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Nd: YAG laser treatment for adult hypopharyngeal haemangioma

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Abstract
Adult hypopharyngeal haemangioma is an uncommon neoplasm. We present three cases of adult hypopharyngeal haemangioma which were successfully treated with a neodymium: yttrium–aluminium–garnet (Nd: YAG) laser in our hospital between 2000 and 2003. The patients in this series experienced no untoward events from the use of the laser. Excessive bleeding and airway problems were not encountered. Postoperative pain was minimal. Excellent long-term function and a full resolution of symptoms can be obtained using Nd: YAG laser. The laser provides a bloodless field and complete healing of the hypopharynx, without stenosis or scar formation.

Key words: Laser Surgery; Haemangioma; Hypopharynx

Introduction

Adult hypopharyngeal haemangioma is an uncommon neoplasm that can cause dysphagia, recurrent bleeding and airway obstruction.[1,2] Haemangiomata have been divided clinically into paediatric and adult types. The paediatric type most often presents as a subglottic mass in children younger than two months of age, although it is occasionally seen in children as old as 30 months. In adults, haemangiomata are usually found in the larynx and only rarely in the hypopharynx, and can occur at any age. No skin lesions are present.

Histologically, haemangiomata are classified as either capillary or cavernous types: in capillary haemangiomata, the size of the primitive endothelial canals corresponds to the size of the capillary bed; while in cavernous haemangiomata, the canals are larger than the terminal vascular bed.

There are numerous publications on haemangiomata that have been treated by various procedures, and some papers have described laser therapy with either CO_2, potassium titanyl phosphate (KTP) or neodymium: yttrium–aluminium–garnet (Nd: YAG) lasers. The Nd: YAG laser has several characteristics that make it well suited to the treatment of low-flow vascular lesions of the hypopharynx. A CO_2 laser beam may not permit good visualization of hypopharyngeal lesions, and bleeding from a vascular tumour may be difficult to control. Also, the Nd: YAG laser is more strongly absorbed in endothelial cells than in the surrounding tissue.

We present three cases of adult hypopharyngeal haemangioma that were successfully treated with Nd: YAG laser.

Case report

Between 2000 and 2003, we treated three adults whose physical examinations were highly suspicious of hypopharyngeal haemangioma. Preoperative evaluation in all patients included a complete history and physical examination, laboratory analysis and radiographic studies. In all cases, the diagnosis of haemangioma was confirmed clinically and radiographically. Computed tomography (CT) and magnetic resonance imaging (MRI) were used to determine the depth and extent of the lesion and to plan treatment approaches that would protect and preserve vital anatomical structures.

In all cases, microlaryngoscopy was performed under general anaesthesia. In each case, a biopsy sample was first obtained with cup forceps, and the Nd: YAG laser (SLT Contact Nd:YAG laser CL50, SLT Japan, Tokyo, Japan) was then used in continuous mode at 15 W. The lesion was photocoagulated in a sweeping fashion until blanching and visible involution were observed. With the Nd: YAG laser in the contact mode, a portion of the lesion was also resected and sent for pathologic evaluation. There were no signs of airway obstruction or bleeding at any time postoperatively.

Case 1

A 58-year-old man presented with throat discomfort and cough. Fibrescope examination demonstrated a submucosal vascular lesion extending into the left pyriform sinus and arytenoid. (Figure 1a). The vocal folds were normal and airway adequate. A CT scan and an MRI demonstrated a vascular tumour in the hypopharynx (Figure 1b and 1c) and magnetic resonance angiography (MRA) showed thin arteries supplying this lesion (Figure 1d). The findings were consistent with a cavernous haemangioma. The lesion was resected and photocoagulated with no bleeding. The next day the patient could eat a regular diet. He was discharged on the

