C02 Laser ablation and Balloon Dilation for Acquired Nasopharyngeal Stenosis: A Novel Technique

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INTRODUCTION

Choanal stenosis (CS) is primarily a congenital anomaly, however acquired forms of CS are known to occur. While acquired CS is often attributed to infectious and granulomatous processes, the etiology is often unclear and left to speculation.

Recently, acquired CS has also been increasingly recognized as a late complication of external beam radiation for head and neck malignancy.1-6 Although uncommon, patients with acquired CS frequently suffer significant morbidities, including phonatory changes, sleep disordered breathing, and otologic disturbances.1,3 Acquired CS is most commonly treated by endonasal endoscopic surgery.

We describe a novel surgical technique utilized in three patients. Durable results are demonstrated, without the requirement for nasal obturator or stent placement. With proper patient selection, this procedure can potentially be performed under local anesthesia in the clinic setting.

OPERATIVE TECHNIQUE

All patients underwent surgery under general anesthesia. A small bore flexible scope with a working channel such as a bronchoscope or a transnasal esophagoscope is passed through the nostril to the location of nasopharyngeal stenosis. (Fig. 1) A flexible C02 laser fiber (Omniguide, Boston, MA) is then inserted via the working channel of the scope. Precise radial incisions are made using the laser under direct visualization. (Fig. 2) The laser is then removed. A controlled radial expansion (CRE) balloon dilation device is then inserted, advanced to span the segment of stenosis, and inflated to achieve adequate dilation. (Fig. 3) The balloon is then deflated and removed. (Fig. 4) Mitomycin-C may then be applied topically to the area of dilation as an adjunctive therapy.

CASE REPORTS

Case 1
A 56-year-old man who received post-operative radiation therapy in 2006, following composite mandibulotomy and fibular free-flap reconstruction for squamous cell carcinoma of the oropharynx presented with progressive nasopharyngeal stenosis and supraglottic stenosis 2 years after treatment. Over a course of 18 months he underwent several dilations with CRE balloons alone as well as cold-steel incision of a prominent posterior scar band followed by CRE balloon dilation. His nasopharynx was noted to have near completely re-stenosed despite these approaches. At this time, and in conjunction with C02 laser supraglottoplasty and dilation, the nasopharyngeal stenosis was treated with radial incision using the flexible C02 laser fiber, CRE balloon dilation, and topical application of mitomycin-C.

Case 2
A 68-year-old woman with a remote history of idiopathic subglottic stenosis presented to our department in January 2008 and was taken to the operating room for evaluation. During endoscopy, significant granulation tissue and early fibrosis were noted in the nasopharynx. Biopsies of the tissue were negative for an infectious, autoimmune or malignant process. The patient returned to the operating room several times during the same year for the management of her subglottic stenosis, chronic sinus disease and bilateral serous otitis media with resultant conductive hearing loss. She continued to have progressive granulation tissue and fibrosis of the nasopharynx, ultimately leading to near complete choanal stenosis. In August, 2009 the stenosis was treated with radial incisions utilizing the flexible C02 laser and CRE balloon dilation.

Case 3
A 52-year-old man treated with external beam radiation in 1995 for squamous cell carcinoma of the tonsil later developed pharyngoesophageal strictures treated in 2000-2002 using rigid dilators. He was subsequently lost to follow-up, and re-presented in early 2010 with severe laryngeal stenosis and near-complete nasopharyngeal stenosis. The nasopharyngeal stenosis was treated with radial incisions using the flexible C02 laser fiber, CRE balloon dilation, and topical application of mitomycin-C.

DISCUSSION

Acquired CS after surgical intervention or external beam radiation therapy is an uncommon yet important consideration for the otolaryngology patient.1-4,6 Severe stenosis of the nasopharynx is historically difficult to manage, as it contributes to considerable patient discomfort and frequently recurs after treatment.1-4

Surgical access to the nasopharynx in the treatment of severe CS may be accomplished using a transpalatal or transeptal approach, however these methods have largely been replaced by transnasal endoscope-based techniques.5,6 The most common procedures performed in the management of acquired CS include primary excision and local flap coverage, primary excision and the placement of stents, and simple dilation.5,6 Variations in these techniques exist, each with its own catalogue of benefits and disadvantages.

The C02 laser has been thoroughly described in its applicability to soft tissue resection in the head and neck. Likewise, its utility in the resection of severe scarring of the nasopharynx has been reported. However, the long-term stent placement, often required postoperatively to prevent restenosis, has been seen as a disadvantage of this technique.1,3 Madgy and colleagues described an alternative method to laser resection utilizing a plasma radiofrequency device in three patients. The benefits to this technique were cited as a reduction in epithelial damage when compared to conventional electrosurgery, and the ability to achieve nasopharyngeal patency without the use of obturators or stents (follow-up range 10-12 months).1,3 Subsequently, Wang et al. demonstrated the use of a similar radiofrequency device as an adjunct to cold-steel excision in 32 patients. While 91% of the patients were reported free of recurrence at greater than 12 months, 23 patients required stent placement and three patients had significant restenosis.7 Other reported techniques in the management of acquired CS include cold-steel excision (with or without the use of a soft-tissue powered microdebrider), and simple C02 laser puncure, however most require long-term obturator placement to achieve lasting results.1,3-6

We were able to successfully treat severe nasopharyngeal stenosis under direct visualization utilizing a transnasal endoscope and a flexible C02 laser fiber placed through the working channel to make radial incisions of the stenosis, CRE balloon dilations, and topical application of mitomycin-C. The recently released and more widespread availability of the flexible C02 laser fiber is advantageous in its ability to both access and remain mobile within confined spaces such as the nasopharynx. By combining the flexibility of the optical C02 laser with that of the transnasal scope, the operator is able to create precise radial incisions under direct observation. Although the present authors chose to use the flexible scope to pass the laser fiber the procedure could also be accomplished by passing the laser fiber through an appropriately sized curved nasal suction catheter. The ability to preserve epithelium and minimize mechanical and thermal injury to the adjacent tissue is further advantage.

Although not utilized in this report, an important benefit of this technique is the ability to perform the incision and dilation under local anesthesia in the clinic setting. Unfortunately, as seen with the patients described here, nasopharyngeal stenosis rarely exists in isolation. More commonly, other concurrent stenoses involving the upper aerodigestive tract are present, and may require general anesthesia for their management.

CONCLUSION:

Acquired CS is an important pathologic process that can be frustrating to both the patient and surgeon, and lead to considerable patient discomfort. While several treatment methods exist, acquired CS can be successfully repaired with durable results, using an optical C02 laser and balloon dilation.

REFERENCES: