Tracheal Necrosis Following Two-Stage Thyroidectomy

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Abstract

Following surgery for thyroid carcinoma, tracheal necrosis is extremely rare with few reports in literature. We report a patient who underwent a thyroid lobectomy for potential papillary carcinoma, followed by a completion thyroidectomy due to follicular variant papillary carcinoma pathology. Management was successful after debridement and tracheostomy, followed by decannulation.

Abstract

Tracheal necrosis is a rare complication of a thyroidectomy, almost exclusively following resection of invasive thyroid carcinoma with tracheal involvement. We report a case of delayed tracheal necrosis following a routine thyroidectomy for non-invasive papillary thyroid carcinoma likely secondary to a postoperative seroma. This complication was successfully managed with a temporary tracheostomy.

1 INDRODUCTION

When preparing a patient for a thyroidectomy, the more common complications are discussed with them prior to surgery which may include recurrent nerve injury, temporary or permanent damage to parathyroid glands, need for additional surgeries, etc. Following surgery for non-invasive thyroid carcinoma, tracheal necrosis is extremely rare with very few reports in literature. We report successful management of tracheal necrosis in a patient who underwent a thyroid lobectomy for potential papillary carcinoma, followed by a completion thyroidectomy as tissue examination revealed a 3.1cm follicular variant papillary carcinoma.

2 CASE PRESENTATION

A 31-year-old female with past medical history of anxiety presented with a thyroid nodule that was palpated during an annual check up with her PCP. At the time of presentation, she was asymptomatic and denying symptoms of dysphagia, hoarseness of voice, and odynophagia. She does report a family history of thyroid carcinoma in her mother at 60 years old that was treated with thyroidectomy and radioactive iodine. Ultrasound and FNA were performed revealing a TR3 follicular neoplasm measuring 3.7 x 1.9 x 3.5 cm and pathology suspicious for follicular neoplasm. Pathology was then sent for AFIRMA molecular testing with "suspicious for malignancy" results indicating a 50% risk of malignancy. Patient was presented with options of a total thyroidectomy or a hemithyroidectomy, with patient electing the latter.

The right hemithyroidectomy was performed utilizing bipolar cautery and a harmonic scalpel for hemostasis. There was no sign of adjacent tissue invasion of the tumor, minimal amount of bleeding was encountered during the procedure, and the only anatomical variant noted was the absence of a thyroid isthmus. Final pathology revealed follicular variant papillary carcinoma with tumor measuring 3.1 cm with tumor capsule invasion, which was subsequently staged as pT2, pNx (stage 1). Seven days after the right hemithyroidectomy, patient underwent a completion thyroidectomy due to pathology results. Procedure again was uneventful with minimal bleeding (approximate EBL 20cc), followed by removal of any residual thyroid tissue on the right side.

Immediate post-operative course was uncomplicated apart from a low PTH treated with temporary oral calcium and vitamin D supplementation. She was seen postoperatively in the clinic 3 days following completion thyroidectomy when mild drainage from incision site was noted along with peri-incisional erythema. Needle aspiration was performed removing 14cc of serosanguineous fluid with patient expressing relief of pressure. She was prophylactically placed on cephalexin 500mg 3 times per day. Five days later (8 days since completion thyroidectomy) she presented to our clinic with an open wound with air escape noted.

Patient was taken to the operating room for wound exploration. The wound was irrigated with saline when breakdown of tissue noted and debrided between cartilaginous rings 2, 3, and 4 with the largest amount of breakdown between 3 and 4 as seen in Figure 1. A #6 Shiley tracheostomy tube was placed between 3$^{\text{rd}}$ and 4$^{\text{th}}$tracheal rings, with 4-0 Ethilon suture placed on either side of wound. Patient was then admitted to the hospital for observation and discharged on post-operative day 3. One week following discharge she was seen in clinic for follow up, her tracheostomy tube was downsized to a #4 Shiley tracheostomy tube. Using a Passy Muir Valve patient was able to phonate well with a mild amount of air escape in her neck.

2 weeks later, approximately 1 month since the completion thyroidectomy she was taken to the OR for direct laryngoscopy with rigid bronchoscopy. Findings revealed mild subglottic stenosis with no signs of tracheal necrosis and was subsequently decannulated. Over the following 2-3 months the stoma closed appropriately with no further signs of a tracheocutaneous fistula or symptoms of dysphagia, dysphonia, or stridor. She did have I-131 radioactive ablation without issue.

3 DISCUSSION

The formation of a tracheocutaneous fistula following a thyroidectomy may be secondary to several etiologies. It has been previously reported following radiation therapy[2], iatrogenic tracheal injury, prolonged intubation following procedure, infection of surgical site, excessive cautery on tracheal wall[4], or pressure induced ischemia[3]. Many surgeons attempt to minimize excessive cautery around the trachea to prevent necrosis, using cautery on a lower setting when necessary[4]. Some authors report tracheomalacia as a potential cause of tracheal necrosis as thyroid tissue may act as framework for the trachea, causing tracheal collapse when removed.[1]

In our case we postulate the formation of a seroma postoperatively potentially led to a pressure induced necrosis of the anterior tracheal wall. Only one case has been reported to our knowledge of tracheal necrosis in the setting of a post-operative seroma. The pathogenesis of a seroma induced pressure necrosis is likely similar to the hypothesized manner in which elevated cuff pressure leads to tracheal necrosis. The hypothesis is the cuff pressure exceeds perfusion pressure of tracheal mucosa, resulting in pressure necrosis.[5] The other manner in which tracheal necrosis may have occurred is due to disrupting the blood supply to the tracheal wall. Blood supplying the trachea stems from the inferior thyroid artery. These branches can be very delicate and easily interrupted with cauterization during removal of thyroid tissue.[5] The largest risk factor in this patient for tracheal necrosis would be the need for a second procedure for complete removal of thyroid tissue. Compared to a single procedure, a two-step procedure would increase the amount of time intubated and lead to repeat use of cautery around anterior tracheal wall. Other common risk factors for tracheal necrosis that were not a factor in our patient include post-operative infection, large thyroid goiter that might have compromised tracheal blood supply, marked bleeding during procedure leading to excessive cauterization for hemostasis, prior chemoradiation, among others.[7]

4 Conclusion

In retrospect, a single stage procedure as well as a more aggressive post-operative follow up course may have prevented this complication. Risks of performing a hemithyroidectomy in place of a complete thyroidectomy during initial procedure were discussed with patient who elected to assume these risks. However, the need for a second procedure may have led to the formation of tracheal necrosis. Patient reported noticing seepage from her incision for 1-2 days prior to follow up appointment wherein she had 14cc of fluid aspirated from the seroma, had she followed up sooner there may have been less pressure induced compromised blood supply to the tracheal wall.

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None

CONFLICT OF INTEREST

None declared

AUTHOR CONTRIBUTIONS

TC and CS were involved in reviewing the literature and preparing and editing the manuscript, and authors approved the final version of the manuscript.

ETHICAL APPROVAL

This study does not require any ethical committee approval

CONSENT

Written consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy

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