# Endoscopic management of choanal obliteration following radiotherapy for nasopharyngeal carcinoma

Clinical Case


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## Abstract

Acquired choanal obliteration, though rare post-radiotherapy, can result from various factors. This report discusses a case of post-radiotherapy choanal obliteration treated surgically, with the patient maintaining nasal patency after 18 months.

Case presentation: A 46-year-old female with nasopharyngeal carcinoma treated with chemo-radiotherapy in 2011 developed progressive nasal obstruction. In 2022, she underwent endoscopic surgery with a U-shaped nasal stent insertion to re-open both nasal cavities. Regular follow-ups and stent maintenance were vital for preserving nasal patency.

Conclusion: The case highlights the importance of surgical intervention for choanal atresia post-radiotherapy and underscores the need for diligent follow-up care and nasal hygiene to prevent reoccurrence.



Keywords: Choanal obliteration, after radiotherapy, surgical management


## Introduction

Acquired choanal atresia can result from various aetiologies, with post-radiotherapy instances being infrequent[1]. The clinical presentation often includes unilateral or bilateral nasal obstruction, which may be accompanied by rhinorrhoea, anosmia, snoring and hypoacusis, potentially associated with otitis media with effusion. Diagnosis is primarily confirmed through endoscopy, revealing scar tissue obstructing the posterior nasal cavity, and is invariably supported by imaging studies. The primary therapeutic intervention for patients with choanal obliteration is surgical[2,3], employing techniques such as laser ablation, debridement, or endoscopic


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procedures, although there is a notable rate of re-stenosis. This case report aims to illustrate the management and treatment of a rare post-radiotherapy complication.

## Case presentation

A 46-year-old female with a medical history of non-keratinizing squamous cell carcinoma (undifferentiated subtype) of the nasopharynx underwent chemotherapy and radiotherapy in 2011. She completed 33 radiotherapy sessions with a total dose of 70.62 Gy. Months after treatment, the patient began experiencing progressive nasal obstruction and rhinorrhoea, without anosmia, inflammatory signs, or relieving or aggravating factors. This significantly reduced her quality of life. She also developed recurrent unilateral otorrhea, bilateral seromucous otitis, and progressive hearing loss. On physical examination, her voice sounded nasal, and the nasal passages' permeability was uncertain during anterior rhinoscopy. She also presented unilateral right otorrhea and hearing loss. For further management, we performed endoscopic evaluation that showed reduced permeability of both posterior nasal apertures. Imaging with computed tomography and subsequent magnetic resonance imaging were requested, revealing and membranous choanal obliteration as "absence of clear opening of the Rosenmuller's fossa and swelling of adjacent tissues in superior planes, with partial obliteration of muscular cleavage planes and bilateral tympanic and mastoid filling, likely of inflammatory nature," as shown in Figure 1.

After informed consent regarding potential risks and complications, the patient underwent a surgical attempt to re-permeabilize the choanal obliteration via nasal endoscopy, in March 2022. Post-operation involved checking permeability through secretion aspiration and forced stent mobility (Figure 2). Three weeks after surgery, the stent was removed, confirming choanae patency. Follow-up was initially weekly, then monthly, with the patient's cooperation in daily nasal hygiene, reinforced after eating. Nasopharyngolaryngoscopy at 6 months post-operation verified nasal passage patency (Figure 3). Figure 3 also displays healing and patency after over more than a year post-surgery. The patient continues regular follow-up in the Otorhinolaryngology clinic.

## Discussion

Choanal atresia following radiotherapy remains a rare complication. To date, 10 studies have been found on the subject, including case reports or patient series [1–9]. In these patients, suspicion of obliteration should first consider tumour progression, which warrants histopathological examination of the excised tissue. The mean age of patients in these studies is around 40-45 years, with prevalent symptoms including bilateral nasal

**Figura 1**
Preoperative magnetic resonance imaging. Identification of occlusion in the posterior region of the nasal cavity, without compromise of the air column of the nasopharynx. (A), (B), (C), and (D) depict axial cuts from superior to inferior.

