

# The use of nasal stent for choanal atresia

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## ABSTRACT

**الأهداف:** تقييم فعالية استعمال الدعامة الأنفية في نتائج الفتح الجراحي للانسداد الأنفي الخلفي الخلقي. وما مدى تأثير العمر في الفتح الجراحي.

**الطريقة:** اشتملت الدراسة على مراجعة ملفات المرضى الذين تم تشخيصهم وعلاجهم كحالات انسداد أنفي خلقي في مستشفى الملك عبد العزيز الجامعي ما بين يناير 1999 ويونيو 2005. ومن خلال الدراسة تم مراجعته العمر، الجنس، التشوهات الخلقية المصاحبة، التدخلات الجراحية وما إذا تم استعمال الدعامة الأنفية أم لا. كما وتم عمل مقارنة بين نتائج التدخل الجراحي لدى المرضى الذين تم استعمال الدعامة الأنفية لديهم والذين لم يتم استعمالها.

**النتائج:** بلغ مجموع عدد من أجريت لهم هذه الدراسة 31 مريض، جميعهم يعانون من انسداد أنفي خلقي خلقي. وقد تم استعمال الدعامة الأنفية لدى 13 مريض. ولم تستعمل لدى البقية وعددهم 18 مريض. وبشكل عام لم يكن استعمال الدعامة الأنفية عامل إيجابي بل نتج عنه سرعة انسداد الأنف بعد إزالتها. وبتفصيل أدق وجد أنه 75% ممن لم يتم استعمال الدعامة الأنفية لديهم من حالات انسداد الجبهة الواحد قد استمر وجود فتحه كافيه للتنفس مقارنة بـ 13% ممن تم استعمال الدعامة لديهم. كما أنه وجد أن 33% من حالات انسداد الأنف بالجبهتين والذين لم يتم استعمال الدعامة لديهم استمر وجود فتحه كافيه لديهم في مقابل 60% من نفس الحالات التي تم استعمال الدعامة لديهم.

**خاتمة:** يستوجب استعمال الدعامة الأنفية زيادة العناية بأنف المريض. ومن الواضح أن استعمال الدعامة الأنفية في حالات انسداد الأنف الخافي الخلقي في الجبهة الواحد يترتب عليه سرعة رجوع انسداد الأنف. وعطفا على نتائج هذا البحث لا ينصح باستعمال الدعامة الأنفية في حالات الانسداد النفي الخلفي الخلقي في الجبهة الواحد وينصح بتأخير إجراء العملية لما بعد السنة الأولى من العمر.

**Objective:** To assess the role of the use of nasal stent (NS) on the outcome of choanal atresia (CA) surgeries, as well as the effect on the age at the time of surgery.

**Methods:** The study involved a retrospective review of the files of the case with the diagnosis of congenital CA that were surgically managed at King Abdul-Aziz University Hospital between January 1999 and June 2005. The review included: the age, gender, associated congenital anomalies, surgical intervention, and use of nasal stent (NS). A comparative study was carried out between the outcome of the cases who received NS, and those who did not.

**Results:** A total of 31 cases with the diagnosis of CA comprised our study group. Thirteen of the cases received NS and 18 did not. Generally, the use of NS for CA surgery resulted in poor outcome. Seventy-five percent of the unilateral cases with no-NS had successful outcome compared to 13% of those who received NS ( $p=0.00988$ ). On the other hand, only 33% of the bilateral cases with no-NS had a successful outcome compared to 60% of those who received NS ( $p=0.3917$ ).

**Conclusion:** NS mandates an increased medical care. Its use in unilateral CA was associated with poor outcome. Based on our findings, it is recommended not to use NS in unilateral CA, as well as to postpone the surgical intervention, if possible, until the child is one year old or more.

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**C**hoanal atresia (CA) is a common congenital anomaly, initially described by Roederer in 1755.<sup>1</sup> The most common presentation of this anomaly is by nasal obstruction. This can be life threatening immediately after birth in bilateral cases.<sup>2</sup> The reason for this is that most of the neonates are obligating nasal breathers. Other common presenting symptoms in bilateral CA are feeding difficulties and cyclical cyanosis. While in unilateral CA the presentation is commonly late, mostly with unilateral nasal obstruction and discharge. Immediately after birth, it is very important to maintain the airway patent in bilateral cases. This is achieved by the use of oropharyngeal air way or McGivern nipple. The definitive management of CA is by restoring the patency of the posterior choana. Choanal atresia can be opened by different approaches, however, the endoscopic technique is the approach of choice in recent years.<sup>3</sup> In a survey by the American Society of Pediatric Otolaryngologists members, 85% of the respondents utilized endoscopic techniques, 60% transpalatal, and 17% puncture techniques for bilateral choanal atresia.<sup>4</sup> These indicate the controversy, and disagreement that exist on the procedure of choice. The issue of restenosis of the posterior choana is a very common consequence, with rates approaching 30%.<sup>5</sup> This issue triggered the search for tools to reduce its occurrence. The use of nasal stent (NS) to reduce the possibility of restenosis has been practiced for a long time.<sup>4,6</sup> However, the ability of nasal stent to prevent restenosis has been challenged recently,<sup>7</sup> although still recent reports are recommending the use of NS especially for bilateral CA.<sup>8</sup> In this study, we evaluate the effect of NS on the outcome of surgical repair of CA.

