CASE REPORT

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# The Rare Presence of Post-tracheotomy Tracheal Narrowing During Total Laryngectomy: A Case Report

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## Abstract

**Background:** Tracheotomy is a common procedure, which can induce late and serious complications, such as tracheoarterial fistulae and tracheal stenosis. The tracheal narrowing may occur due to the wrong technique at the time of tracheotomy. In this case report, we aimed to present a rare post-tracheotomy tracheal narrowing during total laryngectomy.

**Case presentation:** The patient was a 62-year-old man with a history of smoking and 6-month hoarseness. At the time of the first surgery, direct laryngoscopy had revealed a large exophytic ulcerative mass of epiglottis and pre-epiglottic space with an extra-laryngeal extension. During laryngectomy and after the removal of the larynx, an abnormal coronal thick membrane was found in the caudal part of the specimen with significant tracheal narrowing.

**Discussion:** There are different types of incisions that can be made for tracheotomy tube insertion, such as horizontal, vertical, T-shaped, and H-shaped incisions, as well as resection of a small section of the tracheal ring to create a window. Each type has its own advantages and disadvantages.

**Conclusion:** Although it seems that the tracheal narrowing was due to the inverted portion of the tracheal flap during the previous tracheotomy, which was an accidental finding, however, it necessitates a proper evaluation of the tracheal incision types for tracheotomy.

**Conflicts of Interest:** The Authors declare no conflicts of interest.
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## Introduction

Tracheotomy is a common procedure that can induce late and serious complications, such as tracheoarterial fistulae and tracheal stenosis (1). It has been noted that approximately 8% of patients develop significant symptomatic stenosis. Stenosis can occur at two sites, including stomal and cuff. Stomal stenosis occurs owing to the insertion trauma at the level of the entry ring, which can be reduced by decreasing pressure and levering on the tracheostomy during mechanical ventilation. On the other hand, cuff stenosis tends to occur with high cuff pressure (2-3).

However, tracheal narrowing may occur due to the wrong technique at the time of tracheotomy. In this case report, we aimed to describe the rare presence of a post-tracheotomy tracheal narrowing finding during laryngectomy.

## Case presentation

The patient was a 62-year-old man with a history of smoking and 6-month hoarseness. Tracheotomy had been performed due to severe respiratory distress in another center.

At the time of the first surgery, direct laryngoscopy had revealed a large exophytic ulcerative mass of epiglottis and pre-epiglottic space with an extra-laryngeal extension.

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Squamous cell carcinoma had been reported in the pathology; therefore, the patient underwent total laryngectomy and bilateral neck dissection.

During laryngectomy and after the removal of the larynx, an abnormal coronal thick membrane was found in the caudal (tracheal) part of the specimen with significant tracheal narrowing (Figure 1).

This tracheal narrowing was due to the inverted portion of the tracheal flap during the previous tracheotomy, which was an accidental finding, however, it necessitates a proper evaluation of the tracheal incision types for tracheotomy.

