

# Endoscopic Treatment of Glottic Stenosis Secondary to Caustic Injury with Silastic Keel Placement: A Case Report

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### SUMMARY

The use of an endoscopic approach for the division of glottic webs or stenosis has been reported in the literature and has been mainly confined to the anterior commissure. We report a rare case of caustic injury to the upper aerodigestive tract that resulted in extensive web formation along the membranous vocal cord which was successfully treated with endoscopic lysis of the adhesions and the use of a silastic sheet keel as a stent.

### KEY WORDS:

Glottic, Stenosis, Web, silastic, Keel, Endoscope

### CASE PRESENTATION

A 28 years old lady was referred to us with a history of caustic burns to the face. She had been the victim of an assault involving the use of an unknown substance and accidentally inhaled its vapour. She was treated during the acute phase of injuries in the intensive care unit, intubated for a week and thereafter extubated uneventfully. Two weeks post-extubation she developed stridor and had tracheostomy performed. Intraoperative endoscopic evaluation revealed extensive glottic scarring with stenosis. She was then referred to our centre for further management.

On examination, she had facial scarring as well as microstomia. 70 degree rigid laryngoscopy revealed fused true vocal folds bilaterally with interarytenoid scar formation in the posterior glottis (Figure 1). The glottic airway was reduced to a pinhole opening. The arytenoids mobility however appeared intact. The supraglottis showed healed submucosal scar but the subglottis were normal. The hypopharynx was normal as well and the patient did not have any complaint of dysphagia. Flexible bronchoscopy through the tracheostomy tube fenestra revealed minimal mature scarring along the anterior tracheal wall just above the tracheostomy tube.

We proceeded with direct laryngoscopy and division of the mature scarring tissue using a swivel microlaryngeal knife and scissors (Figure 2). A custom-fashioned laryngeal keel was made from a silastic sheet of 0.3 mm thickness. It was rectangular in-shape with rounded edges and placed at the anterior commissure to cover the entire "cut" surface of the vocal cords (Figure 3). Using a Lichtenberger endo-extralaryngeal needle carrier, a Prolene 2.0 suture was passed below the anterior commissure through the cricothyroid space inferiorly and the thyrohyoid space superiorly to be anchored to the neck skin.

This keel would act as a stent and prevent re-adhesion of the cords by permitting adequate time of re-epitheliazation of its raw edges. The stent was left in place for three weeks. Postoperatively, three doses of intravenous corticosteroid were given. She was discharged the following day with anti-reflux medication and oral antibiotic.

We re-examined her under general anaesthesia 3 weeks later and removed the silastic sheet. Both vocal cords had re-epithelialized and an adequate airway was established (Figure 4). We have kept the tracheostomy in situ to anticipate further plastic and reconstructive surgery for her microstomia and facial scars repairs. We are concerned that her microstomia may cause difficulty in future intubation and potentially caused recurring glottic injury. On follow-up two months post-procedure, she was able to breathe comfortably through the fenestration of the spigotted tracheostomy tube and able to vocalize satisfactorily with a good voice.

### DISCUSSION

Laryngeal stenosis has varied causes and treatment options. The earlier aetiologies of infection particularly diphtheria and syphilis are not common in today's practice. In adults, the majority of glottic webs resulted from trauma especially endotracheal intubation and removal of laryngeal papillomas at the anterior commissure. The treatments over the past century have ranged from dilatation to laryngofissure and scar excision with stenting. More recently endoscopic approaches and laser surgeries have been advocated with good results.

A review conducted by Koshkareva et al with the intention of identifying the risk factors for laryngotracheal stenosis found that in the adult population, prolonged intubation, tracheostomy, previous non-airway surgery, and irradiation for oropharyngeal and laryngeal tumors were risk factors<sup>1</sup>. In this review of 74 patients, none gave previous history of trauma due to ingestion of corrosive substance such as in our patient. Other cases in literature have described supraglottic stenosis in both adults and in the pediatric age group presumably due to the protective mechanism of the false cords which thus spares the true cords from injury. We are unable to explain why in our patient her supraglottis was almost spared with the exception of minimal submucosal scar. In contrast, both of her true cords were maximally affected with resultant stenosis.

