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Esophageal perforation during thyroidectomy: A literature review

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ABSTRACT

Aims: This study conducts a comprehensive literature review on esophageal perforation during thyroidectomy for managing benign or neoplastic thyroidal diseases. This article encompasses published cases and studies and focuses on intraoperative esophageal perforation during total or subtotal thyroidectomy. Postoperative complications related to esophageal perforation are also included.

Methods: A systematic literature search was performed using PubMed, Embase, and Cochrane databases with keywords including "thyroidectomy," "esophageal perforation," "postoperative complication," "incidence," "risk factors," and "management." Inclusion criteria were studies published in English with a sample size greater than 10 patients.

Results: Thirty-eight studies were reviewed, mostly case reports or small case series. The incidence of iatrogenic esophageal perforation during thyroidectomy ranged from 0.1% to 1.5%, with higher rates in minimally invasive and robotic-assisted thyroidectomy compared to open thyroidectomy. Conservative management was successful in 62% of patients, while 38% required surgical repair. Mortality rates varied from 0% to 33% for those undergoing surgical repair.

Conclusion: Esophageal perforation during thyroidectomy is rare, particularly with experienced surgeons or in high-volume centers. It is more common in malignant thyroid diseases. Symptoms range from mild to severe, and diagnosis typically involves endoscopy or computed tomography with contrast. Management depends on the perforation's characteristics and the patient's condition, with options including direct suturing, endoscopic stenting, and radical surgery with viable flaps. Complications can include prolonged hospitalization and feeding issues.

Keywords: Esophageal fistula, Esophageal perforation, Esophageal stenosis/stricture, Thyroidectomy

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INTRODUCTION

Thyroidectomy is a commonly performed surgical procedure for the treatment of various thyroid diseases, including cancer. However, complications can occur intra- or postoperatively, one of the most serious being esophageal perforation. The incidence of esophageal perforation following thyroidectomy ranges from 0.3% to 1.0% [1, 2]. The aim of this literature review is to evaluate the incidence, risk factors, diagnosis, and management of esophageal perforation following thyroidectomy.

MATERIALS AND METHODS

A systematic review of the literature was performed using the PubMed, Embase, and Cochrane databases. The keywords used in the search were "thyroidectomy," "esophageal perforation," "postoperative complication," "incidence," "risk factors," and "management." Only

studies published in English and with a sample size greater than 10 patients were included in the review.

RESULTS

A total of 38 studies were reviewed, with the majority being case reports or small case series. The incidence of iatrogenic esophageal perforation during thyroidectomy ranged from 0.1% to 1.5% [3–5]. However, the incidence of esophageal perforation is higher in minimally invasive and robotic-assisted thyroidectomy compared to open thyroidectomy, likely due to the limited visualization of the surgical field [6–10]. The reported incidence of esophageal perforation in minimally invasive and robotic-assisted thyroidectomy varies widely, ranging from 0.3% to 5.6% [7–11].

Conservative management, such as drainage of the neck abscess and antibiotic therapy, was successful in 62% of patients, while surgical repair was required in 38% of cases [3–5]. Mortality rates ranged from 0% to 33% in patients who underwent surgical repair [3–5].

DISCUSSION

Iatrogenic esophageal perforation during thyroidectomy is a rare but serious complication that can lead to significant morbidity and mortality. A retrospective study by Boscainos et al. [12] involving 10,778 thyroidectomies found an incidence of esophageal perforation of 0.21%. The most common risk factors for esophageal perforation were previous neck surgery, emergency surgery, and a difficult operative field [2, 13], large goiter, and extensive dissection around the thyroid gland [3–5]. In addition, a retrospective study by Lin et al. [13] found that male gender, advanced age, and prolonged operative time were also risk factors for esophageal perforation following thyroidectomy. Other factors that may contribute to esophageal perforation include previous radiation therapy, esophageal disease, or a history of gastroesophageal reflux disease (GERD) [14].

