Scientific Research Publishing

International Journal of Otolaryngology and Head & Neck Surgery, 2025, 14(2), 89-95
https://www.scirp.org/journal/ijohns
ISSN Online: 2168-5460
ISSN Print: 2168-5452

Management of Choanal Atresia: A Quarter-Century of Experience

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How to cite this paper: Ndiaye, C., Woury, B.M., Ndongo, P., Aminata, M., Houra, A., Fatou, T.N., Thiam, A., Abdourahmane, T., Malick, N. and Siga, D.E. (2025) Management of Choanal Atresia: A Quarter-Century of Experience. *International Journal of Otolaryngology and Head & Neck Surgery*, **14**, 89-95.
https://doi.org/10.4236/ijohns.2025.142010

Received: January 18, 2025
Accepted: March 11, 2025
Published: March 14, 2025

Abstract

Introduction: Choanal atresia is characterized by the abnormal presence of obstructive tissue preventing communication between the nasal cavity and the nasopharynx. The aim of this study was to determine the epidemiological profile of patients and to evaluate the results of treatment. **Materials and methods**: We conducted a retrospective descriptive study from January 1, 2000 to December 31, 2023. All patients treated for choanal atresia in the ENT department of the Fann University Hospital were included. All patients admitted to the department for respiratory distress related to choanal atresia were included in the study. Diagnosis was made on CT scan and endoscopic examination. Sociodemographic, clinical, radiological and therapeutic parameters were studied. **Results:** During the study period, 37 cases were identified. The mean age was 1 year, with extremes ranging from 1 day to 14 years, and 91% of patients were less than 6 months old. The sex ratio was 1. Moderate respiratory distress was the most frequent circumstance of discovery. Bone atresia was found in 45.94% of cases. The success rate varied according to the surgical technique used. **Conclusion:** Endoscopic treatment gives better results than blind divulsion.

Keywords

Choanal Imperforation, Nasal Obstruction, Neonate, Endoscopy

1. Introduction

Choanal atresia is a rare birth defect of the nasal cavity characterized by the complete or partial obstruction of the choana [1].

Choanal atresia has been extensively studied in both pediatric and adult populations, with an incidence ranging between 1/5000 and 1/10,000 live births [2] [3]. It can be unilateral or bilateral. Previous studies reported that 90% of atresias were purely bony and 10% were purely membranous [3]. In more recent studies, some authors have reported that choanal atresia is mixed in 70% of cases and purely bony in 30% of cases [4]. Regardless of the feature, the treatment of atresia involves surgical resection of the stenosis. Our surgical approach has evolved over the years. For 12 years, we performed blind dilations followed by calibration. Since 2011, with the acquisition of endoscopic equipment, patients have been treated by endonasal endoscopic approach. This study aimed at investigating the clinical characteristics and the types of atresia, as well as to compare the anatomical outcomes between dilation and the endoscopic approach.

2. Materials and Methods

We conducted a retrospective and descriptive study ranging from 1st January 2000 to 31st December 2023 at the Oto-Rhino-Laryngology Department of FANN Teaching Hospital in Dakar, Senegal. In this study, we included all patients who underwent a treatment for unilateral or bilateral choanal atresia.

2.1. Diagnostic Criteria

The diagnosis of atresia was suspected in the presence of congenital high airway obstruction.

Given this clinical presentation, we performed either the mist test with a metal tongue depressor or the probe test, which involves inserting a small-caliber probe into the nasal cavities to detect an obstruction. CT scans were only performed in cases of suspected unilateral choanal atresia, which were less urgent than bilateral patterns. Since 2011, the endoscopy has been implemented in our practice. Therefore, we used endoscopes as diagnostic tools to visualize the atretic choana.

2.2. Type of Surgery

Before 2011, puncture-dilation of the atresia was the surgical technique used. Then, with endoscopy, we use endonasal endoscopic to perform the surgical approach. The surgery involved puncturing the atresia followed by dilation. We systematically performed resection of the posterior septum below the plane of the tail of the middle turbinates. After the surgery, we left an intubation tube size 3 in place as a calibration device. This device was removed 2 months later.

