

Case report

Serial intralesional steroid injection combined with balloon dilation as an alternative to open repair of subglottic stenosis

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ABSTRACT

This article will describe successful use of serial balloon dilations and steroid injections to help a child with acute SGS avoid tracheotomy or major reconstructive procedures. An 11-month infant presented with subglottic ulcerations that developed after intubation for acute laryngotracheitis. Over the next 4 months, the child developed SGS, requiring three balloon dilations consisting of triamcinolone injection into the scar tissue followed by outpatient balloon dilation without intraoperative intubation. Twelve months after initial presentation and 8 months follow-up from the third and final dilation, the patient is thriving. This report illustrates the potential safety and efficacy of serial intralesional steroids combined with balloon dilation as an alternative to more invasive treatments. The technique is novel in the number of attempts at balloon dilation, highlighting that serial dilations can succeed after initial failure. Issues for further investigation include optimal timing and number of dilations.

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1. Introduction

A variety of options for the management of subglottic stenosis exist, including observation, pharmacotherapy, dilation, laser, single or multi-stage open surgical reconstructions, and tracheostomy [1,2]. Balloon dilation has gained popularity recently, but guidelines regarding post-operative observation and repeat dilations have not been established. Here we present a patient with acute subglottic stenosis managed with serial balloon dilations and steroid injections, ultimately avoiding more invasive procedures.

2. Case presentation

An 11-month-old male was originally admitted to our institution with symptoms of croup. Shortly after admission, he developed worsening respiratory distress requiring intubation and further care in the pediatric intensive care unit. Over a 4-day period, he was unable to tolerate weaning trials. He self-extubated on the fourth day of intubation requiring emergent re-intubation. On the fifth day of intubation, he was taken to the operating room by the Otolaryngology service for a direct laryngoscopy and bronchoscopy. His subglottis was noted to have circumferential ulcerations with exposed cartilage over 20–30% of the right posterolateral subglottis (Fig. 1). Moderate glottic edema was also

noted. The patient was successfully extubated in the operating room, weaned from supportive care, and discharged home within 4 days.

Because of the exposed cartilage, the patient was placed on systemic antibiotics, antacids, and steroids, and scheduled for an elective surveillance direct laryngoscopy 18 days later. By this time his parents noticed a progressively worsening “whistling” sound from inspiration. Endoscopy showed a 2 mm subglottic lumen with immature posterior glottic scar tissue (Fig. 2). Less than 1 ml of Triamcinolone (40 mg/ml) was injected into the scar tissue in a four-point circumferential fashion via a spinal needle and a tuberculin syringe. After injection a 6 mm wide, 2 cm long angioplasty balloon was inflated to 12 cm H₂O pressure for 20 s to dilate the subglottic lumen to 4.5–5 mm (Fig. 3). Post-procedure, the patient again did well and was breathing quietly. He was discharged home directly from the recovery room.

The patient was rescheduled for a follow-up endoscopy but presented two and a half weeks later with worsening stridor ahead of schedule. Direct laryngoscopy again revealed a 2 mm airway. Triamcinolone was injected and a 10 mm wide, 2 cm long balloon was inflated to 12 cm H₂O pressure for 20 s to dilate the subglottis to a maximum 4.5–5 mm in diameter, equaling the results of the first balloon procedure. The patient was again sent home several hours post-procedure.

Three weeks later, the patient again presented with worsening stridor but to a lesser extent than on prior visits to the operating room. At this time, the patient was able to be active and play, but his mother did notice a constant, mild upper airway noise. In the operating room, the airway was noted for the first time to have

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Fig. 1. Subglottic ulcerations and exposed cartilage on initial laryngoscopy.

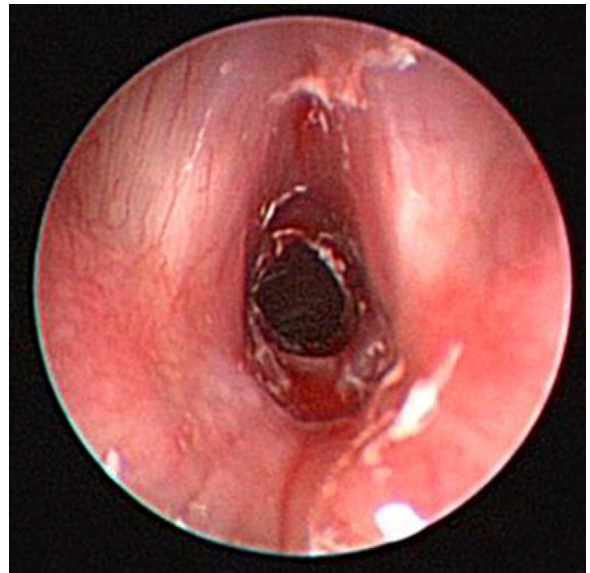


Fig. 3. Post-procedure during the first dilation.

maintained improvement. The subglottis was 3.5–4 mm prior to balloon dilation and reached its maximum at 5 mm after dilation with a 6 mm wide, 2 cm long balloon. Triamcinolone was again injected pre-dilation.

