Balloon Dilatation of Recurrent Post-treatment Short Segment Subglottic Stenosis by Airway Balloon in an Adult

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ABSTRACT
Subglottic stenosis poses a challenging situation for otolaryngologist. In many cases tracheostomy is required to safeguard the airway.Recently, encouraging results in use of balloon dilatation for subglottic stenosis has led us to successfully treat a recurrent post-treatment short segment subglottic stenosis in a 37-year-old male patient who presented to us with complaints of breathlessness and noisy breathing.

Keywords: Subglottic stenosis, Balloon dilatation, Airway balloon.


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Conflict of interest: None

CASE REPORT
A 37-year-old male patient presented to us with history of breathlessness and noisy breathing since 1.5 months duration. There was history of shortness of breath with difficulty while walking upstairs and also trouble ‘catching breath’ especially with exertion since 1.5 months which had progressively worsened over the period of time. The patient had developed subglottic stenosis due to prolonged intubation and ventilation post-organophosphorus poisoning 15 years back. Later, the stenosis was first laser excised and then definitively and successfully treated with laryngotracheal resection and anastomosis. Details of these procedures were not available. There was no history suggestive of any other comorbid illness.

On examination of neck, there was external scar of previous surgery over the skin.

Seventy-degree scope revealed infantile larynx. Apart from this there was no abnormality detected. Bilateral vocal cords were mobile (Fig. 1).

Apart from routine hematological and biochemical investigations following specific investigations were done:
- Radiograph of neck lateral view
- Virtual bronchoscopy
- Examination under anesthesia with 0 degree scope.

Neck radiograph lateral view revealed bottle neck narrowing of airway in subglottic region. Computed tomographic (CT) scan neck virtual bronchoscopy on 64 slice scanner revealed slit-like narrowing of airway just below the glottis with maximum diameter at the stenotic level being 4 × 7 mm (transverse and anteroposterior respectively; Figs 2A to D).

Subsequently the patient was worked up for endoscopic examination of stenosis followed by balloon dilatation of stenosis. Examination under anesthesia with 0 degree endoscopy through laryngoscope revealed stenotic segment just below the vocal cords (Figs 3A to C). A 5 mm endotracheal tube could not be negotiated across the stenosis. Under aseptic precautions airway balloon catheter of polyethylene terephthalate (PET) balloon of size 10 × 40 mm was inserted; with the help of guide wire up to stenotic segment, stylet was removed, balloon was inflated with saline under direct vision, pressure serially raised initially up to 6 atmospheric pressure for 10 seconds to 1 minute using inline pressure gauge. Then the balloon is deflated and removed. Intermittent ventilation technique was used by anesthetist. Endoscopy was repeated following dilatation which revealed marked improvement in diameter of previously stenotic segment, leading to complete disappearance of stenosis. The patient tolerated the procedure well. Following the procedure, patient had immediate relief of symptoms and had an uneventful recovery. A postoperative scan after 2 months was done which showed that the segment was 1 × 1.7 cm in diameter (Figs 4A and B).

DISCUSSION
Narrowing of airway below glottis leads to subglottic stenosis. Chronic stenosis may be said to be established if
the airway is unsatisfactory 4 weeks after the injury. It is an important condition which interferes with speech, breathing and ability to clear secretions from lower respiratory tract. Various etiological factors contribute for this condition, such as nonrecognition of acute trauma or failed treatment, complication of prolonged intubation, tracheostomy or partial laryngectomy, scleroma, Wegener’s granuloma, polychondritis, autoimmune thyroiditis. The main cause is, therefore, disruption of the supporting cricoid and tracheal skeleton. The associated soft tissue narrowing usually reflects the lack of integrity of supporting structures. The important factor in the correction of chronic subglottic stenosis is that of tissue memory. Disrupted cartilaginous framework heals with fibrous tissue compromising fibrocytes with a directional memory. Thus, merely incising and separating scar tissue will lead to replacing scar tissue in its original scarred state. Mayer and Cotton proposed classification originally for pediatric subglottic stenosis (Table 1), which may be applied in broader sense to all adult and pediatric laryngotracheal stenosis. As per literature review except for congenital cartilaginous laryngotracheal stenoses, grade I stenoses are amenable to endoscopic management with potentially high success rate (>90% of cases with a nearly normal airway). Use of closed surgical approaches was the earliest documentation for interventional methods for laryngotracheal stenosis. Various endoscopic treatment modalities available are dilatation by boogies, CO₂ laser excision and balloon dilatation. Traditionally, dilatation was performed by passing rigid boogies along the tracheal long axis, thereby creating unnecessary injury...
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The airway is far less damaging to subglottic and tracheal wall mucosa. Any balloon larger than 1.6 mm of subglottis is found to be capable of causing cricoid fracture at pressures of 6 atmospheric pressure as per animal model.

In the present case, the patient had already been operated twice for subglottic stenosis in past, 15 years back initially by laser and then by open resection of stenotic segment and end-to-end anastomoses of trachea. In this case, the stenosis had recurred at the anastomotic site. Dilatation of this short segment stenosis by airway balloon catheter resulted in immediate relief of symptoms.

CONCLUSION

Subglottic stenosis, although not very uncommon, presents a challenging problem to otolaryngologists. Since, various treatment modalities are available the management requires expertise in selection of the appropriate candidate for the right type of treatment. Balloon dilatation is the recently introduced treatment modality for subglottic stenosis. Although literature review suggests that this is being used in the western part of the world, apparently, this was the first case of its kind of management of subglottic stenosis by balloon dilatation in the entire Asia-Pacific region. Since, this was not associated with mortality or morbidity it has proven to be safe and effective suitable treatment option for the patient of short segment subglottic stenosis.

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REFERENCES


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