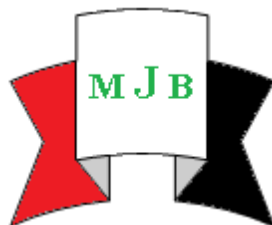


Management of Choanal Atresia

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Abstract

Background: Choanal Atresia is a congenital disorder in which the posterior choanae unilaterally or bilaterally fail to develop properly.

The aim: To evaluate the effectiveness of the available diagnostic methods and surgical techniques for the treatment of congenital choanal atresia .

Patients and methods: A prospective study of Twenty one patients

The diagnosis was based on clinical examination, and by the following:

1. Cold spatula test.
2. Failure of passage of 6 -8F catheter tube.
3. CT to confirm the diagnosis and evaluate the type and thickness of the atretic plate..
4. Endoscopic nasal examination.

Results: 15 of our patients were females and 6 were males with age ranging between 1 day and 25 years. There was only one adult, the rest of our patients were children. 14 of our patients had unilateral atresia , and 7 had bilateral atresia.

Eighteen of the patients showed mixed bony and membranous atresia, by CT scan , 3 cases show pure bony atresia . There was no case with a pure membranous atresia.

Thirteen of the unilateral Choanal atresia involved the right side, and only 1 Case had left sided atresia (7.6 %).

A total of 3 cases were associated with other congenital anomalies 14 % .All of them had bilateral choanal atresia. Two of them were with atrial septal defect and one had ventricular septal defect.

Ten of our patients were treated by trans-nasal non-endoscopic surgical approach Two of our patients treated by trans-palatal approach

Nine of our patients underwent transnasal endoscopic surgical approach Stent was used postoperatively in 13 of our cases for 6 weeks.

Only 2 of our patients who underwent surgical intervention had restenosis and required revision surgery .

Conclusion: Although the transnasal endoscopic approach requires experience, special equipments and with prolonged duration of surgery, it is more accurate , minimal invasive method and provides an excellent visualization of the plate.

Key Word: choanal atresia, congenital disorder.

طرق تشخيص و معالجة انسداد فتحتي المنخرين الخلفيتين الولادي

الخلاصة

الخلفية : انسداد فتحتي المنخر الخلفيتين هو تشوه ولادي وقد يصيب احد أو كلا المنخرين.

الأهداف: تهدف هذه الدراسة للمقارنة بين عدة طرق مستخدمة لتشخيص و علاج انسداد فتحة المنخر الخلفية.

طريقة العمل: خلال الفترة من تشرين الأول ٢٠١٠ الى تشرين الأول ٢٠١٢، خضع ٢١ مريض لعملية تقوية المنخر الخلفي، ٧ من الذكور و ١٤ من الإناث بعد ان تم تشخيص الحالة المرضية عن طريق المفراس الحزوني للأنف والفسحة خلف الأنف و بواسطة ناظور الأنف .تم تقسيم المرضى الى ثلاث مجموعات المجموعة (أ) اجري لهم التدخل الجراحي عن طريق الانف و بدون استعمال

الناظور. و المجموعة (ب) أجريت لهم العملية عن طريق التجويف الفموي والمجموعة (ج) أجريت لهم العملي، بالطريقة الناظورية عبر الأنف. المعايير التي تم دراستها هي: استجابة المرضى، الاضرار للانسجة المحيطة، و العقابيل بعد العملية. النتائج: بعد المتابعة وجدنا ان المجموعة (ج) لم يعاني اي مريض من انسداد فتحتي المنخر بعد العملية مما يتطلب إعادة العملية في حين ان مرضى المجموعة (أ) (تطلب إعادة توسيع المنخر و المجموعة (ب) (تحتل الإصابة بعقابيل بعد العملية. التوصيات: الطريقة الناظورية هي طريقة آمنة وفعالة أكثر من الطرق الأخرى لأنها تمكن الجراح من العمل بمدى رؤيا مباشر و ولكنها تحتاج الى مهارة أكثر.