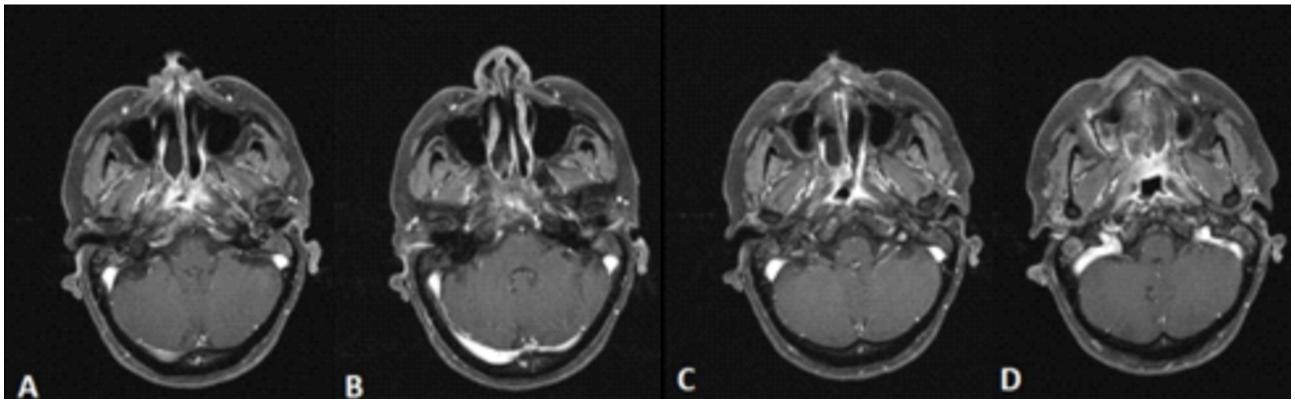
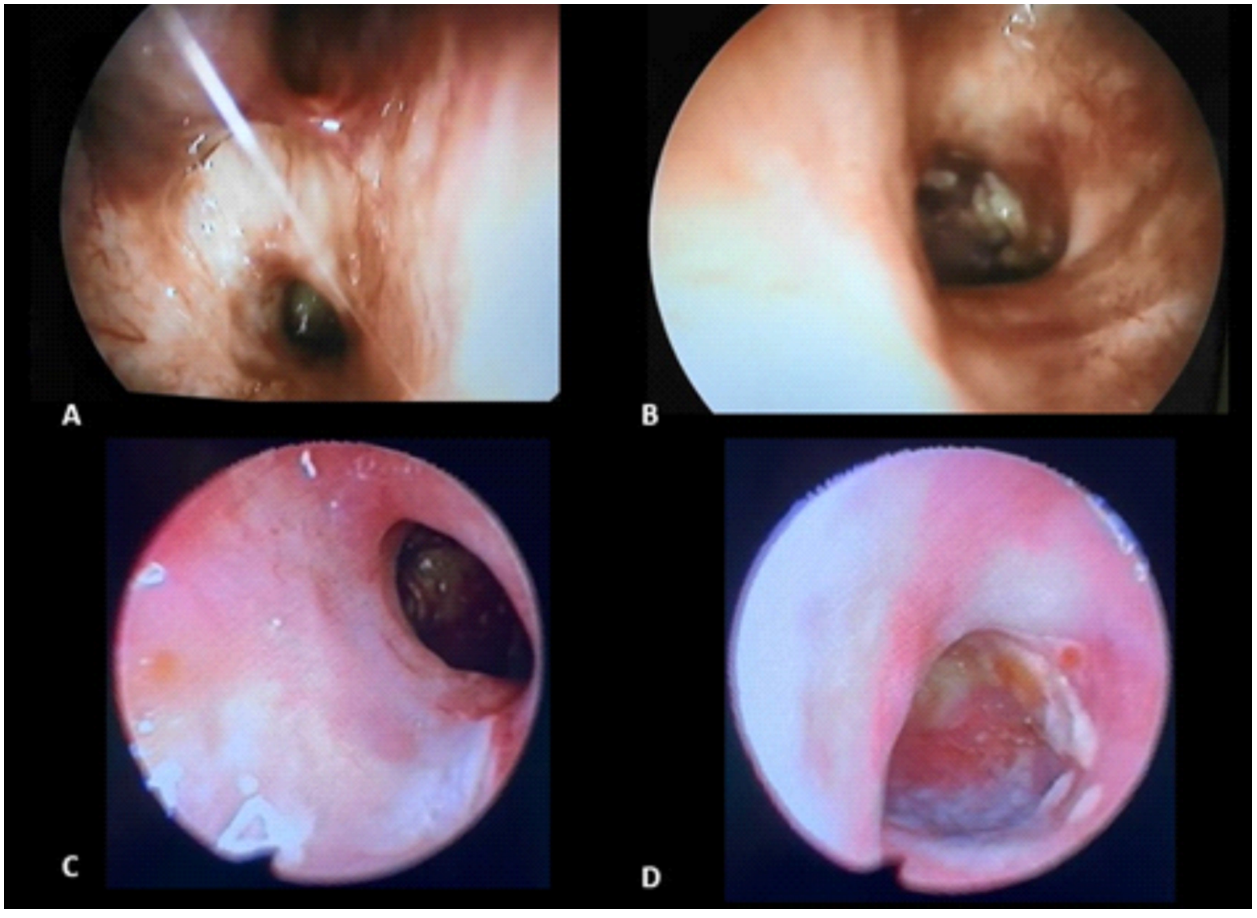


