Cervical Hematoma and Wound Complications

17

Paolo Carcoforo, Maria Grazia Sibilla, and Margherita Koleva Radica

17.1 Introduction

Although thyroid surgery is a relatively safe procedure, it may be associated with some clinically concerning postoperative complications, including postoperative cervical hematoma, incision infection, hypocalcemia, and, in some cases, vocal cord paralysis. Postoperative hemorrhage is a well-recognized complication of thyroid surgery, with an incidence between 0.45% and 6.5% [1, 2]. While hemorrhage is the underlying mechanism, it is hematoma formation which usually requires immediate bedside intervention due to risks of airway obstruction, respiratory distress, or even death due to suffocation [3, 4]. In recent years, following the development of new instruments such as bipolar scalpels, ultrasonic shears, and energy platforms thyroid surgery has become more precise and is increasingly being performed on an outpatient basis as a result of short hospital stays and low costs [5]. However, postoperative cervical hematoma remains a potential life-threatening complication and is the main reason why patients are required to stay in the hospital overnight for monitoring after thyroid surgery.

17.2 Risk Factors

Bleeding complications are usually due to slippage of a ligature on one of the major arterial pedicles, to bleeding from the transected parenchymal surface or from traumatized muscles, or to a jugular vein injury. This usually occurs during retching, vomiting, bucking, Valsalva maneuver or increased blood pressure during recovery.

P. Carcoforo (✉) · M. G. Sibilla · M. Koleva Radica
Department of Surgery, Unit of General Surgery, S. Anna University Hospital and University of Ferrara, Ferrara, Italy
e-mail: ccf@unife.it; mariagrazia.sibilla@unife.it; klvmgh@unife.it

M. Testini, A. Gurrado (eds.), *Thyroid Surgery*, Updates in Surgery,
https://doi.org/10.1007/978-3-031-31146-8_17

Hematoma will not be seen beneath the skin if the strap muscles are tied without any gap which usually is not advocated. Sometimes, the clots may dissect below the strap muscles in the peritracheal area along the deep neck spaces. Total airway obstructions may progress very fast, in a tight compartment below the strap muscles leading to tracheal compression. Moreover, the impairment of venous and lymphatic drainage leads to laryngopharyngeal edema causing added laryngeal inlet obstruction.

Factors that may cause increased risk of hemorrhage include male sex, age, Graves' disease, hypertension, antithrombotic agent use, history of thyroid procedures in low-volume hospitals, previous thyroid surgery, bilateral thyroidectomy, and neck dissection [6, 7].

17.3 Recognition

Urgent recognition of the hematoma can avert major morbidity, so medical staff should be aware of the clinical features. Patients present with respiratory distress, pain or a pressure sensation in the neck or dysphagia. The signs include progressive neck swelling, suture line bleeding, dyspnea or stridor and a significant amount of drain losses. Minimum monitoring should include: wound inspection, early warning score (EWS: respiratory rate, heart rate, blood pressure, temperature, arterial oxygen saturations, Glasgow Coma Scale), and pain score, as well as awareness for more subtle signs (agitation, anxiety, difficulty in breathing; discomfort) [8]. To aid identification, the acronym DESATS has been created, which includes: difficulty swallowing/discomfort; increase in EWS or national EWS (NEWS); swelling; anxiety; tachypnea/difficulty breathing; stridor. This acronym has been developed as part of the recommended post-thyroid surgery regular review to act as a cognitive aid and support the early recognition of patients manifesting signs of potential postoperative hematoma [8]. Since hemorrhage superficial to the strap muscles never accompanied any deep hematoma, the discoloration of the laryngeal mucosa is a sign of hemorrhage deep to the strap muscles. Transient vocal cord paralysis is reported which disappears on hematoma evacuation [9]. Vocal cord movements should be checked after hematoma evacuation as re-ligation of the bleeders may damage the recurrent laryngeal nerve.