Introduction

Choanal atresia is a rare condition (incidence 1 in 7000 live births), in which there is complete obstruction of the posteriornasal openings on one or both sides. The blockage has been thought to be either bony or membranous in origin. In reality, a mixed picture is usually seen (70 percent of cases) with the remainder being purely bony. It is believed to be secondary to persistence of the nasobuccal membrane [1,2].

choanal atresia is more common among girls (2:1), and unilateral atresia is more common than bilateral atresia.[3,4]

This disorder can be transmitted as an autosomal recessive trait.[5]

This defect was first described by Johann George Roederer in 1755, and was later characterized as an anatomical deformity of palatine bone by Adolf Otto in 1854. Also in 1854, Carl Emmert first successfully corrected choanal atresia using transnasal surgery of the palate.[14,7]

Patients and Methods

The present study was carried out at AL-Hillageneralhospital. To achieve the objectives of study.

A prospective randomized trial was designed.

Our results were evaluated by *T test* formula by an expertise statistic specialist to issue the mean value and standard deviation

21 patients referred to AL- Hilla General Hospital in the period from October 2010 to October 2012.

7 of them were complaining of bilateral choanal atresia, and 14 of them were complaining of unilateral choanal atresia, history was taken from the patients (if they are old enough) and their parents. Physical examination done for them, the diagnosis was done by high suspicion in the absence of misting on cold spatula, the failure to pass 6-8 F catheter tube, the diagnosis was confirmed by doing CT scan (which provide information about the atretic plate and its components and also provide information if there are associated anomalies), and nasendoscopies were done for them.

After confirming the diagnosis of choanal atresia the 21 patients were treated surgically according to surgeons' preferences resulting into 3 groups:

Group A: treated by transnasal non endoscopic approach (10 patients. 5 of them had bilateral atresia and the other 5 had unilateral atresia) this method done by perforating the atretic plate and dilating the opening by introducing different sizes of female urethral dilators, a stent was inserted in all cases.

Group B: was treated by transpalatal approach (2 patients both had bilateral atresia) for both cases stent was used,

Group C: was treated by transnasal endoscopic approach (9 patients) all of them had unilateral choanal atresia, endoscopic approach done by using telescope (4 mm), with the aid of microdebrider, a stent was used in one case.

Stent was used postoperatively in 13 of our patients for 6 weeks (2 patients of transpalatal approach , 1patient of endoscopic approach , and 10 patients of transnasalnon endoscopic approach) .

A No. 3.5 or 4portex endotracheal tube cut to the appropriate length and shape is commonly used as a stent .

The stent is fixed in place by suturing to the nasal septum using 2-0 silk sutures, a single stent was used in case of unilateral atresia.

Meticulous care was needed to prevent stent obstruction with secretion ,infection, stent displacement, and columella ulceration.

Regular suction was carried out after instillation of 0.9% normal saline drops, and parents were trained to use suction apparatus. Antibiotic was prescribed for the patients who developed infection.

Results

Of the 21 patients 7 had bilateral atresia (2 males and 5 females), 14 had unilateral atresia (4 males and 10 females).

There was higher incidence among females 15 patients (71,8%) in comparison to male 6 patients (28,5%), with female to male ratio was 2.5:1.

For the bilateral cases the mean age of presentation was 2 days (1 -3 days) (mean $\pm$ SD 2 ± 0.8165) (95% C.I 1.2449-2.7551), while the unilateral cases present at older age (4 – 25 years) (mean $\pm$ SD 9.1538 ± 5.494) (95% C.I 5.8339 – 12.4738) .All of the unilateral patients were children except in 1 case was adult . Thirteen of the unilateral atresia involved the right side, only 1 Case had left sided atresia (7.6 %).

The presentation of the patients also varied between the unilateral and the bilateral cases ,for the bilateral cases they present as emergency with cyanosis aggravated by feeding and relieved by crying, while the unilateral cases present with different symptoms all of them had nasal obstruction and discharge, 4 of them had recurrent sinusitis, and only one had otologic symptoms (conductive deafness).

Table 1 the presenting symptoms of the unilateral cases.

Symptoms	Number	Percentage
Nasal obstruction	14	100%
Otological symptoms	1	7.14%
Recurrent sinusitis	4	28.5%

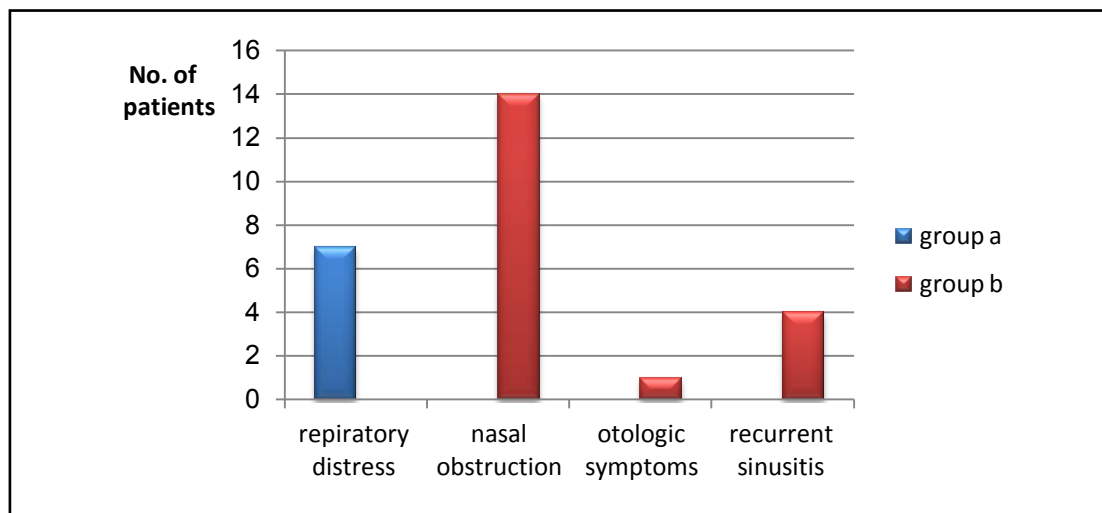


Figure 1 The presentation of the patients group a : the bilateral cases, group b : the unilateral cases.

All our patients were with normal birth weight , and no history of maternal diseases during pregnancy. 3 of our patients with bilateral atresia had another congenital anomalies 14.2% (2 had atrial septal defect and one had ventricular septal defect).

The diagnosis was made by the suspicion in the absence of misting on cold spatula ,then the failure of passage of 6 – 8 F catheter tube on the obstructed side, the definitive diagnosis was done by axial CT of the nose and nasopharynx.

There was 18 patients had mixed type atretic plate (bony and membranous) 85.7% , 3 patients had pure bony 14.28%.

Initial surgery was carried out at AL-Hilla General Hospital, the type of surgical procedure was chosen according to surgeons' preferences.

They were classified into 3 groups:

Group A: transnasal non endoscopic approach.

Group B: transpalatal approach.

Group C: transnasal endoscopic approach.

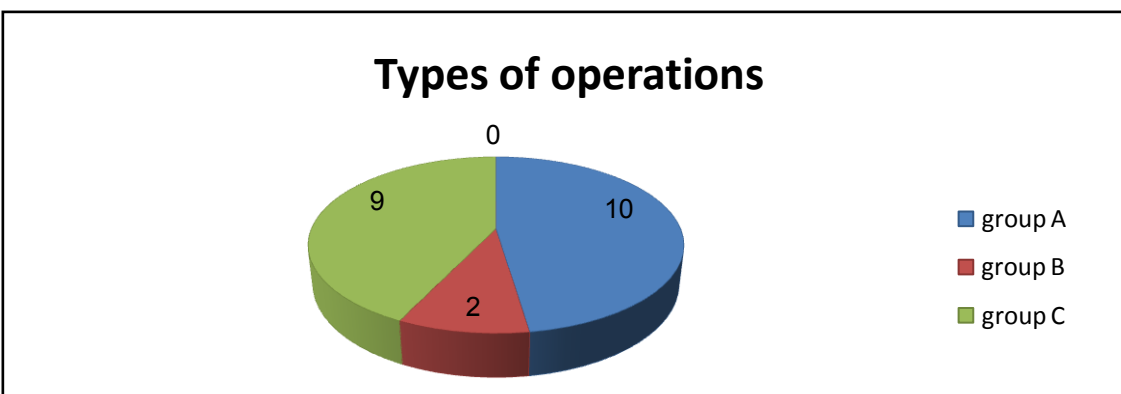


Figure 2 types of operations.

Group A : (5 of them had bilateral choanal atresia and 5 had unilateral choanal atresia) ,in this approach we

used female urethral dilator in frequent sizes.

Of these 10 patients 4 had nasal mucosal trauma 40% , 6 developed

persistent discharge 60% , 3 had stent obstruction 30% , 2 of them developed restenosis required dilatation 20% and

only one case developed skin excoriation 10%.

