

Using A Modified Apron Tracheostomy to Prevent Stoma Stenosis Post a Total Laryngectomy

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Abstract

This study describes a surgical procedure that can be applied at initial stomal construction after a total laryngectomy that involves cutting the posterior tracheal mucosa and then interdigitating a modified apron skin-thick superiorly based flap onto a similar recipient area in the higher posterior tracheal wall. A glottic carcinoma patient (cT2N0M0, stage II) was treated using 6996 cGy of radiation but one year later, there was a recurrence with left vocal cord fixation. A double apron incision salvage total laryngectomy was successfully completed and the patient has had frequent follow-up care in the outpatient center without complications. Since then, there has been a satisfactory stoma opening without stenosis for more than three years.

Keywords:

apron tracheostomy; stenosis; total laryngectomy

Introduction

Stenosis of the tracheostoma following a total laryngectomy is a common issue for head and neck surgeons [1-3]. The patient feels uncomfortable and anxious when the opening is insufficiently large. The airway must be treated using a second course of plastic surgery, or a laryngectomy tube must be worn continuously [4-6]. We have created and improved a successful method for customizing the tracheostoma during a total laryngectomy in order to prevent postoperative stoma stenosis even in circumstances where the patient has received radiation therapy [7]. It might make the tracheostoma's posterosuperior wall more suited for a tracheoesophageal puncture tract to restore voice following a total laryngectomy. The study describes a surgical procedure that can be applied at initial stomal construction that involves cutting the posterior tracheal mucosa and then interdigitating a modified apron skin-thick superiorly based flap onto a similar recipient area in the higher posterior tracheal wall.

Case presentation

A 75-year-old male patient with a history of hypertension reported a husky voice and trouble with speaking clearly for a full year. He sought assistance from the local medical clinic (LMC), but oral medicines produced little or no change. The patient was then moved to the outpatient department (OPD) of the study hospital for further assessment. Physical examination at the OPD revealed the presence of bilateral vocal tumors with a distorted mucosal surface. The patient was admitted for additional tests and treatment because cancer and bilateral vocal tumors were suspected. General

anesthesia was used during the vocal fold biopsy. Laryngeal cancer, stage II, cT2N0M0, was the final diagnosis at the conclusion of this admission. He received 6996 cGy of radiation therapy. Unfortunately, a year later there was a recurrence with left vocal cord fixation. A double apron incision salvage total laryngectomy was used to create an apron tracheostomy during the procedure (Fig 1).



Figure 1: A modified apron skin-thick superiorly based flap was designed for the initial incision (purple line). This photograph was from a recent incident.

The procedure involved a stomaplasty with a posterior U-shaped advanced flap. After cutting 1 cm of the posterior tracheal mucosa, the procedure was completed by interdigitating a modified apron (modified isosceles triangle, 2 x 1 cm) skin-thick superiorly based flap raised from the lower midline of the front of the neck onto a similar recipient area at the upper posterior tracheal wall (Fig 2).



Figure 2: Wound healing was good after the neck skin incision stitches were removed 7 days after the operation.

The skin and the tracheal opening were sutured together using a half-mattress with No 2 or 3 nylon sutures to pull the skin over the exposed tracheal ring. The patient has had frequent follow-up care in the outpatient center without complications. The stoma opening has been good and there has been more than three years without stenosis (Fig 3).



Figure 3: After six months of follow-up, the wound healing was satisfactory and there was no stenosis of the stoma.

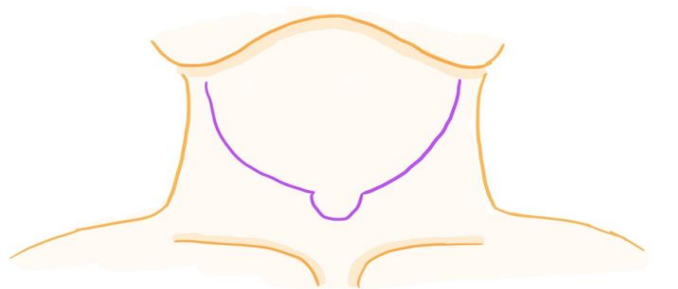
Discussion

Since it was originally performed in 1880, laryngectomy has been used to treat laryngeal cancer. Patients can experience tracheostomal stenosis. Tracheostomal stenosis has a reported incidence of 4% to 42% [1]. The overall rate of stenosis was 28.4%. Women (46.4%) had tracheostomal stenosis more frequently than males (21.6%) [2-3]. Prior to 1991, stenosis rates for the bevel or circle techniques were 33% and 75%, respectively. The incidence of stenosis was unaffected by the use of steroids, neck dissection, the use of pectoralis major myocutaneous flaps, primary tracheoesophageal punctures. Diabetes mellitus and the related tracheostomal infection may be considered as risk factors for tracheostoma stenosis in patients who have

