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MAIN ARTICLE

Surgical management of nasal stenosis following chemoradiation for nasopharyngeal carcinoma

V V WILMOT[1], I HATHORN[2]

[1]ENT Department, St John's Hospital, Livingston, Edinburgh, and [2]ENT Department, University of Edinburgh, Scotland, UK

Abstract

Background: Nasal stenosis is a rare but significant complication of chemoradiation treatment for nasopharyngeal carcinoma. It can cause distressing obstructive symptoms for the patient and potentially interfere with monitoring for recurrence. Quality-of-life indicators are known to be very poor in this group of patients; however, there is very little evidence in the literature as to management of this complication.

Methods: This paper presents an endoscopic day-case surgical procedure to address total posterior nasal stenosis, as conducted in three patients, which involves division of adhesions and removal of the posterior septum and posterior inferior turbinates, without the need for packing or stenting.

Results: In this series, there was resolution of obstructive symptoms and no recurrence of stenosis during follow up (up to 20 months).

Conclusion: This endoscopic procedure performed to manage total nasal stenosis differs from those previously described in the literature, as post-operative stenting or packing is not required, and removal of the posterior aspect of the septum is performed routinely.

Key words: Nasopharyngeal Cancer; Nasal Surgical Procedures; Bilateral Nasal Obstruction; Stenosis

Introduction

Nasopharyngeal carcinoma (NPC) has a high prevalence in Southeast Asia, but is uncommon in Western society, with an incidence of around 1 per 100 000 per annum.[1] Radiotherapy (RT) is the mainstay of treatment for NPC. Intensity-modulated RT allows for concavities in the radiation dose distribution. It can improve coverage of the primary tumour and reduce unnecessary radiation to nearby unaffected structures. This has reduced some of the morbidity associated with NPC, especially xerostomia.

Acquired-nasal stenosis is an unusual complication of chemoradiation for NPC. Although rare, it can cause considerable morbidity, with patients complaining of nasal obstruction, rhinorrhoea and conductive deafness secondary to Eustachian tube involvement.[2] A single-centre study looking at late sinonasal complications following treatment for NPC over 20 years found an incidence of stenosis in their cohort of 15 per cent.[3] The authors found that patients with nasal stenosis had the lowest quality-of-life scores as compared with other treatment-induced complications. Although numbers with stenosis were small, they found no correlation with tumour (T) staging of disease, and no correlation between standard RT or intensity-modulated RT and this rare complication.

Currently, the literature on treatment for acquired stenosis following chemoradiation is sparse. Most of the studies come from Southeast Asia, given the higher prevalence of NPC in that region. All described techniques to date have combined various patterns of resection of nasal anatomy and the occasional use of mitomycin C application, and all descriptions thus far have advocated post-operative packing or stenting in order to try and prevent re-stenosis. Evidence from the West is even more limited, describing single case reports only.

This study reports successful endoscopic surgical management for this complication of NPC treatment, without the need for post-operative stenting or packs, in three patients.

Materials and methods

Over three years, three patients with troublesome obstructive symptoms following chemoradiation for nasopharyngeal carcinoma were referred from the head and neck multidisciplinary team for consideration of surgical management.

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The patients were evaluated in the out-patient clinic by a consultant rhinologist. All patients underwent rigid nasendoscopy examination and computed tomography scanning (Figure 1), and were confirmed to have total bilateral posterior nasal obstruction without velopharyngeal insufficiency.

All 3 patients were male, with a mean age of 61 years (range 50–70 years). One was referred in light of difficulty monitoring the disease because of stenosis, alongside obstructive symptoms, and two patients were referred solely for symptoms of nasal obstruction. The tumour–node–metastasis (TNM) disease stages for the three patients were $T_4N_2M_0$, $T_1N_2M_1$ and $T_4N_0M_0$. The mean time to onset of significant symptoms following radiation was six months (range of four to seven months).

