

Single stage Airway Balloon Dilatation for Laryngotracheal stenosis

Authors:

1. **Dr. Sanchita Kalita** (MS ENT), Consultant ENT Surgeon, Pratiksha Hospital, Guwahati

2. **Dr. Biswajit Gogoi** (MS ENT), Consultant ENT Surgeon, Pratiksha Hospital, Guwahati

3. **Dr. Gautam Khaund** (MS ENT)

Chief Consultant ENT Surgeon, Nightingale Hospital, Guwahati

Consultant ENT Surgeon, Pratiksha Hospital, Guwahati

Consultant ENT Surgeon, Apollo International Hospital, Guwahati

Corresponding author:

Dr. Sanchita Kalita

Email id : drsanchitakalita@gmail.com

Phone no: 9508867914/ 8135845274

Abstract :

Introduction: Laryngotracheal stenosis is defined as partial or complete cicatricial narrowing of the concerned airway. Though its management poses as a serious challenge, the final objective remains the same: establishing a stable airway and a serviceable voice. 90% of cases of acquired subglottic stenosis is attributed to endotracheal intubation.¹⁰⁻¹² There are several management options from tracheostomy to crico-tracheal/ tracheal resection and anastomosis, which usually requires revision or staged procedures.

Aims and objectives: To study the outcome of single stage airway balloon dilatation for early laryngotracheal stenosis.

Materials and methods: A case report study was conducted in tertiary level hospital. Flexible fiberoptic endoscopy was used for the diagnosis and grading of airway stenosis (Myer Cotton grading). Airway balloon dilator with an insufflator has been used for the dilatation of subglottic stenosis.

Results and conclusion: In early short segment laryngotracheal stenosis, airway balloon dilatation can be employed as a single stage procedure with favourable result during follow up.

Keywords: Laryngotracheal stenosis, post intubation, airway balloon dilatation, single stage

INTRODUCTION:

Laryngotracheal stenosis (LTS) is defined as partial or complete cicatricial narrowing of the endolarynx or trachea.^{1, 3} The most common benign incidence of post intubation tracheal stenosis has been reported to be 21%. Moreover, due to increased incidence of road traffic accidents and requirement of invasive ventilation, there has been an increase in cases of laryngotracheal stenosis. The association with high morbidity, the anatomical and anaesthetic complexities make its management a challenging one.² Depending on the endoscopic Myer Cotton grading, the surgical management differs from case to case.¹ Early diagnosis is pivotal in the management as symptoms are easily mistaken or disregarded for a myriad of other disorders.^{7,8} Though use of bougies and dilators are not an unknown practice, as a minimally invasive surgery, consideration of airway balloon dilators cannot be ignored for airway stenosis.¹³ We have used airway dilators of different sizes as a secondary procedure too in two cases, but in this case report, we are focussing on the use of primary single stage balloon dilatation for laryngotracheal stenosis.^{3,5}

The main objective of our study is to evaluate the role of airway balloon dilatation for an early laryngotracheal stenosis case as a single stage minimally invasive surgery and its future prospectives.

A case report study was conducted in a tertiary level hospital in Northeastern India. Flexible fiberoptic endoscopy was used for the diagnosis and grading of airway stenosis (Myer Cotton grading). Figure 1



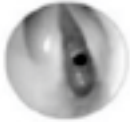

Grade	From	To	Examples
Grade I	No Obstruction	50% Obstruction	
Grade II	51% Obstruction	70% Obstruction	
Grade III	71% Obstruction	99% Obstruction	
Grade IV	No detectable lumen		

Figure 1: Myer Cotton Grading for laryngotracheal stenosis¹

Airway balloon dilator with an insufflator has been used for the dilatation of subglottic stenosis.

CASE

A 21 years old male was on ventilator support for 8 days for head injury during a Road Traffic Accident. The patient was extubated, was stable and discharged from hospital. However, 2 weeks later, he developed gradually progressive respiratory distress. He had to be tracheostomised to secure the airway as an emergency measure in another hospital. Then, he was referred to our centre for airway assessment.

A flexible fiberoptic endoscopy was done, which revealed Myer Cotton Grade III subglottic stenosis. Figure 2

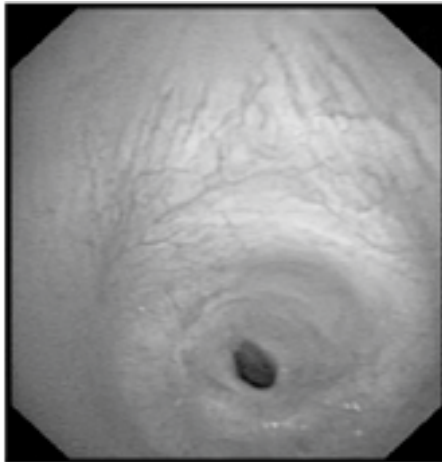


Figure 2: Fiberoptic flexible endoscopy revealing Grade III subglottic stenosis (Myer Cotton)

Being an early short segment airway lesion, airway balloon dilatation was planned

Balloon size: The size of the airway balloon dilator was decided in accordance to the age of the patient with the guidance by MOBILE AIRWAY CARD by Cincinnati group. (Figure 3) Being a 21 years male, a dilator of balloon size 16/40 mm was used, where 16 mm is the maximum inflated diameter and 40 mm is the length of the balloon.