undergone total laryngectomy and adjuvant radiotherapy [8]. The case for this study showed no evidence of diabetes mellitus or tracheostomal infection during hospitalization. Paying close attention to every detail when constructing the stoma is the most crucial element in preventing stomal stenosis following laryngectomy. A low rate of stenosis should occur with proper technique and a plastic-type closure to break up the suture line [6,7]. About 18% of Taiwanese patients who underwent total laryngectomy reported developing tracheostomal stenosis [9]. Patients with hypopharyngeal cancer had a higher pharyngocutaneous fistula formation rate [9]. Patients with flap reconstruction had a higher tracheostomal stenosis rate [9]. No significant difference in tracheostomal stenosis rate was found in patients with or without preoperative or postoperative radiotherapy in the previous Taiwanese report [9].

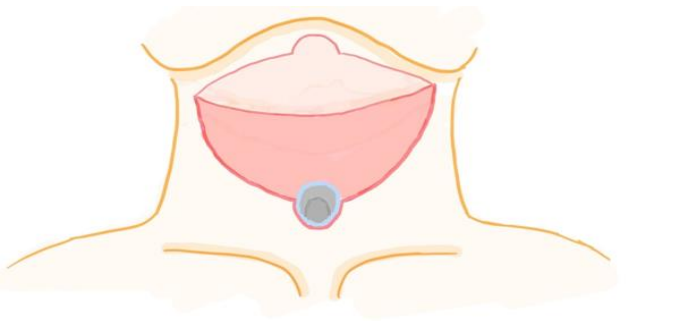
This study describes a surgical procedure that can be applied at initial stomal construction to prevent tracheostomal stenosis. After cutting 1 cm of the posterior tracheal mucosa, a modified apron (modified isosceles triangle, 2 x 1 cm) skin-thick superiorly based flap that is raised from the lower midline of the front of the neck is interdigitated onto a similar recipient area in the upper posterior tracheal wall (Fig 4). This technique eliminates a circular scar and prevents stenosis, while maintaining a proper stoma shape.

Figure 4: A schematic representation of the entire process for a modified apron



A

Figure (4A): A double-apron incision line of the neck is developed (purple line).



B

Figure (4Ba): The modified apron flap is elevated (pink area).

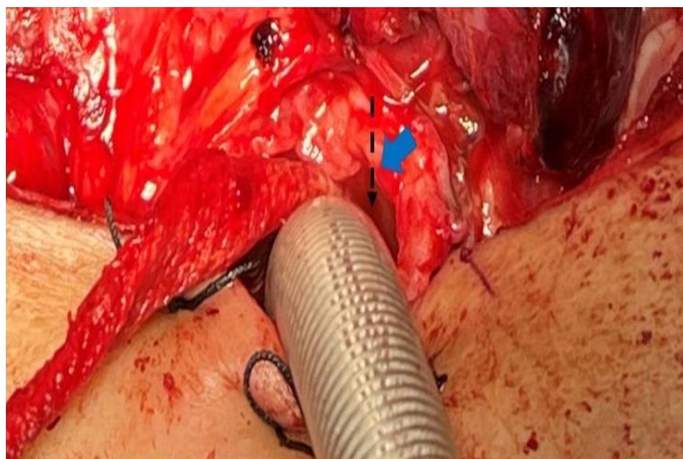
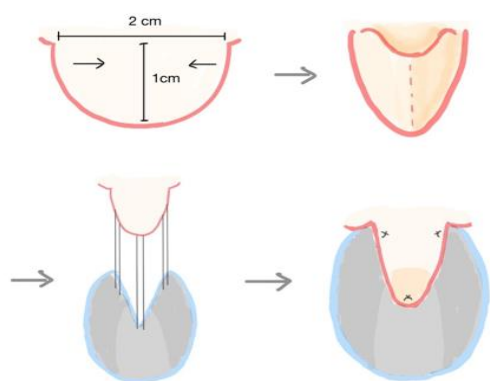
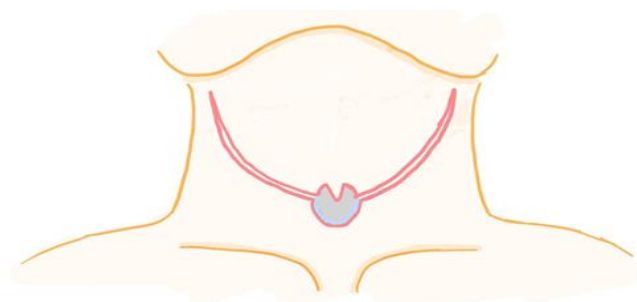