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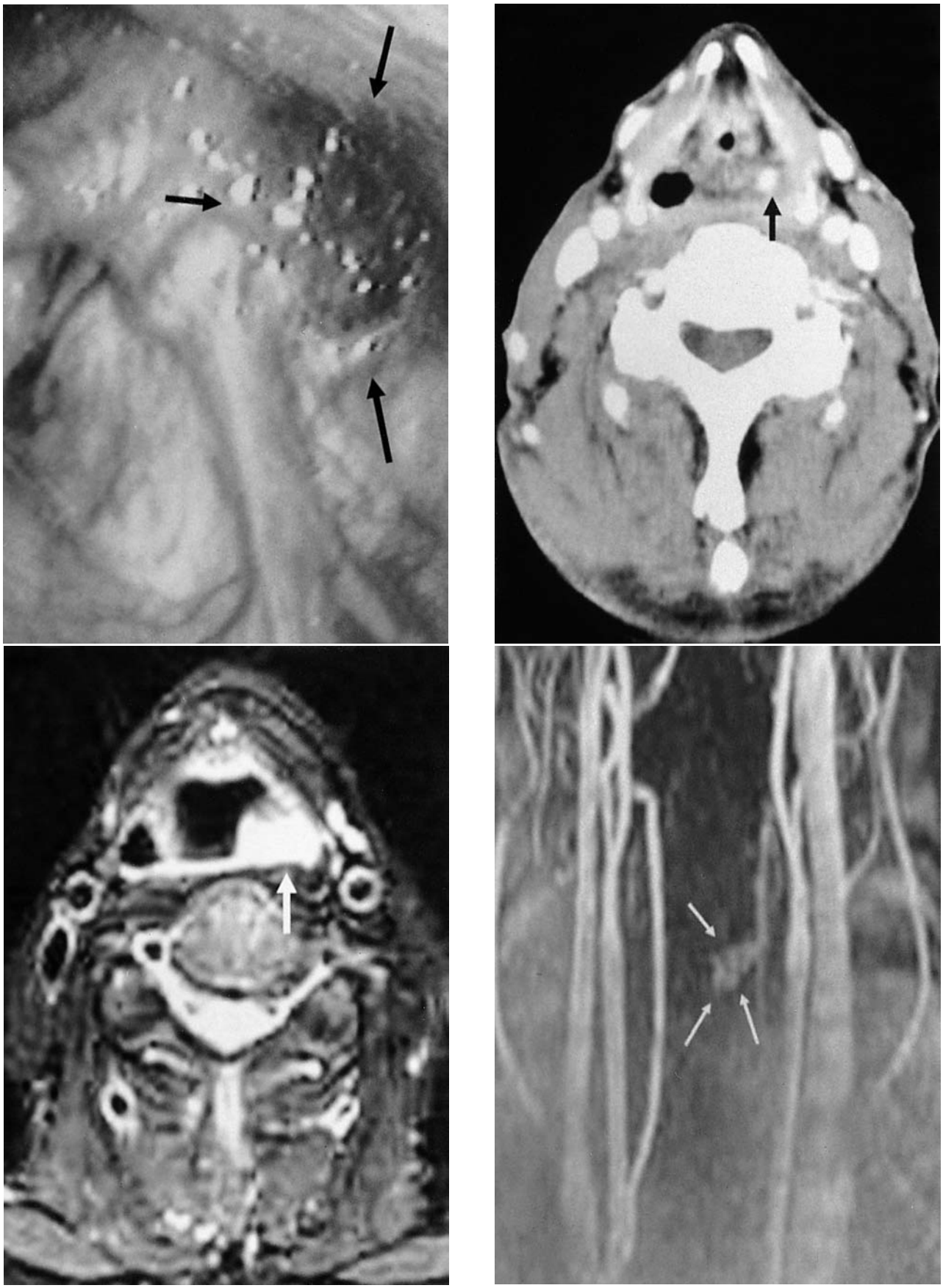

FIG. 1

Case 1. (a) Fibrescope examination demonstrated a submucosal vascular lesion (arrowed) extending to the right pyriform sinus. (b) Axial contrast-enhanced CT scan and (c) T2-weighted axial MRI demonstrated a vascular tumour (arrowed) in the hypopharynx. (d) MRA showed thin arteries (arrowed) supplying the hypopharyngeal tumour.

