INTRODUCTION

Tracheal necrosis is a rare complication after thyroidectomy for thyroid cancer, with a limited number of cases reported worldwide till date. A life threatening complication of thyroidectomy, each clinical scenario presents uniquely as a challenge for the surgical team. Most patients present in the early postoperative period with neck swelling or subcutaneous emphysema. Late presentation with stridor has not been reported till date. We present a case of TN three weeks after surgery with stridor, managed with sternohyoid muscle cover.

CASE REPORT

A 41-year-old male with no comorbidities presented with complaints of left neck swelling since 1 month. He had no history of dysphonia, dysphagia, or dyspnea and no symptoms of hyper- or hypo-thyroidism. Clinical examination revealed a hard swelling in the left lobe of the thyroid gland measuring 4.5 × 5.0 cm with no palpable neck nodes. Ultrasonography of the neck showed bilateral thyroid hypo-echoic nodules with micro calcifications, the largest measuring 4.5 × 3.4 cm in the left lobe and a few left level II lymph nodes. Contrast enhanced computed tomography of neck showed bilateral thyroid nodules, the largest measuring 4 × 2.5 cm on the left lobe with ill-defined margins and indistinct planes with the adjacent left strap muscle, and multiple cervical nodes (left level II–IV). Fine needle aspiration cytology showed papillary thyroid carcinoma. On indirect laryngoscopy, bilateral vocal cords were mobile. Thyroid function tests were normal.

The patient underwent total thyroidectomy with bilateral neck dissection and central compartment clearance. Intra-operative findings were as follows: (1) a hard mass involving the entire left lobe infiltrating the sternothyroid muscle, nodular right lobe, and a normal isthmus, (2) multiple centimeter sized left level II to level VI nodes, (3) bilateral recurrent and superior laryngeal nerves, and bilateral parathyroid glands were identified and preserved. Dissection of the left lobe of thyroid was difficult as the...
tumor was densely adherent to the lateral tracheal wall and the Ligament of Berry. Multiple lymph nodes were present in the left paratracheal (VI) and lateral cervical (II-IV) levels. Fine-tipped bipolar cautery forceps with continuous saline irrigation was used at all times for the thyroidectomy and neck dissection. Histopathology report revealed multifocal papillary thyroid carcinoma involving both lobes of the thyroid gland and the isthmus, the largest nodule measuring 3.5 × 2.5 cm on the left lobe with focal extrathyroidal extension, all resected margins were free of tumor, with closest margin being the posterior left lobe (1 mm), lympho-vascular invasion was seen with no perineural invasion; the total lymph node yield was 66 (24 on the right, 38 on the left, 4 in the central compartment), out of which 11 nodes in the left side were metastatic. During the immediate postoperative period, the patient had slight hoarseness of voice but no stridor, serum calcium at 48 h after surgery was normal and he was discharged on postoperative day three.

Patient presented 3 weeks later with sudden onset stridor for 24 h. The neck wound was completely healed with no edema or inflammation. Serum calcium levels were normal. Indirect laryngoscopy demonstrated an edematous laryngeal inlet with bilateral fixed vocal cords. Ultrasonography of the neck revealed minimal collection over the left side neck; 30 ml straw colored fluid was aspirated. After an attempt at conservative management failed, he was taken for emergency surgery.

Neck exploration revealed left anterolateral tracheal wall necrosis extending from tracheal rings 1–3 (See Figure 1). After thorough lavage with warm saline, necrotic tissue over the tracheal wall was carefully debrided with water jet and sharp dissection without disturbing the granulation tissue over the thyroid bed. The sternohyoid muscle on either side were divided at the superior attachment (See Figure 2), rotated medially and used as a plug to buttress the tracheal rings. The strap muscle flap was fixed to the cricothyroid muscle superiorly and to one another anteriorly with interrupted non-absorbable suture (See Figure 3). Tracheostoma was done through the 5th tracheal ring anteriorly. A 7.5 Fr tracheostomy tube was inserted, and the neck wound was closed over a suction drain. Indirect laryngoscopy and flexible bronchoscopy done on Day 21 (3 weeks) showed significant reduction in supra-laryngeal edema. Both vocal cords were visualized with flicker of movement and tracheal rings showed good stability and signs of re-vascularization. At 6 weeks, indirect laryngoscopy showed normal supra-glottic area, and bilateral true vocal cords were mobile. Patient was able to vocalize after plugging the tracheostoma. At 12 weeks, he was decannulated. Low dose radiiodine scan with 2 mCi \( ^{131} \text{I} \) scan done after 6 months of thyroidectomy showed no significant residual functioning thyroid tissue in thyroid bed, and no metastatic uptake in the rest of the body. Patient is alive and disease free, 1 year after the thyroidectomy, with a normal voice.