**Figura 2**
Immediate follow-up: External view of the placement of the U-shaped stent

**Figura 2**
Image of nasopharyngolaryngoscopy at 6 months (A, B) and 18 months (C, D) post-operation. Choanal patency is observed after permeabilization. (A): right nasal cavity (B): left nasal cavity (C): right nasal cavity (D): left nasal cavity



obstruction, rhinorrhoea, and recurrent otitis media [1,8,9]. The average radiation dose to the nasopharynx is approximately 66 Gy. Notably, the incidence of stenosis as a complication is not significantly influenced by the radiation dose or technique employed [8], consistent with our presented case. Various stent types are employed to maintain choanal patency post-choanoplasty, facilitating mucosal healing and resolution of atretic obstruction (Table 1). While no universal stent design exists, most require intraoperative customization. The endotracheal tube (ETT), especially Portex polyvinyl chloride variants, remains the most used due to favourable outcomes and low complication rates. However, stentless approaches have shown promising results, often utilizing endoscopic techniques and adjunctive therapies like mitomycin C. Restenosis, particularly in bilateral bony CA or syndromic cases, remains a challenge. Stenting carries risks including mucosal injury, granulation, infection, and impaired mucociliary clearance. Alternative stents include silicone-based, metal-reinforced, and drug-eluting designs (e.g., mometasone-eluting stents), aimed at reducing inflammation and restenosis. Various mucosal flap techniques (e.g., L-shaped,crossover,T-shaped,andswingingdoor) have improved outcomes by covering exposed bone and minimizing re-epithelialization-related stenosis. Evidence suggests that flap-based stentless repair may offer comparable success with fewer complications. Overall, the choice of technique and stent type should be individualized based on patient age, atresia type, comorbidities and surgeon preference or experience. Postoperative outcomes are optimized by careful stent placement, flap coverage, and addressing contributing factors such as reflux[10]. Table 1 summarizes the most used types of stents, their key features and associated outcomes. In the presented case, an exclusive endoscopic nasal technique

**Table 1**
Overview of the most used types of stents, their key features and associated outcomes

| Stent Type | Material | Used in | Advantages | Complications / Notes |
|---|---|---|---|---|
| Portex ETT | Polyvinyl chloride | Unilateral/ Bilateral | Widely available; customizable | Risk of mucosal trauma, granulation, may soften at body temperature |
| Silicone stent (e.g. Foley) | Soft silicone | Mostly bilateral | Comfortable, low risk of necrosis; easy to place/remove | Some risk of granulation; longer stenting needed in bony CA |
| Silastic stent | Medical-grade rubber | Bilateral | Malleable; acceptable cosmetic outcome | Infection risk if not irrigated; requires long stenting (12–16 weeks) |
| Reinforced silicone (metal core) | Silicone with metal wire | Severe/ recurrent CA | Resists collapse; minimal granulation; shorter operation time | Must prevent columellar pressure necrosis with padding |
| Teflon "Little Gun" | Biocompatible Teflon | Neonates | Customizable; intranasal; maintains mucociliary function | Requires regular cleaning and stent change |
| Drug-eluting stent (Mometasone) | Steroid-eluting polymer | Uni-/ Bilateral | Anti-inflammatory; reduces restenosis | Expensive; one case required early removal |
| Nelaton catheter | Rubber (low-cost) | Resource-limited settings | Inexpensive; available | Fixed with sutures; infection risk if not maintained properly |
| No stent (Flap-only techniques) | N/A | Mostly unilateral | Avoids stent-related complications | Restenosis possible without proper flap coverage |

with U-shaped stent placement was selected, and meticulous follow-up was essential for optimal outcome. The placement of a silicone-based stent was employed as an alternative therapeutic approach, known by achieving effective airway patency in over 90% of patients who underwent microscopic surgical correction of choanal atresia [11]. We used a silicone stent fashioned from Foley catheter size 18 French. The stent was positioned in a perforated "U" configuration along the posterior aspect without suture fixation but secured to the columella (Figure 2).

A T-shaped mucosal incision was made using a fine-tip cautery device, with the vertical limb of the T oriented medially toward the nasal septum. Mucosal flaps were elevated superiorly and laterally, along with a smaller medial flap. The posterior segment of the residual bony septum was covered by the medial flap, allowing interdigitation with the contralateral medial flap of the opposite choana. The duration of the stent placement is not precisely defined in the literature and can be prolonged in cases of bilateral and/or bony choanal atresia. In our case the stent remained in place for 3 weeks, with weekly manipulation and daily hygiene. No mitomycin was applied. As described in the literature, recurrence rates are significant, especially with exclusive surgical techniques [8]. Hence, this case underscores the importance of nasal care in preserving stent patency and ensuring it remains in situ for at least two weeks. Weekly stent adjustments (and hygiene) help maintain the patency of the created orifice without significant adjacent tissue stenosis, contributing to a sustained favourable surgical outcome at 6 and 18- months post-procedure.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## Disclosure statement

The authors repost there are no competing interests to declare.

## Informed consent

The authors confirm that the patient gave her written informed consent.

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