Figure 3: MOBILE AIRWAY CARD

Anaesthesia: The procedure was undertaken under GA, intubating through the tracheostoma. In our case, the patient was already tracheostomised. However, if referred earlier, an attempt could have been made of off the tube apnoea technique of anaesthesia with intermittent bag and mask ventilation, thereby avoiding tracheostomy.

Procedure: Mcintosh laryngoscope blade was used to lift the epiglottis under visualisation with a rigid endoscope of size 4mm. Then under visualisation, the airway balloon dilator was introduced with the stylet into the laryngeal inlet and further such that the distal end of the dilator is passed beyond the stenosis and the balloon rested at the stenotic site. (Figure 4)

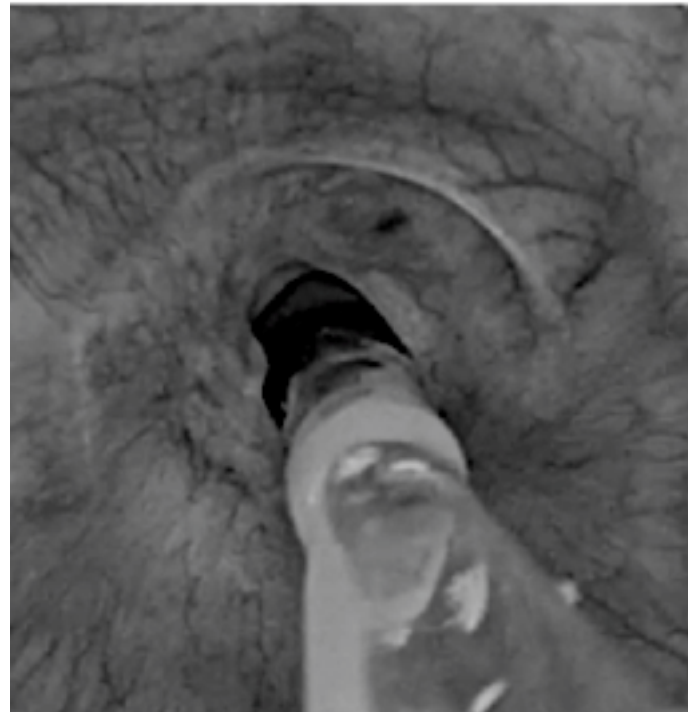


Figure 4: Showing introduction of the airway balloon dilator

The insufflators was connected, pressure was increased till it reached 12 atm. This pressure was held for 1 minute. Repeat dilatation was done with the same dilator in the same sitting.

(Figure 5, 6)

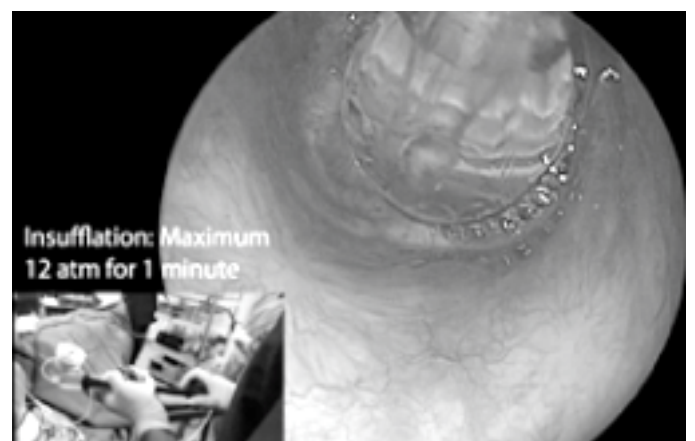


Figure 5: Showing the insufflated balloon at the stenotic site

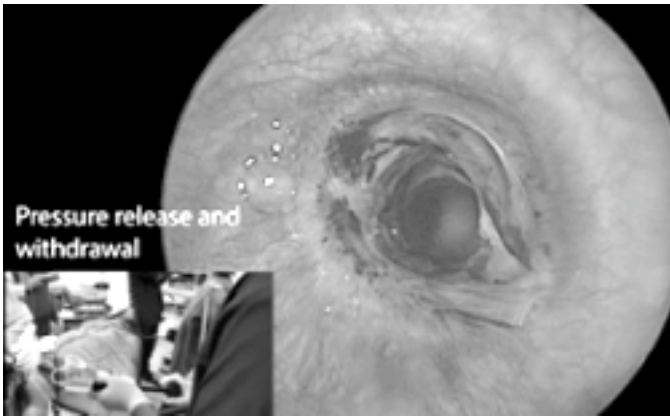


Figure 6: Endoscopic picture of the immediate dilatation of the stenotic site post procedure

Adjuvant: At the end of the procedure, local instillation of steroid was done submucosally at the site of dilatation. Also, the dilator tip and balloon before introduction was laden with local steroid ointment. Nebulisation with steroid was another fortification with adjuvant.

