EDITORIAL

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A novel and promising addition to the treatment arsenal for post-intubation subglottic stenosis: Holmium laser ablation and cryotherapy via flexible bronchoscopy

Dr. Jiao et al[1] from Beijing Children's Hospital present an impressive report on the novel use of a holmium laser and subsequent cryotherapy delivered via a flexible bronchoscopy as a treatment modality for post-intubation acquired subglottic stenosis in children. Excellent outcomes were achieved in 16 consecutive patients with serial procedures, including clinical cure (defined as: resolution of respiratory symptoms, significant improvement in subglottic stenosis grade, and tracheotomy decannulation) in 15 of 16 patients. They had no serious complications. This novel approach with promising results adds to the toolbox of methods available to address the vexing problem of post-intubation subglottic stenosis.

This work represents an important finding in the treatment of a complex airway disease. Acquired stenosis accounts for 95% of all cases of subglottic stenosis; prolonged intubation is the most common etiology.[2] Various techniques have been published in the literature and are used at different institutions, suggesting that there is no one ideal treatment modality. Historically, mild to moderate stenosis (Myer-Cotton grades I–II) was treated endoscopically, while more severe stenosis (Myer-Cotton grades III–IV) was approached with open laryngeal framework surgery. Gradually, endoscopic techniques have advanced and largely eclipsed open surgery, with open surgery now reserved for only the most severe subglottic stenosis and failed endoscopic cases.[2,3] Common endoscopic approaches to subglottic stenosis include balloon dilation, radial incisions with carbon dioxide (CO_2) laser or cold knife, endoscopic scar excision without dilation, local steroid injection, and endoscopic stent placement. Though balloon dilation remains a popular technique, recent studies have not showed increased efficacy of balloon dilation over laser approaches.[3,4]

Use of an endoscopic laser in the treatment of airway surgery was first reported in the 1970s.[5] The carbon dioxide laser was the first employed in airway surgery, and since that time, use has expanded to the KTP and Nd:YAG lasers. In 1991, the holmium (also called holmium:YAG) laser was first described in airway surgery in an animal model.[6] As stated in Dr. Jiao's manuscript, Fong et al[7] reported its use in the pediatric airway, though only one patient in their series of 8 patients had subglottic stenosis. The first report of cryotherapy as an alternative means of treating airway stenosis was published in the late 1970s[8] and its success has been documented.[9,10] However, its use has yet to become mainstream. Though the dual use of laser and cryotherapy has been reported in the airway,[11] to our knowledge, this publication represents the first report of holmium laser used in conjunction with cryotherapy to manage subglottic stenosis in children.

The advantages of the holmium laser with cryotherapy as presented by Dr. Jiao are multifold. Their cohort suffered no major complications. Those patients with preoperative tracheostomies underwent successful decannulation and no patients in the cohort required new tracheostomy placement. It is important to note that Dr. Jiao et al[1] achieved successful outcomes on all 15 patients not lost to follow up, and 13 of the 15 had Myer-Cotton grade III stenosis. This suggests that the holmium laser and cryotherapy is effective in even severe cases of subglottic stenosis, which in the past have demonstrated worse endoscopic outcomes than mild stenosis and were more likely to require tracheostomy placement.[12] One patient experienced respiratory distress 24 hours postoperatively and required a repeat bronchoscopy to remove eschar and crusting from the airway. The patient did not have lasting morbidity following this episode. As a precaution, Dr. Jiao et al recommend close airway observation for 72 hours postoperatively.

The most common means of laser use in the subglottis is via direct or microsuspension laryngoscopy.[3,4] In nearly all cases, the patient must be spontaneously ventilating or apneic, which requires precise intraoperative anesthesia. An advantage of the holmium laser is its use via a flexible bronchoscope. The flexible bronchoscope can be

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passed via a laryngeal mask airway (LMA), allowing the anesthesiologist to continue to provide the patient with positive pressure ventilation during the procedure.

The authors acknowledge the most important limitations of their study in their manuscript. Though this is a relatively large cohort of consecutive patients with post-intubation acquired subglottic stenosis, 16 patients remains too small a sample size from which to broadly generalize results. The patients were followed for 6 months postoperatively to ensure no return of airway symptoms or stenosis on endoscopy. Prior studies have shown that an intervention-free period of 2.5 years suggests that a plateau has been reached and no further surgery is necessary.[3] Continued follow up in this cohort is important; indeed, a follow-up manuscript would be of great interest. This is also the experience of a single surgeon with significant interventional bronchoscopic experience; thus, the success may not be generalizable to all surgeons that manage patients with subglottic stenosis. Surgeon experience and preference remains paramount when selecting the best approach to subglottic stenosis. Finally, though holmium lasers may be available at most quaternary care centers, not every surgeon has ready access to this instrument in their operating rooms. Costs of the laser could be an obstacle at smaller hospitals. The requisite surgical skill set, coupled with specific resource needs of the institution, may warrant that this procedure be performed at a major medical center, such as Beijing Children's Hospital.

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CONFLICT OF INTEREST

None.

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