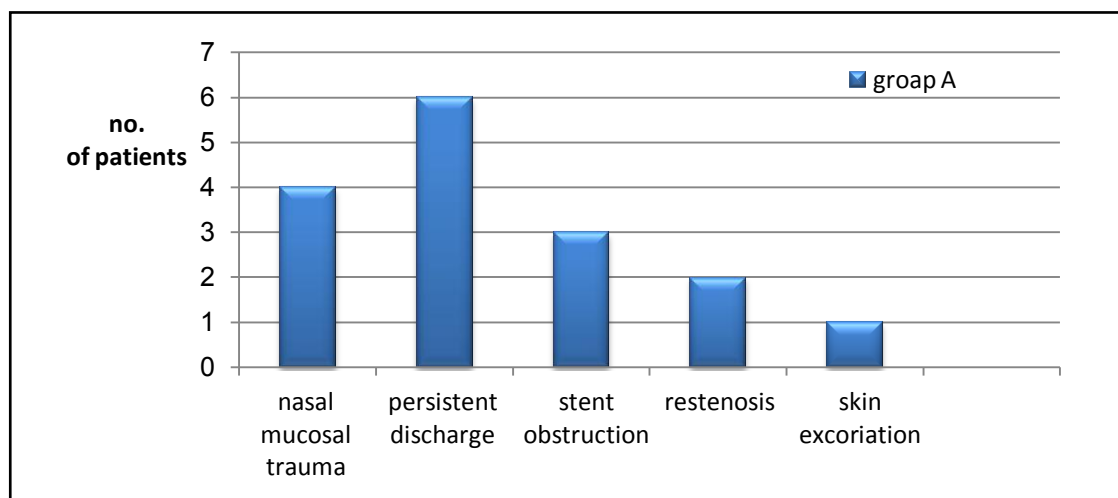


Figure 3 complications of transnasal non endoscopic approach.

Group B : both had bilateral choanal atresia, both had simple palatal trauma 100% and one of them had persistent discharge 50%, both had stent obstruction 100%, and one of them had

skin excoriation 50% (the stent removed immediately without sequel) none of them developed restenosis requiring revision surgery.

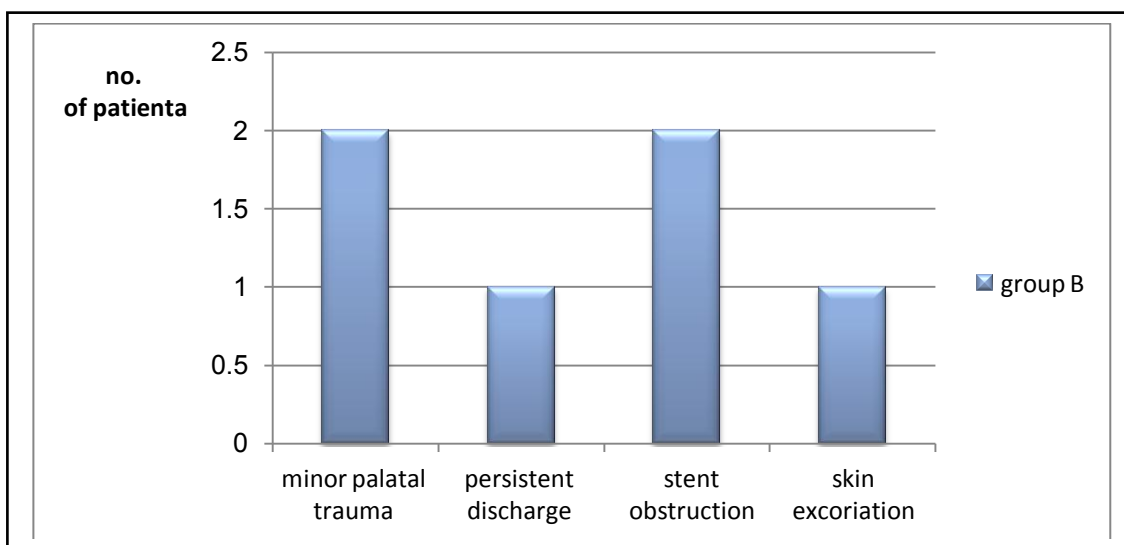


Figure 4 complications of transpalatal approach.

Group C : all of them had unilateral atresia, endoscopic technique done by using telescope (4 mm) and microdebrider.