Follow up: During 20th day follow up, there was no dyspnoea at rest or exertion. On fiberoptic endoscopy, there was no stenosis and good epithelialisation, but minimal granulation was noted at the dilatation and suprastomal area. (Figure 7)

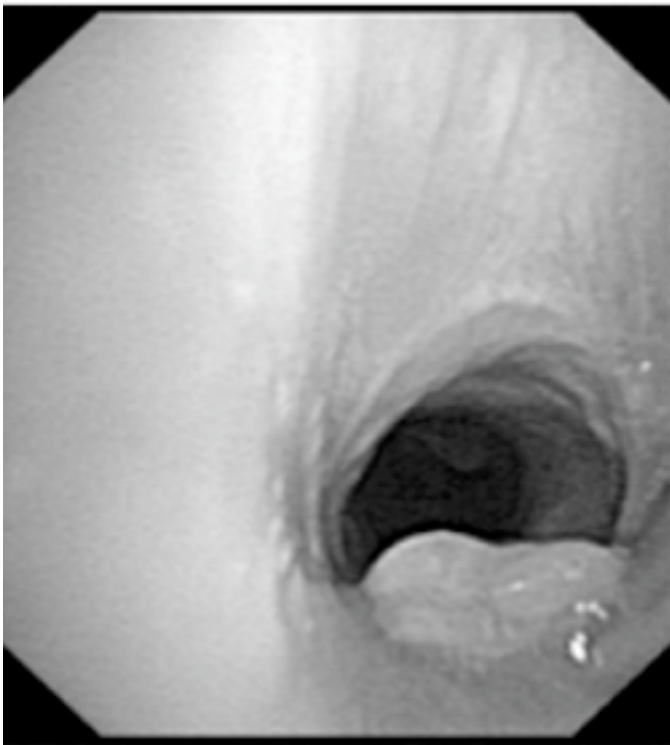


Figure 7: Showing minimal granulation at the dilated site in first follow up at 20th day

Decannulation was done and the patient was advised Budesonide nebulisation. On postoperative Day 45, apart from a symptom free history, fiberoptic endoscopy revealed that the dilated site corresponded to tracheal diameter with resolving granulation. (Figure 8)

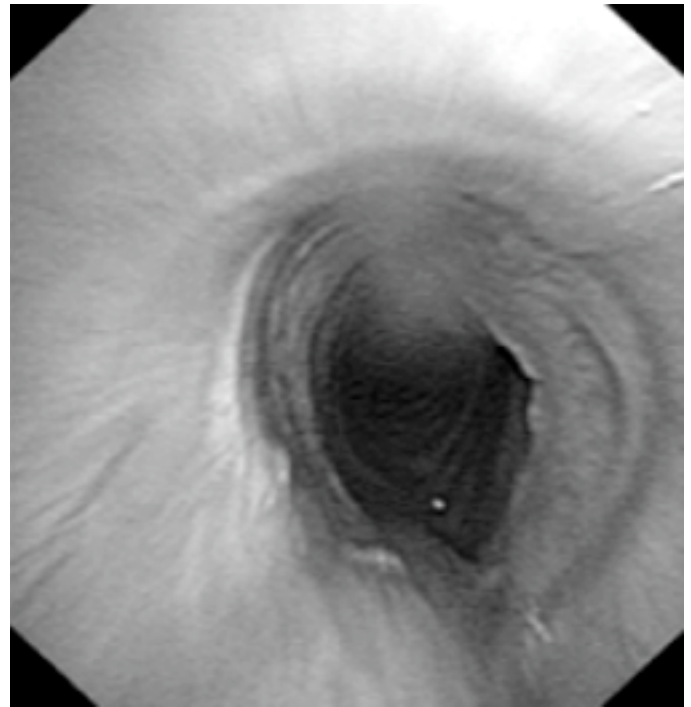


Figure 8: Endoscopic picture of the 2nd follow up at 45th day with no stenosis and resolved granulation

The patient has been followed up for more than 2 years and has been symptom free.

CONCLUSION

Early diagnosis of short segment laryngotracheal stenosis can play a key role in the successful management of such cases with airway balloon dilators with the advantages of being a minimally invasive surgery and less morbidity. 5,6 Also, it is advisable to select those acquired laryngotracheal stenosis cases with no comorbidities. Intraoperative local steroid instillation at the stenotic site and postoperative steroid nebulisation can be beneficial in recovery. Airway balloon dilators are also handy as an adjunctive secondary airway procedure. 10,11 In pediatric cases as well as adults, there have been a lot of supportive research for endoscopic airway balloon dilatation for recurrent laryngotracheal stenosis or as a part of multimodality treatment. 7 In our centre's airway series, we have other cases too who have benefited with the use of balloon dilator, not as a primary case, but as a revision surgery. 13 But as a single stage procedure, literature is very limited. Multicentric long duration studies with a long follow up are warranted to give us more insight into the time-tested results of such cases of laryngotracheal stenosis treated as a single stage non-invasive procedure.

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