2.3. Criteria for Surgery Assessment

The success of the intervention was assessed:

- In the short term, based on eupneic breathing
- In the long term, through an endoscopic examination to visualize the size of the choana

Sociodemographic, clinical, CT scan, and therapeutic data were collected. Data

processing was performed using Microsoft Excel.

3. Results

During our study period, 37 patients were consulted for choanal atresia. The mean age at the moment of diagnosis was 1 year, with extremes of 1 day and 14 years; 91% of the patients were less than 6 months. The sex ratio was 1.

3.1. Circumstances of Discovery

Respiratory distress was the only revealing sign. It was distributed as presented in Figure 1.

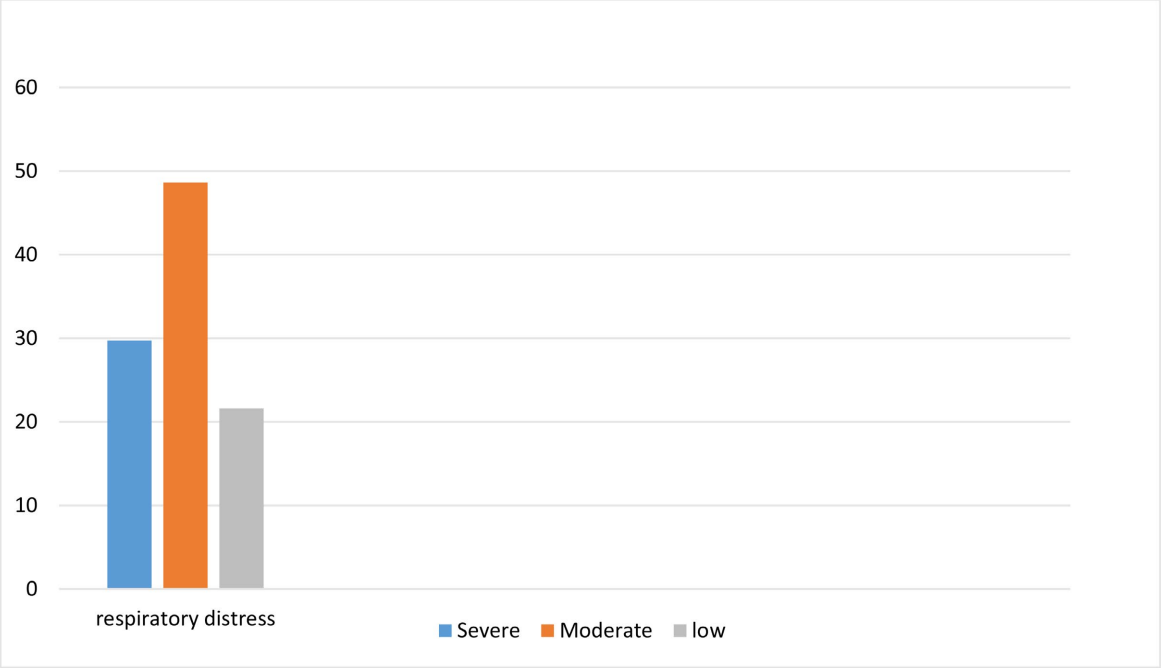

Figure 1. Circumstances of discovery of choanal atresia.

3.2. Clinical Data

Table 1. Pathologies associated with choanal atresia.

Pathologies associated	n
ankyloglossia	1
CHARGE syndrom	5
Crouzon syndrome	1
cranio-facial dysmorphy	1
Omphalocele	1
Heart defect	1

Regarding the family history, 30.30% of patients had first-degree consanguinity.

One case of familial atresia was found. This involved a family where the father had unilateral choanal atresia, as well as his two sons, while the daughter did not have choanal atresia. In 9 patients (24%), the atresia was associated with another pathology (Table 1).

3.3. CT Scan Data

CT scans of the facial bones were performed in 27% of patients. The atresia had the following characteristics: bony in 45.94%, mixed in 15%, and membranous in 39.06%. It was unilateral in 39% and bilateral in 61% of patients.

3.4. Therapeutic Data

Blind puncture alone or dilation of the stenosed choana was performed in 23 patients. Twelve (12) patients underwent endonasal endoscopic surgery and 2 patients had dilation followed by endoscopic surgery in two operative stages. All surgeries were followed by calibration for an average of 8 weeks. The immediate outcome was unremarkable in 97.29% of cases. Death occurred in one patient on day 1 postoperative. Table 2 reports the results of each surgical technique after an average follow-up of one year.