Two patients had undergone treatment with cisplatin and 5-fluorouracil chemotherapy with irradiation, and one patient had received carboplatin with irradiation. All patients had received intensity-modulated RT at 70 Gy in 33 fractions.

Surgical technique

Surgery was performed under general anaesthetic by a single operating surgeon with the Stryker image guidance system. The nasal cavity was prepared using 1 in 1000 adrenaline soaked patties bilaterally, and infiltrated with 2 per cent lidocaine with 1:80 000 adrenaline.

Adhesions between the inferior turbinates and septum were divided by cold steel (Figure 2). The posterior aspect of the inferior turbinates, including bone and overlying mucosa, was removed. The posterior choanae were opened using the microdebrider, removing the soft tissue stenosis in this area back to nasopharyngeal mucosa. The posterior portion of the septum, including bone and overlying mucosa, was removed with the microdebrider and back-biters. The anterior margin for dissection of the septum was the anterior edge of the middle turbinate (Figure 3).

FIG. 1
Axial computed tomography image showing bilateral posterior nasal stenosis.

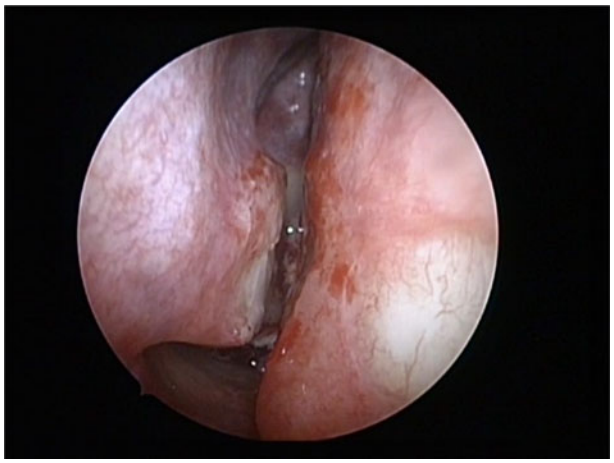

FIG. 2
Intra-operative photograph of right nasal cavity, showing posterior nasal stenosis and division of adhesion between inferior turbinate and septum.

At the end of the procedure, there was intact nasopharyngeal mucosa, with a space anterior to it due to the removal of the soft tissue stenosis, the posterior part of the septum and posterior inferior turbinates. Figure 4 illustrates this space and shows the posterior choanae to be widely patent at the end of the operation. The aim is to leave no exposed bone so as to reduce the chance of re-stenosis.

Post-operatively, regular nasal saline douching, three times daily for four weeks, was prescribed, along with four weeks' fluticasone propionate nasal drops.

One patient had pre-existing chronic rhinosinusitis, and had previously undergone functional endoscopic sinus surgery and polypectomy. In addition to the

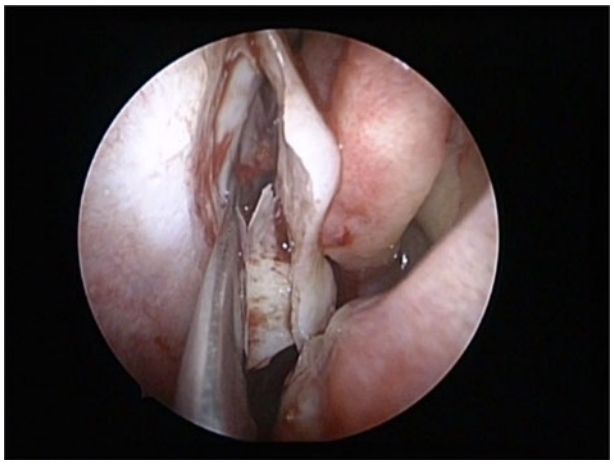

FIG. 3
Intra-operative photograph of left nasal cavity, showing division of posterior aspect of the septum at the level of the anterior aspect of the middle turbinate.