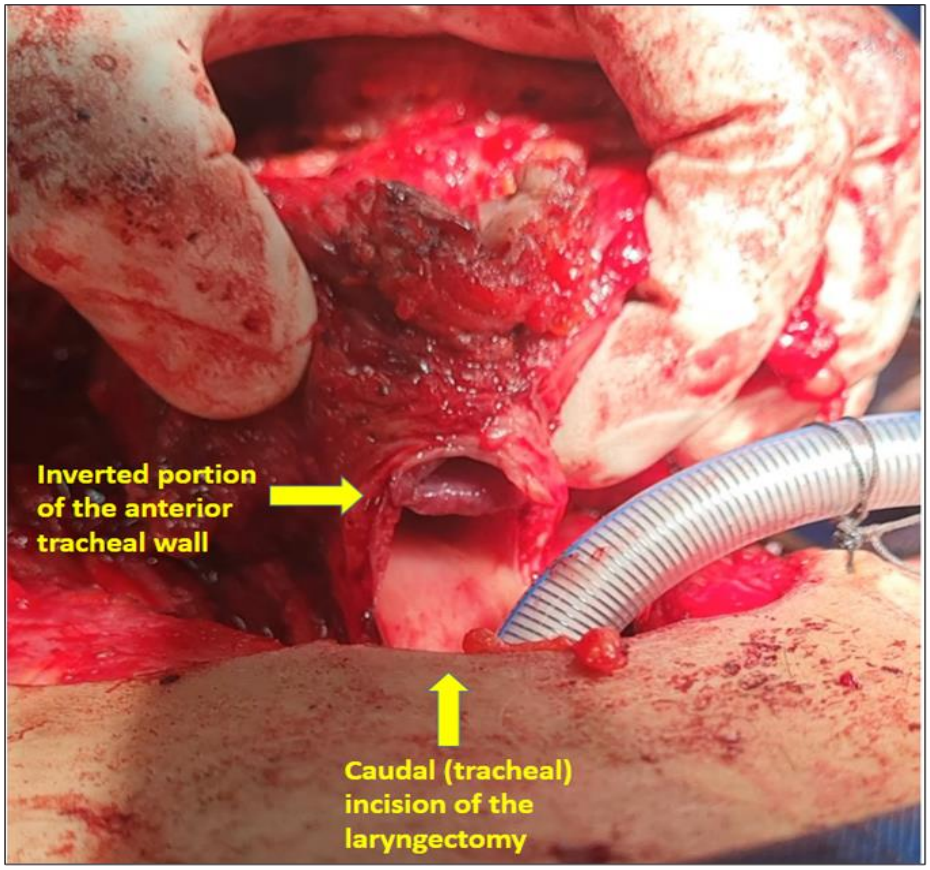


**Figure 1.** Tracheal stenosis as an accidental finding during total laryngectomy.

## Discussion

Surgeons have different viewpoints on the type of tracheal incision for tracheotomy. Concerning this case, our finding suggested that the vertical tracheal incision with two everting lateral traction sutures is the best choice for preserving the anterior wall blood supply due to less incisional trauma to the trachea. It also prevents the inversion of the tracheal flap and the resultant tracheal stenosis. Several modifications have been introduced for a tracheal incision at the site of tracheotomy tube insertion, including horizontal, vertical, T-shaped, and H-shaped incisions, and resection of a small section of the tracheal ring as a window. Each type of these incision has its pros and cons, which will be discussed in the following section (4).

Cutting a window out of the trachea: This method could be performed in the second, third, or fourth ring. Two nylon sutures can be placed on each side of the tracheal window. These sutures are left long and brought out through the skin incision. If the tube becomes dislodged, these sutures can serve as guides in an emergency. The sutures are taped to the skin on the right and left sides, respectively. It minimizes the danger of fragmented cartilage

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being pushed into the tracheal lumen, decreases the hazard of narrowing the lumen from inverted portions of the trachea when the tube is removed, provides greater ease of establishing an airway in the event of accidental dislodgment of the tracheostomy tube during the first 72 postoperative hours. However, it induces an increased risk of anterior tracheal wall weakening and soft tissue invagination, especially during inhalation, and a prolonged time for defect closure after tube removal.

**U-shaped incision:** It can be designed as a superior or inferior base tracheal flap that can decrease tension with tube placement. However, due to segmental arterial supply to the tracheal rings, using two vertical incisions can compromise vascular supply to the central part of the U-shaped flap. Therefore, there is a higher risk of tracheal wall weakening after decannulation. Moreover, the tracheal narrowing can occur because of the inverted portions of the trachea when the tube is removed.

**T-shaped incision:** It can be designed as a superior or inferior base tracheal flap. It can reduce tension with tube placement and decrease the risk of tracheal wall weakening compared to U-shaped incision after decannulation. Conversely, it narrows the tracheal lumen from inverted portions of the trachea when the tube is removed which can be reduced with the placement of traction sutures on the tip of triangular flaps on each side during tracheotomy.

**Horizontal incision:** Since the space between tracheal rings is less than 5 mm, this incision puts greater pressure on tracheal rings and led to eventual necrosis and weakening.

**H-shaped incision:** This method provides an “open book” exposure without resection. The skin incision is I-shaped and the tracheal incision is H-shaped. The lateral skin flaps form the lateral sides of the tracheostomy and the tracheal flaps form the superior and inferior margins. This creates a semi-permanent tracheostomy (5) that widens exposure without window removal. Nonetheless, multiple incisions increase the risk of segmental vascular insufficiency and possible tracheal weakening and narrowing.

**Midline vertical incision:** Since this method requires only one incision, the risk of the tracheal wall weakening after decannulation becomes the least compared to a U- or T-shaped incision, or window resection. Additionally, there is no risk of narrowing the lumen from inverted portions of the trachea after decannulation, especially with two lateral traction sutures. However, it places an incision through three rings.

## Conclusion

Conclusion: There are different types of tracheal incisions for tracheotomy and each of them has its own benefits and complications. Concerning this case, we think that the vertical tracheal incision with two everting lateral traction sutures is the best choice for preserving the anterior wall blood supply because of the refrain from window resection and multiple incisions. So, the integrity of the anterior wall of the trachea is well preserved. It also prevents the inversion of the tracheal flap so decreases the chance of post-operative tracheal stenosis. Placing two everting lateral traction sutures warrants the airway in future.

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## Conflicts of Interest

The authors declare no conflicts of interest.

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## Patient's Perspective:

Written consent was obtained from the patient. The whole examination process and the article's purpose were thoroughly explained.

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