Hemorrhage and subsequent hematoma most frequently occur within the first 24 hours following thyroid surgery, with approximately half occurring within 6 hours [8]. Thus, routine patient observations should be carried out at least hourly for first 6 hours postoperatively. Following the initial 6-hour period, the frequency of observations may be tailored according to individual patient risk and local policies. Although several cases of hematoma following thyroid surgery have been reported after 24 hours, this is extremely rare. Patients are usually discharged one day following surgery [10].

17.4 Management

In the event of a suspected hematoma, management should start with concurrent oxygenation and clinical evaluation progressing to hematoma evacuation and tracheal intubation when indicated. The signs of airway compromise (arterial oxygen desaturation; difficulty breathing; stridor; tachypnea) or concern about deterioration due to rapidly expanding neck swelling indicate a need for immediate evacuation of the hematoma at the patient's bedside if necessary or in the operating theatre. Recent guidelines recommend using the SCOOP approach: skin exposure; cut sutures; open skin; open muscles; pack wound [11]. The urgent evacuation is followed by careful re-exploration of the operative site with copious lavage of blood clots to identify the source of bleeding, which is identified in only 73% of patients. Either passive or suction drains are placed depending on the circumstances. If a noncompressive hematoma is present, it can be decompressed by simple needle aspiration, but careful surveillance for recurrent collections is essential in all cases. Intravenous dexamethasone and tranexamic acid should be considered. Dexamethasone may improve upper airway obstruction and edema and tranexamic acid may reduce bleeding. Should hematoma evacuation fail to stabilize the patient, with no resolution of airway compromise and/or further patient deterioration, tracheal intubation is indicated. Intubation during re-exploration will be difficult because of considerable edema of the epiglottis, pharyngeal wall and vocal cords. Sometimes intubation will be successful after decompression of the hematoma. In "cannot intubate, cannot oxygenate" situations, scalpel cricothyroidotomy or emergency tracheostomy are used.

Post hematoma airway complications are common in older patients, large goiters having tracheal compression preoperatively.

Precautions to prevent post-thyroidectomy hemorrhage and hematoma should start preoperatively by control of hyperthyroidism and intraoperatively by rigorous and meticulous hemostasis and by performance of a Valsalva maneuver in coordination with the anesthesiologist after completion of the dissection to detect bleeding. Leaving a gap in the lower end while suturing the strap muscles in the midline allows the blood to come out of the relatively closed compartment into the subplatysmal space where it can be easily detected, and should be practiced. Dissection in the subplatysmal plane should be done meticulously as damage to the anterior jugular veins may cause bleeding later on. Drainage of the cervical space after thyroidectomy has been proven by a Cochrane Database meta-analysis to be of no utility [12]. Postoperatively, prompt resumption of antihypertensive medications is very important. Smooth extubation and avoiding coughing reduces the slippage of ligatures.

Surgical site infection (SSI) after thyroid surgery is uncommon and thyroidectomy is almost always classified as a clean case. In fact, the frequency of SSI after thyroid surgery has been estimated to be 0.3–2.9%, but the consequences can be costly and morbid for patients [13].

Clinical manifestations of SSI include wound cellulitis, treated with oral antibiotics, or infected seroma, which may require drainage and culture-directed treatment with intravenous antibiotics. The risk of developing an SSI increases in the case of prolonged operation time, use of drains, reoperation due to bleeding and concomitant lymph node dissection [14]. The use of preoperative antibiotic prophylaxis is generally not recommended due to the low incidence of SSI after thyroid surgery [15]. Whether or not there is a subgroup of patients at higher risk of SSI where prophylactic antibiotics could be considered is at present unclear. Patients who underwent lymph node dissection and were reoperated due to bleeding had increased risk of SSI [16]. Several studies have shown that the use of drains in thyroid surgery is associated with a high rate of SSI, prolonged hospital stay and a high pain score [17].

SSI after modified radical neck dissection due to cancer in the neck is a major complication estimated to occur in 13–20% of patients undergoing this procedure [18]. The reason for this is not clear, but could be due to prolonged operation time or the lymph node dissection *per se*. It might be considered that lymph node dissection may cause disruption to the immune system and reduce the local barrier for infection. The use of drains and concomitant lymph node dissection are associated independently with SSI in surgery for thyroid disease. Patients with these two risk factors constitute a subgroup in which prophylactic antibiotics might be considered [6].