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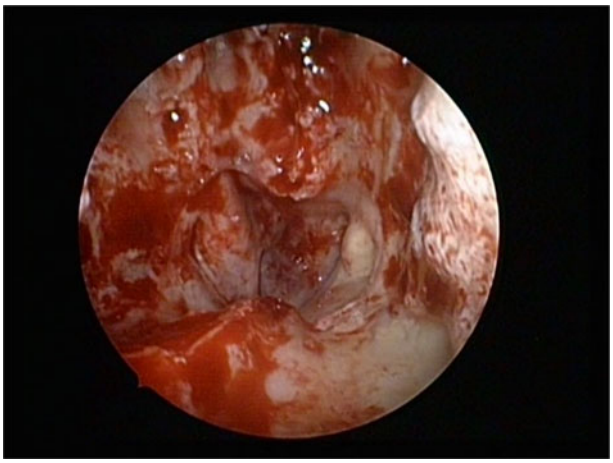

FIG. 4
Intra-operative photograph of patent nasal choanae at the end of the procedure.

above procedure, this patient underwent polypectomy, anterior and posterior ethmoidectomies, sphenoidotomies, re-opening of middle meatal antrostomies, and opening of the bilateral frontal drainage pathway. Biopsies were taken intra-operatively to exclude recurrence.

Follow up was at 1, 2, 6 and 12 months with the operating surgeon, and it continues concurrently with the combined head and neck and oncology team. Glasgow Benefit Inventory scoring was used post-operatively to assess the impact of surgery. Rigid nasendoscopy with debridement was performed as necessary at post-operative visits, and the posterior choanae were assessed for adhesions, re-stenosis and patency.

Results

In two cases, the operations were performed as day-case procedures. The third patient was admitted overnight because of the distance from the hospital facility. There were no post-operative complications. Total follow-up time was between 2 and 20 months. Nasal choanae remained patent upon direct visualisation with a nasendoscope, and an improvement in nasal breathing was noted in all cases and at all reviews. There were no reported recurrences of obstructive symptoms. One patient, disease stage $T_1N_2M_1$, elected to discontinue follow up at two months because of disease progression, not at the primary site. His nasal obstructive symptoms improved and were no longer troubling him. He died three months following the surgical intervention and did not complete the Glasgow Benefit Inventory. The Glasgow Benefit Inventory scores for the other two patients were +5.6 and +55.6 at six months post-operation.

Discussion

Synopsis of new findings

This is the first case series of treatment for acquired choanal stenosis following chemoradiation in the West. These cases illustrate a simple and effective treatment for acquired posterior nasal stenosis. The condition carries significant morbidity and is distressing to patients. This procedure is the first to be described that does not require post-operative stenting or packing. This is beneficial in terms of patient comfort and there is no requirement for further procedures to remove the stents. The procedure can be performed as a day-case operation. Furthermore, it can improve nasal obstruction and allows continued monitoring of the disease. Although the numbers are too small to draw any conclusions from Glasgow Benefit Inventory scoring, outcomes are encouraging and all patients noted good improvement in their symptoms.

Comparisons with existing literature

Most information on nasal stenosis following chemoradiation originates from Southeast Asia, where the incidence of NPC is much higher.

A study from Hong Kong, conducted in 2001, described the surgical management of six cases of stenosis following chemoradiation for NPC.[4] The method they described was transnasal endoscopic resection of scar tissue in the membranous stenosis, performed under local anaesthetic with a sickle knife. This resulted in a limited left and right choanae separated by posterior nasal septum. They routinely used Merocel® nasal splints for two weeks post-operatively to prevent re-stenosis. Four patients remained symptom free, and two developed re-stenosis at two to three weeks post-operatively and required re-operation.