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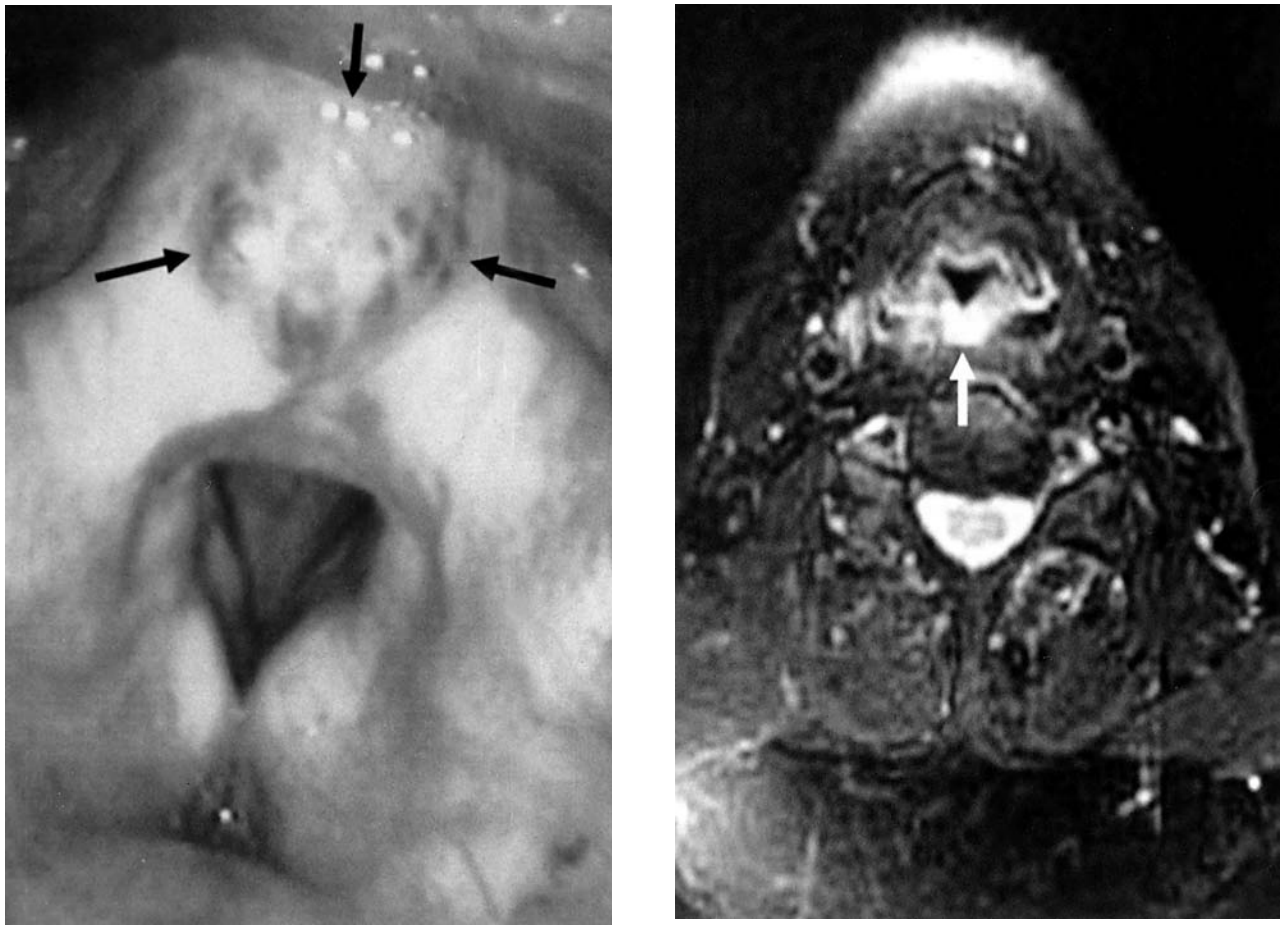

FIG. 2

Case 2. (a) Fibrescope examination demonstrated a submucosal vascular lesion (arrowed) in the post-cricoid region. (b) T2-weighted axial MRI demonstrated a vascular tumour (arrowed) in the hypopharynx.

sixth postoperative day. The 32-month follow-up revealed no residual tumour or scar, and a normal airway.

