Rhinology, 24, 205–209, 1986

# Congenital choanal atresia treated by laser surgery

*Peter Illum, Aarhus, Denmark*

SUMMARY

*Nine patients with choanal atresia have been operated upon with the carbon dioxide laser. Five of the patients had been operated upon before by various methods, and four of the cases were unilateral and untreated before. The operation was performed under general anaestesia using the operating microscope. The pharyngeal mucosa was protected by a saline-soaked packing in the nasal pharynx. No stent was used in the postoperative period.*

*Normal air passage was obtained in six patients, and one patient, who had co-existing adhesions through the whole nasal cavity after previous treatment by dilation, achieved a limited air passage after one laser treatment, and further attempts were postponed until he grew older. One patient did not want another try after one failure. One patient has been operated recently, and the result is uncertain.*

*Laser-treament of choanal atresia seems to make other methods of operation obsolete for the following reasons: The operation is easy and quick and of slight discomfort to the patient. The time of hospitalization is short, and the operation can be repeated, if a good result is not achieved in the first try. And most important is the fact, that no stent is needed.*

## INTRODUCTION

Congenital choanal atresia is a rare malformation which, in the bilateral type, however, calls for immediate recognition and treatment. The condition is thought to be due to a persistence of the buccopharyngeal membrane. It is mostly found as a solitary condition, but can be part of more widespread malformations. The atresia may be membranous, but is most often partially or completely bony.

### *Clinical symptome*

The newborn infant is not capable of mouthbreathing, presumably due to anatomical conditions in the pharynx (Winther, 1978). The bilateral choanal atresia, therefore, gives rise to immediate severe respiratory distress, which has to be relieved by establishment of an oral airway with a tongue depressor or endotracheal intubation, until the definitive treatment can take place. The diagnosis is confirmed by probing both sides of the nose with a rubber catheter. In rare doubt-

ful cases can methyline blue dye be instilled in the nose while observing the appearance of the dye in the pharynx, or contrast radiography can be used. Unilateral choanal atresia, on the other hand, gives usually rise to less distinct symptoms and may often be diagnosed later in life, when the child is examined because of persistent unilateral discharge and obstruction.

*Treatment*

A variety of different approaches have been described in the literature, i.e. transpalatal, transseptal (Greisen et al., 1972), and even transantral. During the latest years the transnasal approach has been recommended in the literature using dilation (Winther, 1978) or trepanation (Masing et al., 1984).

A stenting of the nose for 2 to 8 weeks after creation of a new choana has been recommended by all authors. Commenly used is a U-shaped silastic tube introduced from behind through both nasal cavities and tied in front of the nostrils (Winther, 1978). A hole in the part of the tube lying in the nasal pharynx secures the air passage.

There has been but few reports on the use of te carbon dioxide laser for this operation (Healy et al., 1978; Masing et al., 1984), and a nasal stent has been used by these authors.

The results of endonasal treatment of choanal atresia with the carbon dioxide laser without any stenting in the postoperative period is reported here.

## MATERIAL AND METHODS

All patients with choanal atresia, who have been recorded at our department from 1971 were reexamined by the time, we got access to the laser equipment. There were a total of 19 patients, 8 boys and 11 girls, and 15 of these had been operated upon by several different methods (Table 1). Four of the patients, all with unilateral atresia had had no treatment before. The results of the previous treatment is seen from Table 1. All patients with closed choanae were offered laser treatment, and all, except for one, accepted.

Table 1. The results of previous operations for choanal atresia in 19 patients 1973–84.

| | unilateral | | bilateral | |
|---|---|---|---|---|
| type of operation | open | closed | open | closed |
| transpalatal | 1 | | | |
| transseptal | 2 | 1 | 1 | |
| dilation × 1–4 | 3 | 2 | 2 | 2 |
| not known | | 1 | | |
| total operated | 6 | 4 | 3 | 2 |
| no treatment | | 4 | | |

A Sharplan $CO_2$-laser, model 733, with micromanipulator coupled to a Zeiss operating microscope was used. The focal length was 300 mm.
The operation was performed under general intravenous anestesia using 30% oxygen/70% nitrogen. The patient was positioned with the head in horizontal position. A small orotracheal tube wrapped in aluminium tape was used. The eyes were protected with a strip of aluminium tape and the face with wet gaze. The mucosa of the nasal pharynx was protected with a saline-soaked packing. The atresia could easily be visualized through the microscope after application of a cocain solution in the nasal cavity. A small hole was then made in the center of the atretic area with the laser until the packing in the nasal pharynx could be seen. The hole was then gradually enlarged by vaporization using the gaze as a landmark. This was quite simple in cases of membranous atresia, but also thin bony walls could be vaporized. In order to reduce the deposition of heat, were more substantial bony parts more than 1 mm thick removed with a small chisel, still using the microscope. In case of marked swelling of the posterior part of the inferior turbinate, could this similarly be removed with the laser. The operation was usually finished in 10 minutes and no stent was used.
The patients were remitted from the hospital the next day. They were seen for a follow-up examination after 3 months. A new laser treatment was offered, if the primary result was unsatisfactory.