- **Nasal stenosis is a rare but significant side effect of chemoradiation for nasopharyngeal carcinoma**
- **It causes significant morbidity for patients and may impact upon disease surveillance**
- **An endoscopic procedure is described that addresses total posterior nasal stenosis**
- **The procedure involves division of adhesions, and removal of posterior septum and posterior inferior turbinates**
- **This procedure differs from those previously described, as post-operative stenting and packing is not required**
- **Furthermore, removal of the posterior aspect of the septum is performed routinely**

The largest case series to date was performed in China, in which data from 16 patients with bilateral and 6 with unilateral treatment-induced stenosis were evaluated over 6 years.[2] Patients underwent transnasal endoscopic surgery with microdebridement to re-open the stenosis and reduce the posterior aspect of the inferior turbinate. The posterior aspect of the septum was not routinely removed. These patients also underwent

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sinus surgery during the same operation, in all but one case. Post-operative packing with Merocel packs was again used for 3 days duration, and the mean hospital stay was 5 days. Twenty of 22 patients were symptom free at follow up and 2 patients required further operation for re-stenosis. Visual analogue scores for rhinorrhea and nasal obstruction were significantly improved post-operatively.

Our paper describes a more extensive dissection, with routine removal of the posterior nasal septum and the posterior aspect of inferior turbinates, leaving less potential for re-stenosis. There were no negative side effects in terms of complications or quality-of-life outcomes. The technique removes the need for packing or stenting.

Published literature from the West is limited to single case reports. Shepard and Houser reported on a single case of choanal stenosis 16 years after RT for NPC, where a previous choanal dilatation procedure had failed to provide benefit.[5] The patient also suffered with velopharyngeal insufficiency, and had a partially fixed palate and relapsing unilateral middle-ear effusions. Transnasal endoscopic scar excision was performed with a sickle knife and microdebrider, the posterior aspect of the septum was removed with biting forceps, and topical mitomycin C was applied for 5 minutes. Nasal stents were then left in place for six weeks. The patient reported good nasal airflow at 20 months' follow up. A single case report from France also described a transnasal approach to remove the stenosis at the posterior choanae and the application of Silastic® stents that were left in situ for three weeks.[6] The stenosis remained patent at one year.

Conclusion

Nasal stenosis is an infrequent but significant side effect of chemoradiation treatment for NPC. Given its rarity, ENT surgeons may not encounter it routinely in practice, but the simple technique described herein could be performed by a surgeon familiar with endoscopic nasal surgery. This is a single-stage day-case operation, with no requirement for post-operative packing or stenting. Increased awareness of nasal stenosis following chemoradiation for NPC may well identify more cases that could be easily treated with this technique and improve quality of life in this group of patients.

References

1 British Association of Otolaryngology, Head and Neck Surgery. *Head and Neck Cancer: Multidisciplinary Management Guidelines*, 4th edn. London: ENT-UK, 2011
2 Liu X, Huang X, Sun W, Zeng L, Han P. Endoscopic surgery for acquired choanal atresia after radiotherapy for nasopharyngeal carcinoma. *Am J Rhinol* 2011;**25**:188–92
3 Alon EE, Lipschitz N, Bedrin L, Gluck I, Talmi Y, Wolf M *et al*. Delayed sino-nasal complications of radiotherapy for nasopharyngeal carcinoma. *Otolaryngol Head Neck Surg* 2014;**151**:354–8
4 Ku PK, Tong MC, Tsang SS, Van Hasselt A. Acquired posterior choanal stenosis and atresia: management of this unusual complication after radiotherapy for nasopharyngeal carcinoma. *Am J Otolaryngol* 2001;**22**:225–9
5 Shepard PM, Houser SM. Choanal stenosis: an unusual late complication of radiation therapy for nasopharyngeal carcinoma. *Am J Rhinol* 2005;**19**:105–8
6 Bonfils P, Preobrajenski N, Florent A, Bensimon JL. Choanal stenosis: a rare complication of radiotherapy for nasopharyngeal carcinoma. *Cancer Radiother* 2007;**11**:143–5

Address for correspondence:
Miss Victoria V Wilmot,
St John's Hospital,
Livingston,
ENT Department,
Lauriston Buildings,
Lauriston Place,
Edinburgh EH3 9HA,
Scotland, UK

E-mail: vvwilmot@doctors.org.uk

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