5 of the 9 patients had nasal mucosal trauma 55%, 1 of them had persistent discharge 11% and two of them developed epistaxis 22%, and one patient had stent obstruction 11%.

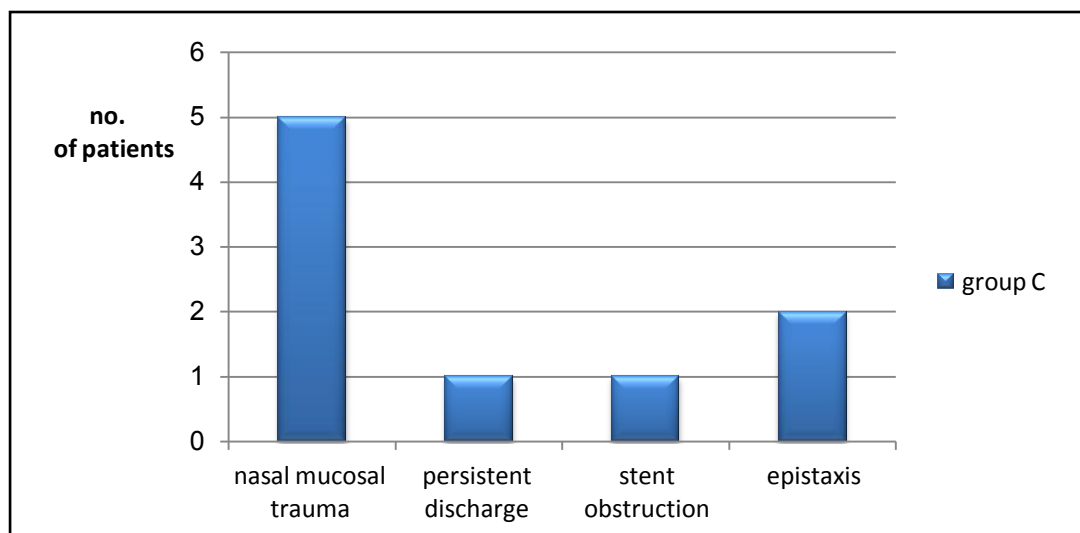


Figure 5 complications of endoscopic approach.

Regarding the complications of the stent, 6 of the patients developed stent obstruction 46% , persistent discharge was present in 8 cases 61.5%, skin

excoriation present in 2 cases 15%, restenosis occur in 2 cases 15% and no granulation tissue formation was detected.

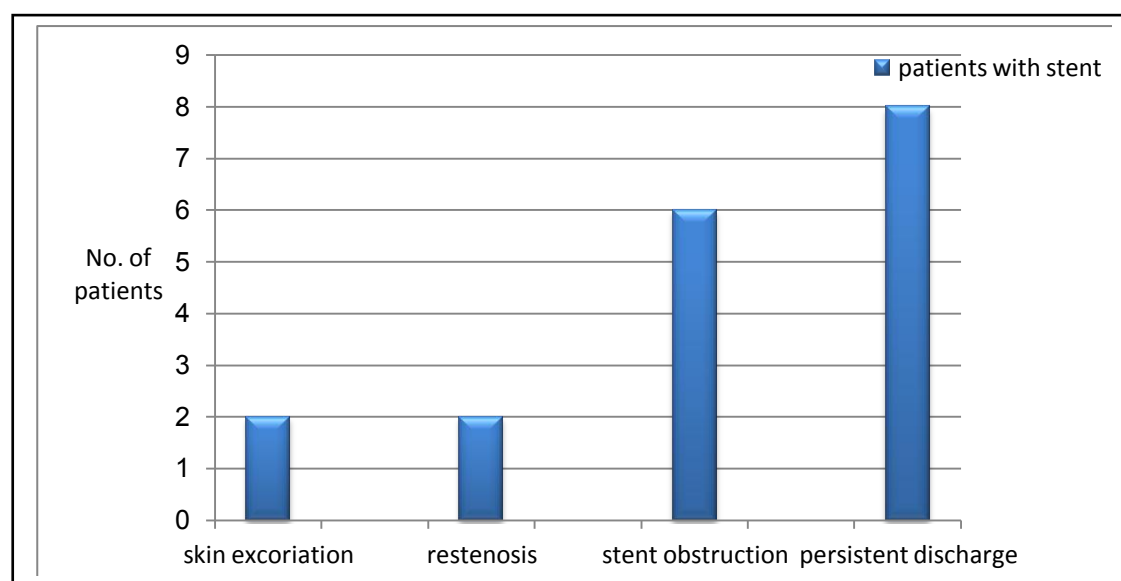


Figure 6 complications of stent.