Figure (4Bb): A recent case demonstrated where the 1 cm incision (dotted line) of posterior tracheal mucosa (arrow).



C

Figure (4C): A posterior-superior modified apron (modified isosceles triangle 2 x 1 cm) skin-thick superiorly based flap (orange line) is made and interdigitated (with sutures) onto a vertical posterior tracheal mucosa (dark area) after a 1 cm incision.



D

Figure (4D): Diagram showing the created tracheostoma.

It is impossible to draw a few conclusions about the benchmarking of surgical methods. After a total laryngectomy, there are still questions about how to prevent stomal stenosis, and the procedure will likely need to be improved in the near future. Our technique places a focus on creation of a posterior-superior modified apron (modified isosceles triangle 2 x 1 cm) skin-thick superiorly based flap that is interdigitated onto a vertical posterior tracheal mucosa after a 1 cm incision. We performed total

laryngectomies using the aforementioned technique for years. A good tracheostoma has been maintained.

Conclusion

We have reported a surgical technique of a modified apron tracheostomy to prevent stomal stenosis post a total laryngectomy which would hopefully help surgeons in their future operations to reduce the incidence of tracheostomal stenosis in the future.

Consent declaration

The patient consented to this case report anonymously.

Authorship contribution

CTC and HWW: data collection, analysis, and writing the manuscript. YLC: references collection and analysis. All authors have reviewed the final paper.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Acknowledgement

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References

1. Wax MK, Touma BJ, Ramadan HH. Tracheostomal stenosis after laryngectomy: incidence and predisposing factors. *Otolaryngol Head Neck Surg.* 1995; 113:242–247.
2. Balle VH, Bretlau P. Tracheostomal stenosis following total laryngectomy. *J Laryngol Otol* 1985;99(6):577-580.
3. Myers EN, Gallia LJ. Tracheostomal stenosis following total laryngectomy. *Ann Otol Rhinol Laryngol* 1982;91(4 Pt 1):450-453.
4. Vlantis AC, Marres HA, van den Hoogen FJ. A surgical technique to prevent tracheostomal stenosis after laryngectomy. *Laryngoscope* 1998;108(1 Pt 1):134-137.
5. Bajaj Y, Shayah A, Loke D, Sethi N, Gunasekaran S, Woodhead CJ. Long-term results with a simple technique of stoma creation after laryngectomy. *Eur Arch Otorhinolaryngol* 2009 Jun;266(6):879-882.
6. Campbell BH, Rubach BW, McAuliffe TL, Freije JE. Tracheal advancement flap for postlaryngectomy stomal stenosis. *Head Neck* 1997;19(3):211-215.
7. Talaat M. Apron tracheostome. *Ann Otol Rhinol Laryngol* 1991;100(8):643-646.
8. De Virgilio A, Greco A, Gallo A, Martellucci S, Conte M, de Vincentiis M. Tracheostomal stenosis clinical risk factors in patients who have undergone total laryngectomy and adjuvant radiotherapy. *Eur Arch Otorhinolaryngol.* 2013; 270:3187–3189.
9. Tsai C-M, Hwang T-Z. Postoperative complications of total laryngectomy: laryngeal and hypopharyngeal carcinoma patients. *J Taiwan Otolaryngol Head Neck Surg* 2003; 38:139-145.