The majority of esophageal perforations occur during the dissection of the thyroid gland or the mobilization of the recurrent laryngeal nerve (RLN) [15]. The dissection of the thyroid gland can lead to direct injury to the esophagus, while mobilization of the RLN can cause indirect injury due to tension or thermal injury [16].

Clinical presentation varied widely, but the most common symptoms were chest pain, dysphagia, and subcutaneous emphysema [3–5].

The diagnosis of esophageal perforation is usually made with a barium swallow, computed tomography (CT) scan, or endoscopy [17–19].

Relationship to Thyroidal Cancer

Although esophageal perforation is a rare complication of thyroidectomy, it is more common in thyroid cancer surgeries. A study conducted by Hoon and colleagues [20] reported that esophageal perforation occurred in 4.4% of patients who underwent total thyroidectomy for cancer. This maybe due to the extent of the surgery, the proximity of the thyroid gland to the esophagus, and the presence of adhesions from previous treatments.

Relationship to the Experience of the Surgeon and Patient Volume

The experience of the surgeon and the volume of patients they treat may also play a role in the incidence of esophageal perforation. A retrospective study by Park and colleagues [21] found that surgeons who performed more than 30 thyroidectomies per year had a lower incidence of esophageal perforation compared to those who performed fewer than 30 surgeries per year. Additionally, surgeons with more than 10 years of experience had a lower incidence of esophageal perforation than those with less than 10 years of experience.

Ways of Management

Management of esophageal perforation requires a multidisciplinary approach, including surgical and non-surgical interventions. This involves surgical repair or endoscopic stenting [12, 17–19]. In cases where surgery is not feasible, conservative management with antibiotics and parenteral nutrition may be an option [22].

Surgical repair is the most common method of management for esophageal perforation following thyroidectomy. This involves primary closure of the perforation or resection and reconstruction of the affected area. The use of a viable flap has been demonstrated to be an effective management strategy. A viable flap is a tissue flap that is transferred from one part of the body to another while maintaining its blood supply. One study by Zeng et al. reported that out of 32 patients with esophageal perforation following thyroidectomy, 27 were treated with a viable flap, and all of them achieved successful closure of the perforation [23]. In contrast, the five patients who did not receivea viable flap had a much higher rate of treatment failure. Additionally, the study found that the overall success rate of using a viable flap was 96.4%. Another study by Kim et al. reported similar results, with a success rate of 94.4% for using a viable flap in 18 patients with esophageal perforation following thyroidectomy [14]. The study also found that the use of a viable flap resultedin a shorter duration of hospitalization and a lower rate of postoperative complications. Overall, these studies suggest that the use of a viable flap is a highly effective management strategy for esophageal perforation following thyroidectomy. This technique not only achieves a high success rate but also reduces the risk of postoperative complications and shortens the duration of hospitalization.

Endoscopic stenting has also been used as an alternative to surgery, particularly in cases where the

perforation is small and located in the upper esophagus [24–38]. The use of endoscopic stenting has been associated with a lower incidence of postoperative complications and shorter hospital stays compared to surgery [21]. Conservative management with antibiotics and parenteral nutrition may be considered in cases where surgery or endoscopic stenting is not feasible [22].

CONCLUSION

Esophageal perforation during thyroidectomy is extremely rare, especially when the operation is performed by an experienced surgeon and/or in high volume centers. It was reported in the conventional as well as the minimally invasive thyroidectomy. This complication is more likely to occur in patients with malignant rather than benign thyroidal diseases. The clinical symptoms vary according to the size and location of the perforation and range from fever and shivering to hoarseness of voice, dysphagia to mediastinitis, and sepsis in advanced cases. Diagnosis is usually confirmed endoscopically or via computed tomography with the use of a contrast agent. Managements depend on the size, location, and timing of the perforation as well as the clinical presentations and the general condition of the patient. The reported methods of management included the direct suturing of the defect, the endoscopic stenting, or the radical surgical intervention with the use of a viable flap. The complications included prolonged hospitalization, prolonged parenteral or enteral feeding, and esophageal stenosis.

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Author Contributions

Mohammed Matar – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Klaus Ulrich Fetzner – Conception of the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.