Discussion

Regarding our results we found that: Our findings reveal female to male ratio of 2.5:1. This is not in agreement with Singh B findings who found the ratio was 5:1[6].

From our results there was a statistically significant difference in age at presentation, with a mean age of

2 days for the bilateral cases and 9.1 years for the unilateral cases, this finding is not in agreement with that of Kim H et al. who found the mean age of presentation for the bilateral and unilateral atresia to be 4.5 months vs 11.5 years respectively[15].

Unilateral atresia was more common than bilateral in our study 14

patients 66.6% versus 7 patients had bilateral choanal atresia 33.3% , this finding is not in agreement with that of T. Andrew Burrow et al [8] who found that Choanal atresia was unilateral in 48.1% and was bilateral in 46.5%.

Choanal atresia involving the right side is more common than in the left side. In our study, the right side was involved in almost all cases except one case was on the left side, this is not in agreement with Harris J, Robert E, Kallen B et al. [9] who found that Unilateral atresia occurs equally often on the right and left side .

For our 21 patients all of them were term at birth with no history of maternal diseases during pregnancy nor taking special medications.

In our study there was 3 patient had other malformations (14%) (2 of them with atrial septal defect and 1 case with ventricular septal defect) all of them had bilateral atresia .this finding is not in agreement with Duncan NO 3rd, Miller RH et al[10] who found associated congenital anomalies in bilateral atresia were 75%.

18 of our cases had mixed type of the atretic plate 85.7% , only 3 cases had pure bony atretic plate 14% and there was no pure membranous atretic plate this is not in agreement with Brown OE, Pownell P, Manning SC et al [11] who their results reveal an incidence of (29%) pure bony, (71%) mixed bony-membranous, and no pure membranous atresia.

Group A developed restenosis requiring further dilatation under GA ,while group B and C did not require revision surgery, Regarding group C The main advantage, it provides excellent visualization, and less traumatic procedure, and the stent was used in only one case , so by using this approach we avoided the complications associated with stent use

and all the patients managed by this approach had no recurrence and need no further dilatation , this is in agreement with El-Ahl MA, El-Anwar MW[13].

on the other hand the patients in group A had fast and safe procedure especially for the bilateral cases which present as emergency but with the use of stent there is some complications affecting the patients in addition to the need for further dilatations due to restenosis in comparison to transpalatal approach which did not require further dilatations this is not in agreement with Hamad Al Muhaimeed, MD [12] who considers the transnasal puncture with dilatation is the first choice approach.

Conclusions

1- Choanal atresia is a congenital anomaly in which there is atretic plate (pure bony or mixed bony and membranous) obstructing one or both posterior nasal apertures.

2- There is higher female incidence with the unilateral cases more common than the bilateral cases.

3- Its presentation differs according to whether it is unilateral or bilateral so bilateral cases present earlier in life as emergency condition, while the unilateral cases present later in life with less acute symptoms.

4- CT scan is useful investigation to provide the definitive diagnosis of the type of atresia and to evaluate other congenital anomalies.

5- The transnasal endoscopic method is more accurate and with low restenosis rate, but with several drawbacks which preclude their routine use as It needs special equipment and experience and more operating time.

6- The transpalatal method affords good exposure under direct vision and the adequate removal of the atretic area,

the disadvantages are that it is a major operation with a serious complication that may affect midface growth.

7- Transnasal non endoscopic method is safe and fast method but with high recurrence rate.

8- The use of stent is associated with several complications and did not reduce the incidence of restenosis on the contrary there was higher recurrence rates in cases with stent.