In Italy, the rate of antibiotic prophylaxis use in thyroid surgery is 38.7% [19], whereas the figures on antibiotic prophylaxis in this surgery outside Italy are much lower. In a survey carried out in the United Kingdom, antibiotic prophylaxis was administered routinely in only 9% of patients, and in 16% of selected cases while 75% of patients did not receive the prophylaxis [20].

A recent review contributes to knowledge on the efficacy of antibiotic prophylaxis in thyroid and parathyroid surgery by examining the results of nine studies (4 RCTs and 5 nRCTs) that reported postoperative SSIs in patients who received antibiotic prophylaxis compared to those without. This is the largest meta-analysis on this topic to date, with 8170 participants included. The overall postoperative incidence of SSI in thyroid and parathyroid surgery was 1.5% (0.6% in the experimental group and 2.4% among controls). The meta-analysis showed no significant differences in the rate of postoperative SSIs between patients who received antibiotic prophylaxis and those who did not. These results do not support the routine use of antibiotic prophylaxis for thyroid surgery and are in line with recent SSI guidelines noting that the risk of SSI is not reduced by routine antibiotic prophylaxis in clean neck surgery [21].

The results of many studies shows that the rate of infections in thyroid surgery is 1% and that antibiotic prophylaxis was not efficient in reducing this rate. The concentration of several infections in one single center is of particular interest and potential concern [19].

Severe SSIs frequently are associated with Group A *Streptococcus* (GAS) because of the ability of these infections to evolve into necrotizing fasciitis. Few cases of post-thyroidectomy GAS SSI have been reported in the literature [22].

High fever and surgical site erythema in the early postoperative period after thyroid surgery can be signs of a GAS infection, which might lead to necrotizing, descending, life-threatening mediastinitis. GAS is isolated from 3% of postpartum infections and 1% of SSIs [23]. Early diagnosis with support of computed tomography scans, immediate therapy including wound opening, lavage, intravenous antibiotic treatment with penicillin and clindamycin are vital. If treatment resistance occurs, cervical negative pressure treatment should be considered [24]. Many of these cases were complicated by septic shock and death, underlining the importance of early identification and proper treatment of GAS SSI post-thyroidectomy. No description of the surgical approach to a necrotizing soft tissue infection after thyroid resection was identified in the current literature [25]. GAS frequently colonizes various sites in the body, including the skin, pharynx, vagina, and anus, asymptomatically [26]. Rates of asymptomatic GAS colonization in adults range from 2% to 8%.