**Methods.** Thirty-eight children with the diagnosis of congenital CA were managed at the King Abdul-Aziz University Hospital (KAUH), Riyadh, Kingdom of Saudi Arabia between January 1999 and June 2005. Surgical repair of the posterior choana was performed for all of the cases. Endoscopic method was the main procedure to open the CA (performed in 32 of our cases). This included the use of 0° telescope (2.7 or 4 mm) connected to a camera and a monitor. The opening of the soft tissue, and dilatation was performed using a microdebrider. A drill was used to dilate the bony atresia medially and laterally, and to resect the posterior margin of the vomer along with a backbiting forceps. Four of the cases were operated utilizing an alternative technique other than endoscopic procedure. We include in this retrospective study, all the cases of CA that were surgically managed at KAUH. Exclusion criteria involved cases: that could not be managed surgically for

medical reasons (2 cases), that were operated outside our institution (2 cases), and the lost to follow up cases (3 cases). Only 31 of the cases of CA were included in this study. In 13 of the cases, nasal stent (NS) was placed at the time of surgical intervention. No stent was used in the remaining 18 cases. Polyvinyl chloride endotracheal tube was shaped, and used as the NS. The duration of stenting ranges between 4 and 6 weeks. We followed our cases for a period ranging between 1-6 years (mean of 2.8 years). We consider a successful outcome whenever the child is breathing comfortably through the nose with patent posterior choana. If there was any need to dilate the posterior choana or revise the surgery, the case was considered a failure.

We used Epi-Info statistical software to perform data analysis. Fisher's exact test was used to compare between the success, and the failure groups. We assumed there is a statistically significant difference when the *P*-value is <0.05.

**Table 1** - The surgical outcome of CA cases with and without the use of NS.

	Side involved	Success	Failure
		n (%)	
Stent used 13 cases	Bilateral 5 cases	3 (60)	2 (40)
	Unilateral 8 cases	1 (13)	7 (87)
No stent used 18 cases	Bilateral 6 cases	2 (33)	4 (67)
	Unilateral 12 cases	9 (75)	3 (25)
NS - nasal stent			

**Table 2** - The outcome of the different age groups in the cases with and without the use of NS.

	Age	Success	Failure
		n (%)	
Stent used 13 cases	≤1 month 3 cases	1 (33)	2 (67)
	>1 month-1 year 3 cases	2 (67)	1 (33)
	>1 year 7 cases	1 (14)	6 (86)
No stent used 18 cases	≤1 month 5 cases	2 (40)	3 (60)
	>1 month-1 year 4 cases	3 (75)	1 (25)
	>1 year 9 cases	6 (67)	3 (33)

**Results:** The files of 31 cases with the diagnosis of congenital CA were reviewed. There were 21 females and 10 males. The age range is between 4 days and 25 years, with a mean age of 2 years and 7 months. In this study, there were only 2 adult patients. Thirteen of the patients received NS. Their distribution into bilateral and unilateral CA, as well as their outcome after surgical intervention is shown in Table 1. However, 18 of the cases did not receive NS. Their distribution into bilateral and unilateral CA, as well as their outcome after surgical intervention is shown in Table 1. By comparing the total outcome of cases, the use of NS resulted generally in poor outcome (31% success with use of NS compared to 61% when NS was not used). However, this difference was not statistically significant  $p=0.0957$ . The use of NS in unilateral CA was associated with poor outcome. Only 13% of the unilateral CA who received NS had successful outcome compared to 75% of the unilateral cases that did not receive NS (Table 1). This difference was statistically significant,  $p=0.00988$ . On the other hand, the use of NS in bilateral cases resulted in 60% success rate compared to 33% success in cases with no NS (Table 1). Unfortunately the number of the bilateral cases was small. This difference was not statistically significant  $p=0.3917$ . The effect of age on the outcome of the NS group, and in the no-NS group is shown in Table 2. From the table, there was no clear benefit from the use of the NS in the <1 month and >1 month-1 year groups. The difference in outcome in both age groups was not statistically significant,  $p=0.71428$  for both groups. However, the use of NS in the group older than one year was associated with poor outcome with only 14% had successful outcome compared to 67% in the group with no-NS. This difference was borderline significant,  $p=0.0545$ . Seventy-five percent of the unilateral cases were operated at the age of more than one year, and 25% of them between the age of >1 month-1 year. On the other hand, 73% of the bilateral CA cases were operated at an age of one month or less, 18% of them were operated between the age of more than one month and one year, and only one (9%) was operated beyond the age of one year. A total of 10 of our cases had other associated congenital anomalies. Two of them had Down syndrome, 2 with Treacher Collins syndrome, one case with ocular colobomas, heart defects, choanal atresia, retarded growth and central nervous system issues, genitourinary hypoplasia, and ear anomalies (CHARGE) association, and the rest of the cases had other nonspecific anomalies. Nasal stent was used in one case of Down syndrome, and one case of Treacher Collins syndrome, and both cases were restenosed. Nasal stent was not used in the rest of the congenital anomaly cases. Four of them had a successful outcome, one with a case of Down syndrome and one

