary surgery or in case of recurrence. On the other hand, in their case report, Seider et al. described only a 6-month follow-up. In one of the longest case series published (n = 96), Herrington et al. [15] found a recurrence rate of 8%, occurring frequently beyond the year of follow-up. In our case, 20 months of follow-up were presented without incidents or recurrences, although it does not reach the three-year follow-up proposed by Herrington et al. [15]. Thus, patient follow-up continues.

This case demonstrates the feasibility of an endoscopic-assisted open rhinoplasty approach for successful resection of NDSC, even in cases of intracranial involvement, avoiding a frontal craniotomy and the significant morbidity associated herewith. It also emphasizes the importance of the preservation of septal mucosa for possible complications such as CSF leaks.

Acknowledgement

None.

Authorship contribution

ASG: Drafted the manuscript; GS and IC: Revised the manuscript

critically; SD: Made the figures, Reviewed the literature; FM: Performed the surgery. Revised the manuscript critically.

Conflict of interest

No conflict of interest.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable

Availability of data and materials

Not applicable.

Funding

No funding of this work.

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