References

1. Doran HE, Wiseman SM, Palazzo FF, et al. Post-thyroidectomy bleeding: analysis of risk factors from a national registry. Br J Surg. 2021;108(7):851–7.
2. Calò PG, Pisano G, Piga G, et al. Postoperative hematomas after thyroid surgery. Incidence and risks factors in our experience. Ann Ital Chir. 2010;81(5):343–7.
3. Farooq MS, Nouraei R, Kaddour H, Saharay M. Patterns, timing and consequences of post-thyroidectomy haemorrhage. Ann R Coll Surg Engl. 2017;99(1):60–2.
4. Edafe O, Cochrane E, Balasubramanian SP. Reoperation for bleeding after thyroid and parathyroid surgery: incidence, risk factors, prevention, and management. World J Surg. 2020;44(4):1156–62.
5. Sun GH, DeMonner S, Davis MM. Epidemiological and economic trends in inpatient and outpatient thyroidectomy in the United States, 1996–2006. Thyroid. 2013;23(6):727–33.
6. Fan C, Zhou X, Su G, et al. Risk factors for neck hematoma requiring surgical re intervention after thyroidectomy: a systematic review and meta-analysis. BMC Surg. 2019;19(1):98.
7. Promberger R, Ott J, Kober F, et al. Risk factors for postoperative bleeding after thyroid surgery. Br J Surg. 2012;99(3):373–9.
8. Iliff HA, El-Boghdadly K, Ahmad I, et al. Management of haematoma after thyroid surgery: systematic review and multidisciplinary consensus guidelines from the difficult airway society, the British Association of Endocrine and Thyroid Surgeons and the British Association of Otorhinolaryngology, Head and Neck Surgery. Anaesthesia. 2022;77(1):82–95.
9. Lee HS, Lee BJ, Kim SW, et al. Patterns of post-thyroidectomy hemorrhage. Clin Exp Otorhinolaryngol. 2009;2(2):72–7.
10. Leyre P, Desurmont T, Lacoste L, et al. Does the risk of compressive hematoma after thyroidectomy authorize 1-day surgery? Langenbechcks Arch Surg. 2008;393(5):733–7.
11. British Association of Endocrine and Thyroid Surgeons. Management of post-operative haemorrhage in thyroid and parathyroid surgery. https://www.baets.org.uk/management-of-post-operative-haemorrhage-in-thyroid-and-parathyroid-surgery. Accessed 23 Nov 2022.
12. Samraj K, Gurusamy KS. Wound drains following thyroid surgery. Cochrane Database Syst Rev. 2007;2007(4):CD006099
13. Salem FA, Almquist M, Nordenström E, et al. A nested case-control study on the risk of surgical site infection after thyroid surgery. World J Surg. 2018;42(8):2454–61.
14. Qin Q, Li H, Wang LB, et al. Thyroid surgery without antibiotic prophylaxis: experiences with 1030 patients from a teaching hospital in China. World J Surg. 2014;38(4):878–81.

15. Bergenfelz A, Jansson S, Kristoffersson A, et al. Complications to thyroid surgery: results as reported in a database from a multicenter audit comprising 3,660 patients. Langenbeck's Arch Surg. 2008;393(5):667–73.
16. Dionigi G, Rovera F, Boni L, et al. Surgical site infections after thyroidectomy. Surg Infect. 2006;7(Suppl. 2):S117–20.
17. Dionigi G, Rovera F, Boni L, Dionigi R. Surveillance of surgical site infections after thyroidectomy in a one-day surgery setting. Int J Surg. 2008;6(Suppl 1):S13–5.
18. Bratzler DW, Dellinger EP, Olsen KM, et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. Surg Infect. 2013;14(1):73–156.
19. Gentile I, Rosato L, Avenia N, et al. Do Italian surgeons use antibiotic prophylaxis in thyroid surgery? Results from a national study (UEC–Italian endocrine surgery units association). Ann Ital Chir. 2014;85(1):33–7.
20. Hardy RG, Forsythe JL. Uncovering a rare but critical complication following thyroid surgery: an audit across the UK and Ireland. Thyroid. 2007;17(1):63–5.
21. Polistena A, Prete FP, Avenia S, et al. Effect of antibiotic prophylaxis on surgical site infection in thyroid and parathyroid surgery: a systematic review and meta-analysis. Antibiotics (Basel). 2022;11(3):290.
22. Moalem J, Ruan DT, Farkas RL, et al. Patterns of antibiotic prophylaxis use for thyroidectomy and parathyroidectomy: results of an international survey of endocrine surgeons. J Am Coll Surg. 2010;210(6):949–56.
23. Urban JA. Cost analysis of surgical site infections. Surg Infect. 2006;7(Suppl 1):S19–22.
24. Buerba R, Roman SA, Sosa JA. Thyroidectomy and parathyroidectomy in patients with high body mass index are safe overall: analysis of 26,864 patients. Surgery. 2011;150(5):950–8.
25. Avenia N, Sanguinetti A, Cirocchi R, et al. Antibiotic prophylaxis in thyroid surgery: a preliminary multicentric Italian experience. Ann Surg Innov Res. 2009;3:10.
26. de Blacam C, Ogunleye AA, Momoh AO, et al. High body mass index and smoking predict morbidity in breast cancer surgery: a multivariate analysis of 26,988 patients from the national surgical quality improvement program database. Ann Surg. 2012;255(3):551–5.