Table 2. Results one year after treatment.

Surgical technique	n	Success rate after 1 year (%)	Stenosis rate after 1 year (%)
Puncture-dilation	23	50	50
Endoscopic surgery	12	73	27
puncture-dilation + endoscopic surgery	2	100	0

4. Discussion

The incidence of choanal atresia is estimated at 1 case per 5000 to 8000 live births [5]. However, the actual incidence might be slightly higher if we consider that some neonatal deaths due to asphyxia could be attributed to the unrecognized presence of this anomaly. This is especially true in our countries where the death of a newborn does not systematically lead to an autopsy. The 37 cases collected over 22 years probably do not reflect the reality. The average age of patients at the time of diagnosis varies from one series to another, ranging from 11 weeks to 10 years [6]-[9]. This wide variability is related to the inclusion criteria of study populations in different series. Indeed, the average age at diagnosis in predominantly pediatric series is earlier than in mixed series consisting of adults and children. Most authors report a predominance of atresia in females [5] [7] [9]-[11]. However, in our series, the sex ratio was 1, without any explanatory argument for this finding.

Regarding laterality, the unilateral pattern is more common than the bilateral

pattern in almost all studies [6]-[11]. However, in our series, bilateral atresia was more significantly found, representing 63.63% of cases. These results do not align with the literature, which can be explained by the fact that unilateral atresias are well tolerated and rarely motivate a consultation. Therefore, the diagnosis is often unrecognized, especially in our limited setting context and a lack of ORL specialists. It is often only considered in cases of neonatal respiratory distress, which constituted 78.79% of our circumstances of discovery. Concerning the diagnosis, CT scan plays a key role. It confirms choanal atresia, assesses its characteristics, nature, whether it is unilateral or bilateral, the extent of bony obstruction, its thickness, and the bony anomalies that constitute it (inclination of the pterygoid processes, thickening of the vomer). In 71% of cases, CT scan reveal mixed atresia, and it is purely bony in 29% [12] [13]. Knowing whether the atresia is bony or mixed helps plan the surgery and anticipate potential difficulties [14]. CT scan was performed in only 27% of cases due to its high cost, the urgency of the situation, and the difficulty of anesthesia in newborns during the procedure. This imaging approach helps rule out a cephalocele or congenital hypertrophy of the inferior turbinates and identify other associated bony anomalies.

Congenital anomalies are associated with choanal atresia in 50% of cases, with CHARGE syndrome being the most common anomaly [15]-[17]. In our series, congenital anomalies were found in 24% of patients. As in the literature, CHARGE syndrome accounted for nearly half of the cases.

The reference treatment for choanal atresia is endonasal endoscopic surgery [18]-[20]. The endoscopic approach offers the advantage of good visualization and allows for extensive resection. It is a short-duration and low-morbidity intervention that can be proposed at birth for bilateral choanal atresias, whether mixed or bony. This surgical technique was introduced into our practice in 2011. Before this date, our patients underwent blind dilation of the stenosed choana. With this blind dilation technique, the postoperative stenosis rate was 50%. Compared to the literature, the endoscopic technique gave better results with good choanal patency in 73% of cases. Dumaz *et al.* reported a success rate of 85.3% in a total of 238 operated patients [20]. I Achour *et al.* found a rate of 76.2% after the first surgery and 95% after surgical revision [21]. Despite these good results, endonasal endoscopic surgery is difficult in newborns. This difficulty is related to the narrowness of the nasal cavities, which makes it difficult to pass the endoscope and instruments. Sometimes, we use otological instruments in the absence of pediatric endonasal instrumentation. Besides instrumental and anatomical constraints, there are difficulties with anesthesia in newborns in this emergency context.

5. Conclusion

Endonasal endoscopic surgery has revolutionized the surgical management of choanal atresia. It represents the treatment of choice and yields better results than blind dilation. There is no consensus on the use of calibration devices or the application of topical agents at the site of the reopened choana. However, extensive

resection of the stenosis reduces the risk of recurrence.

Informed Consent

Informed consent was obtained from the patient to report this case.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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