with a case of CHARGE association. The failure cases included one case of Treacher Collins syndrome.

**Discussion.** Management of CA is still faced with the problem of restenosis. There are so many studies in the literature with tools to improve outcome of surgical intervention. Initially by using different surgical approaches to the use of adjuvant tools or medications. By reviewing our data we tried to evaluate the effect of NS on the outcome of CA repair. Based on this data use of NS especially in unilateral cases was associated with poor outcome (Table 1). Postoperative failure may be a result of prolonged mucosal trauma from stenting rather than any deficiency inherent in the surgical technique.<sup>4</sup> From this data, most of the unilateral cases (75%) were surgically managed at the age of more than one year. Based on that, it is difficult to draw a conclusion on whether operating at an older age, or the unilateral CA is associated with better prognosis. Friedman et al,<sup>9</sup> reported a success rate of more than 75% for their patients (mean age of 30 months) with unilateral CA, and use of NS. However, with revision procedure rate averaging 2.8, Samadi et al,<sup>10</sup> reported almost similar revision rate with use of NS in order to end with patent posterior choana. According to our data, we had a successful outcome in 75% of unilateral CA with only single surgical intervention, and without use of NS. On the other hand, use of NS in bilateral CA was associated with some improved outcome according to our data (success rate of 60% with use of NS versus 33% if NS was not used) despite it was not statistically significant improvement. Unfortunately, the number of the bilateral cases in this study was only 11 cases. Also most of the bilateral cases in this study were operated at an early age (73% of them below one month of age). In a study of 52 neonates with bilateral CA, Gujrathi et al,<sup>11</sup> reported a success rates of 94% after surgical repair, and use of NS. Sadek,<sup>12</sup> reported almost similar results for bilateral CA, and use of NS. Other studies are reporting procedure revision rate ranging between 4.6-4.9 in order to achieve patent choana.<sup>9,10</sup> This reflects the inconsistency of the results of use of NS in bilateral CA among different studies in the literature. In our study there were associated congenital anomalies in approximately 32% of the cases compared to 40% of the cases reported in the literature.<sup>13</sup> Revision surgeries are reported in 36-78% in CA with CHARGE.<sup>14,15</sup> However, there is no strong evidence supporting the need for prolonged nasal stenting in CHARGE.<sup>15</sup> The use of various NS materials has been described, such as endotracheal tubes, soft silicone, self inflating silastic tube, silicone suction tube, and metal reinforced rubber silicone tubes.<sup>16-18</sup> Duration of NS is variable according to different studies ranging from few days to few

months.<sup>9,11,12,19</sup> In our study, NS was used for a period ranging between 4 and 6 weeks. On the other hand, nasal patency was reported to be achieved in both bilateral and unilateral CA without the use of nasal stent.<sup>20</sup> The use of NS may be associated with some complications that include patient discomfort, increased nasal and paranasal infection, and possibly septal or columellar necrosis.<sup>21</sup> According to our finding in this study, we recommend not to use NS in unilateral CA. On the other hand, use of NS may be beneficial in managing bilateral CA.

Our study is limited by the small number of the study population, and being a retrospective study. In order to achieve more reliable conclusions, we recommend performing a prospective, multicenter, well-controlled study, which employs a larger number of cases. In conclusion, the use of NS mandates increased medical care, also may result in nasal complications. Our results indicate that in case of unilateral CA, the use of NS was associated with poor outcome. On the other hand, use of NS in bilateral CA may be associated with improved outcome. Based on our findings, it is recommended not to use NS in unilateral CA, as well as to postpone the surgical intervention, if possible, until the child is one year old or more.

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