Various treatment modalities have been described for the treatment of glottic webs beginning with Hasslinger as early

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Fig. 1: shows confluent glottic web/fusion with a pinhole opening (repeat end-arrow), posterior glottis scar, and supraglottic submucosal scar (arrow head-ball). [A- anterior commissure, P- posterior commissure, T- true vocal cords].

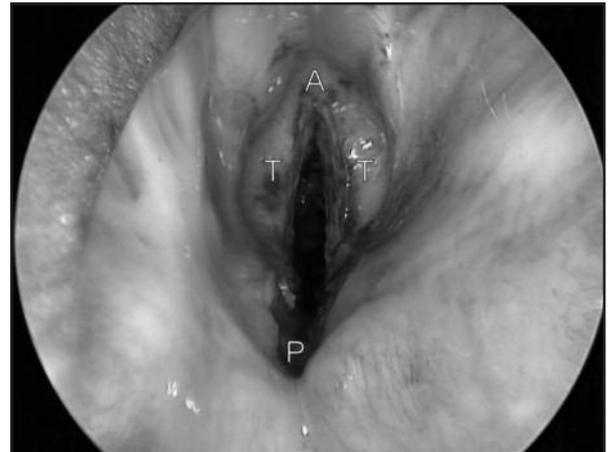


Fig. 2: shows the opened vocal cords after lysis of stenosed glottis using microsurgical instruments. [A- anterior commissure, P- posterior commissure, T- true vocal cords].



Fig. 3: shows a secured custom-fashioned silastic sheet keel (K) straddling raw free margins of the true vocal folds.

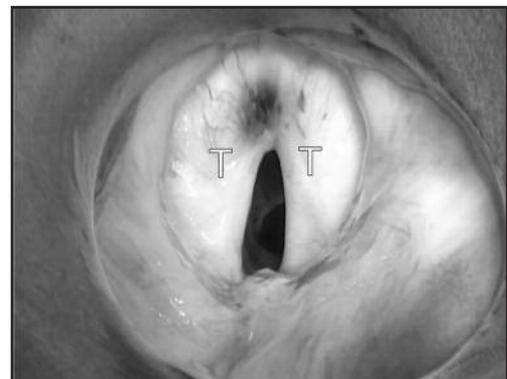


Fig. 4: shows the healed free margins of the true vocal cords after removal of silastic keel. Residual anterior commissure web remains. [T- true vocal cords].

as 1922 and more famously Mc Naught with the placement of a tantalum keel via a laryngofissure approach in 1950. The use of the silicone keel, endoscopic approaches and the invention of an endo-extralaryngeal needle carrier by Lichtenberger has further refined this procedure by removing the need for laryngofissure and even tracheostomy for certain individuals. Lichtenberger *et al.* in 1994 published a series of 12 patients without pre-existing tracheotomy who underwent their method of endo-extralaryngeal keel placement<sup>3</sup>. More recently Edwards *et al* in 2007 presented a study with endoscopic silicone keel placement for 10 patients with anterior glottic stenosis with good results. Nine out of the 10 patients were free of recurrences post procedure<sup>5</sup>.

Endoscopic lysis of anterior glottic webs and keel placement has many advantages not the least of which is the elimination of an external surgical procedure. The laryngofissure technique causes morbidity associated with the open procedure. The endoscopic keel placement also appears to be well tolerated and usually does not require a second trip under anaesthesia for its removal although this was not the

case for our patient. She tolerated the silicone keel well and it did not interfere with her daily living.

### CONCLUSION

Glottic stenosis is a rare complication of caustic injury to the upper airway. Endoscopic lysis of the web with placement of a silicone keel is an effective technique for management of anterior glottic stenosis and reduces the morbidity often associated with open procedures and should be considered in cases with glottic web.

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