In the weeks after his third balloon dilation, the patient became almost asymptomatic. His mother noted no play intolerance and his breathing was only barely audible at his highest level of exertion. Seven weeks after his most recent balloon dilation, the patient was taken for an elective direct laryngoscopy and bronchoscopy. Only a small amount of posterior scar tissue was seen, revealing a 5 mm airway at its narrowest diameter (Fig. 4). No other intervention was thought necessary at this time.

Twelve months after his initial presentation with croup and 8 months since his third and final dilation, the patient had regained the active life of a toddler. He was able to sleep and eat normally and had achieved a normal weight for his age. A faint inspiratory stridor could be heard on maximal exertion, but he exhibited no functional limitation. On elective laryngoscopy, his airway was

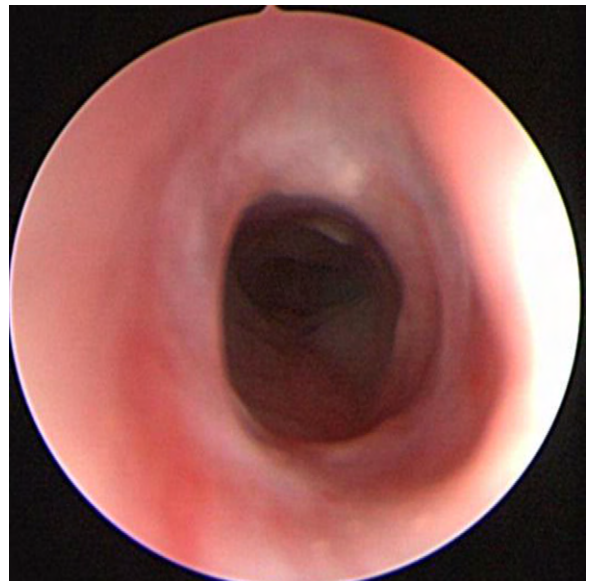


Fig. 4. Laryngoscopy showing 5 mm airway, 7 weeks after final dilation.

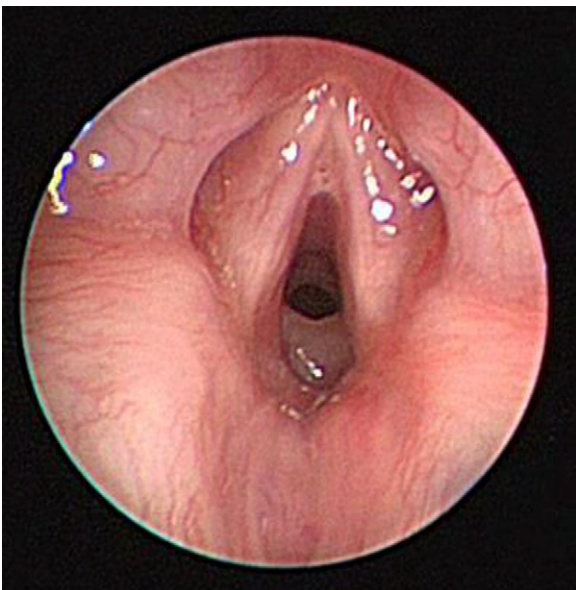


Fig. 2. Pre-procedure during the first dilation.

measured to be 5 mm × 7 mm with no dilation required (Fig. 5a and b).

Although our patient required three balloon dilations, his airway has maintained a diameter of a minimum of 5 mm for approximately 8 months. His activity and growth are not limited by his ability to breathe freely, and an open reconstructive operation has been avoided.

3. Discussion

For the last several decades, surgical options for pediatric subglottic stenosis have primarily consisted of single or multi-stage open reconstructions with grafting. The movement toward less invasive procedures has motivated a search for alternatives. Endoscopically dilating SGS is not a new idea, but due to the variable results of the rigid dilators, open surgical techniques became preferred in the 1980s [3]. In contrast to the older rigid dilation, balloon dilation offers a different mechanism where the

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