3 | DISCUSSION

Two typical presentations of tracheal necrosis are subcutaneous emphysema and localized or diffuse neck swelling, and are usually reported in the early post operative period, within 2 weeks of surgery.\(^2,3,5\) An extremely rare complication of total thyroidectomy, tracheal injury is typically recognized intraoperatively or symptomatic shortly thereafter; late presentation being even more rare according to a recent review of literature by Shew et al.\(^1\) Our patient presented at 3 weeks with stridor, in the absence of the typical signs of tracheal necrosis; the findings thus being unexpected during neck exploration. Windon MJ et al reported delayed presentation of tracheal necrosis after 4 weeks of thyroid surgery, however, the presentation was typical with neck swelling.\(^4\)

During total thyroidectomy, both the recurrent laryngeal nerves (RLN) were identified and preserved, and patient had no significant postoperative complications. The most plausible explanation for stridor in our patient was tissue edema secondary to the tracheal necrosis leading to bilateral recurrent laryngeal nerve paralysis and inspiratory stridor (Gerhardt syndrome). Severe hypocalcemia was a differential diagnosis in patients presenting with stridor; however, there was no evidence of biochemical
hypocalcemia in our patient at any time in the postoperative period.

The cervical trachea has a segmental blood supply from the tracheoesophageal branches of the inferior thyroid arteries. They form a lateral longitudinal anastomosis which gives off anterior and posterior transverse intercartilaginous arteries. Level VI nodal metastasis makes dissection of this area inevitable. Blunt dissection, preserves or minimizes damage of this longitudinal anastomosis and hence prevents devascularization of the trachea and subsequent necrosis. Chauhan et al report tracheal injury resulting from electro-coagulation and subsequent secondary infection as one of the causes of tracheal necrosis. Judicious use of electro cautery, bipolar coagulation notwithstanding can reduce the likelihood of occurrence of this complication.

Our patient had multifocal carcinoma with disease burden primarily on the left side. We used fine tipped bipolar cautery for dissection around the RLN and trachea at all times, with continuous saline irrigation. The left lobe of thyroid was densely adherent but not infiltrating the left side trachea, the sternothyroid muscle was infiltrated by tumor hence excised. Total lymph node yield was 66 (24 on the right, 38 on the left, 4 in the central compartment) out of which 11 nodes in the left side were metastatic. Hence, extensive dissection on the left side neck perhaps led to damage of the branches to the trachea leading to devascularization and necrosis.

Several interventions have been described for the management of tracheal necrosis including debridement with primary closure, vacuum assisted closure therapy, tracheal resection anastomosis, muscle flaps using sternocleidomastoid, strap muscles, and pectoralis major. In our case, the necrosis was lateralized and limited to 3 rings. We successfully managed to cover the defect with a local strap muscle flap.

4 | CONCLUSION

Tracheal necrosis is a rare complication after surgery for differentiated thyroid carcinoma and should be considered as a differential, particularly in patients undergoing extensive nodal dissection. Careful dissection of the para-tracheal space while addressing the central compartment cannot be underestimated. Once diagnosed it can be managed with local muscle flap cover, aggressive wound care, and antibiotics.

AUTHOR CONTRIBUTIONS

Keduovinuo Keditsu, Mitali Dandekar, Khriesatalie Yhome, and Thejavinuo Keditsu conceived the case.
report. Keduovinuo Keditsu and Mitali Dandekar collected the data. Keduovinuo Keditsu took the lead in writing the manuscript. All authors provided critical feedback and helped with the final manuscript.

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CONFLICT OF INTEREST
None.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICAL APPROVAL
The study did not include any experiments on humans or animals.

CONSENT
Written informed consent was obtained from the patient to publish this report in accordance with the journal’s patient consent policy.

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