## RESULTS

A normal functioning airway was obtained in 6 of the 9 patients, in 5 of these after one treatment, and in one case after 3 laser treatments (Table 2). One patient has been treated recently, and the result can not yet be evaluated. One patient, a 4 year old boy, had been treated by transnasal dilation, when he was a newborn. In addition to a massive scarring in the choanae were severe adhesions found in both nasal cavities. This boy achieved a minimal air passage through both nasal cavities, and the tendency to mucoid secretion disappeared. Further attempts were

Table 2. The results of laser treatment in 9 patients with choanal atresia.

| age | type | no. laser-treatments | result |
|---|---|---|---|
| 24 | unilateral | 1 | + |
| 20 | - | 1 | + |
| 17 | - | 1 | + |
| 10 | - | 1 | + |
| 4 | - | 1 | + |
| 3 | bilateral | 3 | + |
| 4 | - | 1 | (+) |
| 10 | unilateral | 1 | - |
| 3 | - | 1 | ? |

postponed until he grew older. One patient, a boy at ten with a unilateral atresia, was not interested in another attempt after one failure.

## DISCUSSION

The laser has been reported useful in babies (Healy et al., 1978; Masing et al., 1984). These authors did, however, use a stent for some weeks postoperatively, and it remains to be proven, that this is unnecessary. No newborn with choanal atresia has been seen at our department after the time, when we got acces to the $CO_2$- laser, but we intend to treat the newborn with bilateral choanal atresia by the same procedure as described. The development of laser equipment should not change the generally accepted principle, that cases of unilateral atresia should be operated upon at an older age.

The results obtained by laser therapy are as good as with any methods reported before. There are, however, very important advantages due to the great accuracy and rapidity and the minimal postoperative oedema obtained by this technique, which seems to make other methods obsolete. It is of great importance to the patients, that a postoperative stent is unnecessary, as the stent seems very unpleasant and has been a major reason, when patients with unilateral choanal atresia have refused operation. Also the short time of hospitalization is valuable.

## ZUSAMMENFASSUNG

Neun Patienten mit Choanalatresien wurden mit dem $CO_2$-Laser behandelt. An fünf Patienten war früher mit verschiedenen Methoden operiert worden, während vier einseitige und unbehandelte Fälle waren. Die Operation wurde unter genereller Anästesie unter Verwendung eines Operationsmikroskopes vorgenommen. Die Pharynxhinterwand wurde durch einen mit Salzwasser gefeuchteten Mulltupfer geschützt. In der postoperativen Phase wurde kein endonasales Röhrchen verwendet.

Bei sechs Patienten wurde normale Luftpassage erreicht. Bei einem Patienten, der nach früheren Behandlungen durch Dilatation gleichzeitige grosse Synechien vorzeigte, wurde nach einer Laser-Behandlung eine begrenzte Luftpassage erreicht. Weitere Versuche wurden aufgeschoben, bis er älter geworden war. Ein Patient wünschte nach einem Misserfolg keinen weiteren Versuch, und das Ergebnis bei einem vor kurzen operierten Patienten is unsicher.

Laser-Behandlungen von Choanalatresien scheinen aus folgenden Gründen andere Methoden veraltet zu machen: Die Operation ist einfach und schnell und für den Patienten nur von geringer Unbequemlichkeit. Der Krankenhausaufenthalt ist von kurzem Dauer und eine Wiederholung der Operation ist bei einem missglückten ersten Versuch möglich. Am wichtigsten jedoch ist, dass auf die Verwendung eines endonasalen Röhrchens verzichtet werden kann.

REFERENCES

1. Greisen O, House L, Stoksted P. Correction of choanal atresia: Report of six cases treated by a modified transseptal method. Int Rhinology 1972; 10:21–27.
2. Healy GB, McGill T, Jako GJ, Strong MS, Vaughan CW. Management of choanal atresia with the carbon dioxide laser. Ann Otol 1978; 87:658–662.
3. Masing H, Steiner W. Zur Behandlung von Choanalatresien. Laryngol Rhinol Otol 1984; 63:181–183.
4. Winther LK. Congenital choanal atresia. Arch Otolaryngol 1978; 104:72–78.

Peter Illum, M.D.
Associate professor
Dept. of Otolaryngology
Aarhus University
Hospital
DK-8000 Aarhus C
Denmark