Case 2

A 75-year-old man had a gastric ulcer and underwent fibreoptic examination for this. A mass in the post-cricoid region was seen and fibreoptic examination demonstrated a submucosal vascular lesion in the post-cricoid region (Figure 2a). A CT scan and an MRI showed a vascular tumour in the hypopharynx (Figure 2b) but MRA did not demonstrate the arterial supply. The Nd: YAG laser was used in continuous mode at 15 W and the lesion resected and photocoagulated. The patient was discharged on the fifth postoperative day. The 22-month follow-up revealed no residual haemangioma or scar, and a normal airway.

Case 3

A 62-year-old man complained of discomfort in his throat for eight days. A fibreoptic examination detected a lesion on the right pyriform sinus. A CT scan and an MRI demonstrated a vascular tumour in the hypopharynx, but MRA again failed to show the arterial supply. The lesion was resected and photocoagulated and the patient was discharged on the sixth postoperative day. The 20-month follow-up revealed no residual haemangioma, no scar and a normal airway.

Discussion

Haemangiomata are benign vascular tumours of unknown etiology. The diagnosis may be difficult to make without endoscopic examination, which shows a unilateral, bluish lesion.

Open surgery is indicated for severe cases,[1] but if the tumour is not too large and does not extend widely, the treatment of choice is laser ablation.

In 1979, Simpson *et al*. reported the first case using a CO_2 laser therapy for subglottic haemangioma.[2] Healy *et al.* followed with a review of 11 patients treated with this laser;[3] in their study, all 11 patients were cured of their disease with one or two laser applications. Performance of CO_2 laser ablation appeared to carry no serious risk of injury to the deep structures.

However, although the CO_2 laser can control the lesion, there may be some difficulty in its use. MacCaffrey and Cortese noted that the CO_2 laser was more effective at cutting than coagulation,[4] and since the straight-line open-tube delivery of the CO_2 laser beam may not permit good visualization of the lesion in the hypopharynx, bleeding from a vascular tumour may be difficult to control. Ward recently reviewed the CO_2 laser bronchoscope system[5] and found that the major limitation to this technique was the inability to use a bronchoscope smaller than 4.0 mm (outside diameter 7.0 mm). Additionally, when using a small bronchoscope, visualization was compromised, and significant scatter from the helium neon-aiming beam could occur.

These considerations prompted us to use the Nd: YAG laser. This laser produces a coherent beam of infrared radiation at a wavelength of 1060 nm[6] and has the advantage that all locations, types and stages of

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haemangiomata can be treated. The emitted light is more strongly absorbed in endothelial cells than in the surrounding tissue. Whereas the CO_2 laser, due to its high tissue absorption, produces surface destruction, the Nd: YAG laser has a lower tissue absorption[7] enabling deeper penetration of the laser energy and thus a deeper coagulation effect. However, because of the large tissue volume treated, there is a danger of transmural injury to underlying structures if the duration of application is excessive, and caution must be used to prevent damage to underlying structures.

- **Series of haemangiomata of the hypopharynx treated successfully with Nd: YAG laser**
- **Use of this laser, compared with CO_2 laser, is discussed**

A KTP laser is also suitable for treating vascular lesions, but it can also have disadvantages as there is a danger of transmural injury if the duration of the laser's application is excessive.[8]

Conclusion

We have treated three patients with hypopharyngeal haemangiomata using Nd: YAG laser. Excellent long-term function and full resolution of symptoms were obtained and tracheostomy was avoided in all cases. The coagulation effect of the laser enabled bloodless coagulation and complete healing, without stenosis or scar formation.

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