Sir,

A 37-year-old female with squamous cell carcinoma involving the lower end of esophagus presented with worsening breathlessness and stridor. On examination, the patient was relatively short statured (150 cm tall) and appeared frail. Computed tomography (CT) of the thorax showed an esophageal mass infiltrating the mediastinal structures and lower trachea, causing luminal compromise. Flexible bronchoscopy revealed infiltration of the posterior tracheal wall beginning 5 cm below the vocal cords extending up to the carina, causing a 70% luminal occlusion of the trachea. Vocal cord, subglottic region, upper trachea, and the distal bronchial tree (beyond the carina) were normal. We planned palliation by deploying a covered metallic Y-stent using rigid bronchoscopy. Under general anesthesia (sevoflurane and propofol), intubation with a 14-mm rigid tracheobronchoscope was attempted. However, the scope could not be negotiated through the subglottic region, which was not infiltrated but anatomically small to permit the scope (outer diameter 14 mm). Hence, we intubated the trachea using an 11-mm tracheobronchoscope. The tumor was mechanically debrided, and the airway was secured. As a larger rigid bronchoscope was required for stent deployment, we reattempted intubation with a 14-mm tracheobronchoscope, but failed to negotiate the subglottic area [Supplemental Video 1].

We now positioned the 14-mm rigid bronchoscope barrel just below the vocal cord and inflated a controlled radial expansion balloon [up to 18 mm at 4 atmospheric pressure for 10 s using CRE™ [M00558650], Boston Scientific], to dilate the anatomically normal subglottic region. The latter allowed the passage of the 14-mm tracheobronchoscope, following which a covered metallic stent (18 mm × 60 mm, Microtech, Nanjing, China) was deployed successfully under direct vision [Supplemental Video 2]. Postoperatively, the patient was extubated and was relieved of her stridor. Chest radiograph and flexible bronchoscopy confirmed the successful deployment of the metallic Y-stent.

The subglottic region is the narrowest portion of the trachea in adults. The cricoid is a complete cartilage with a unique inverted signet shape, unlike the remaining trachea where the cartilaginous rings are “c” shaped and incomplete. In an autopsy study from Sweden, the mean inner diameter of the cricoid region was found to be 11.6 mm (range, 8.9–17 mm) in women and 15 mm (range, 11–21.5 mm) in men. Tracheal dimensions were found to be the least in the subglottic region (5 mm below the vocal cord) among healthy Indian adults undergoing CT, with a mean coronal (95% confidence interval) diameter in the subglottic region of only 11.5 (8.7–12.8) mm in women. This makes negotiation of the subglottic region difficult. However, the tracheal dimensions have poor correlation with anthropometric indices (height, weight, or body mass index of an individual). The only consistent observation across studies was that women have a shorter and narrower trachea. The index patient was a short-statured female and had a narrower trachea and subglottic region. The transient dilatation provided by the CRE balloon enabled the passage of a larger-sized rigid bronchoscope (external diameter of 14 mm in this case) through the anatomically normal subglottic region. Alternatively, we could have also placed the metallic Y-stent under fluoroscopy using two guidewires. However, placing Y-stent using guidewires is fraught with complications, especially when the central airway stenosis is critical. In the index case, the central airway stenosis was successfully managed with a smaller-sized scope. Hence, the two-guidewire technique was possible; however, placing stent under bronchoscopic vision is preferable and hence we performed the same.

Balloon dilatation is frequently used in adults and children to dilate a stenotic segment during rigid bronchoscopy. To our knowledge, this technique of dilating a normal trachea or subglottic region to facilitate rigid bronchoscopy has not been described previously. Awareness of this technique may be useful in situations that require placement of a larger-sized rigid bronchoscope, in constitutionally smaller individuals with a normal but narrow subglottic region.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.
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REFERENCES

1. Randestad A, Lindholm CE, Fabian P. Dimensions of the cricoid cartilage and the trachea. Laryngoscope 2000;110:1957-61.
2. Prasanna Kumar S, Ravikumar A. Biometric study of the internal dimensions of subglottis and upper trachea in adult Indian population. Indian J Otolaryngol Head Neck Surg 2014;66:261-6.
3. Seymour AH, Prakash N. A cadaver study to measure the adult glottis and subglottis: Defining a problem associated with the use of double-lumen tubes. J Cardiothorac Vasc Anesth 2002;16:196-8.
4. Vock P, Spiegel T, Fram EK, Effmann EL. CT assessment of the adult intrathoracic cross section of the trachea. J Comput Assist Tomogr 1984;8:1076-82.
5. Ajmani ML, Jain SP, Saxena SK. A metrical study of laryngeal cartilages and their ossification. Anat Anz 1980;148:42-8.
6. Madan K, Dhooria S, Sehgal IS, Mohan A, Mehta R, Pattabhiraman V, et al. A multicenter experience with the placement of self-expanding metallic tracheobronchial Y stents. J Bronchology Interv Pulmonol 2016;23:29-38.

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