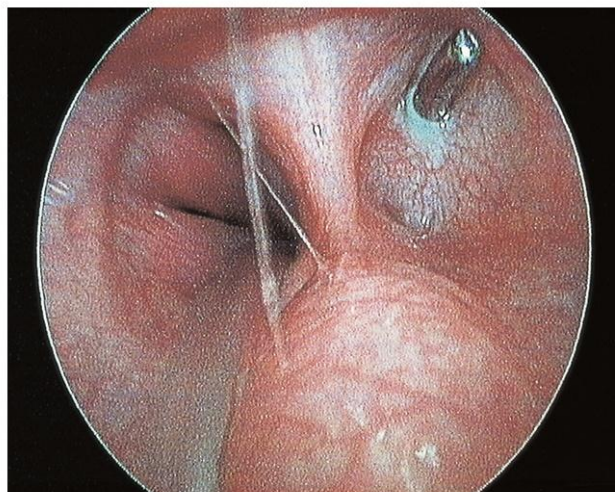
Recommendations

1- The number of patients included in this study is small as the choanal

atresia is rare condition so extended study for a longer duration is required.

2-Although the transnasal endoscopic approach require experience, special equipments and with prolonged duration of surgery it is recommended to be the approach of choice as it provides an excellent visualization of the plate, minimal invasive method and with low restenosis rate and no need for stent use.

3-As some complications may occur several years after surgery such as growth abnormalities associated with transpalatal approach so longer period of follow up is recommended.



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Figure 7 unilateral choanal atresia as viewed from the nasopharynx with a 120° endoscope . A sound is perforating the membrane [1].

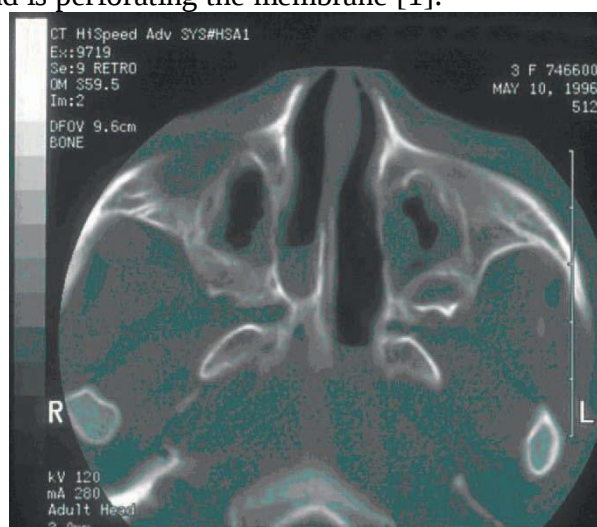


Figure 8 Axial computed tomography scan of unilateral choanal atresia, with a complete bony atretic plate and associated soft tissue [2]

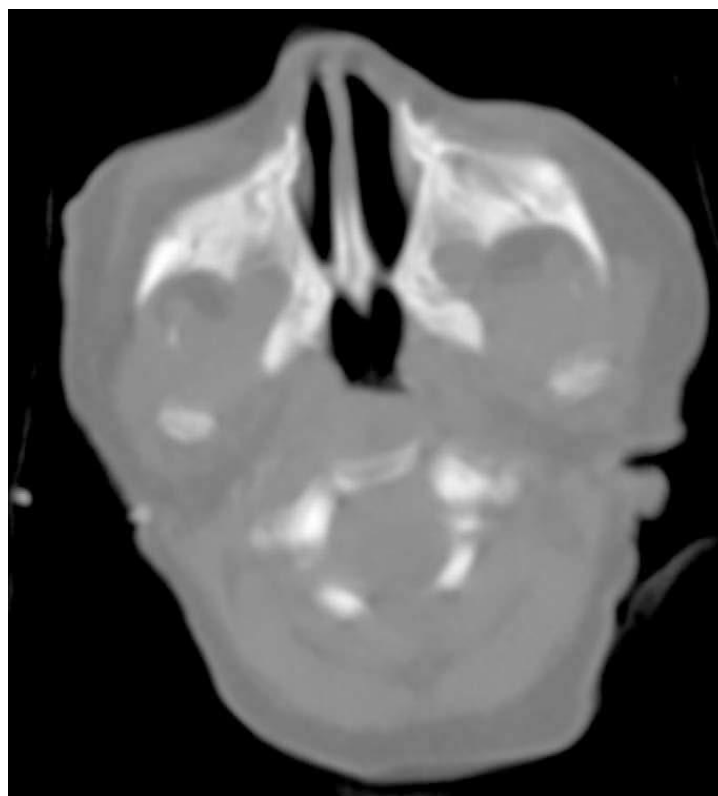


Figure 9 Axial computed tomography scan showing bilateral choanal atresia with soft tissue [3].

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