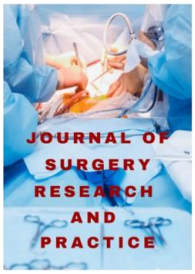

e-ISSN: 3068-3742
Journal of Surgery Research and Practice

ATHENAEUM SCIENTIFIC PUBLISHERS

Research Article

An Evaluation of Surgical Site Infections (SSIs) in Thyroidectomies Without a Prophylactic Antimicrobial in a Teaching Hospital of Suburban Setup

Sriushaswini Bhamidipati[1*], N Subba Rao[2], Arjuna G[3], Bandaru Narasinga Rao[4]

[1]Associate Professor of Surgery, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Marikavalasa, Madhurawada, Visakhapatnam, Andhra Pradesh, India

[2]Professor of Surgery and Dean, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Marikavalasa, Madhurawada, Visakhapatnam, Andhra Pradesh, India

[3]Professor and Head of Department of Surgery, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Marikavalasa, Madhurawada, Visakhapatnam, Andhra Pradesh, India

[4]Officer on Special Duty (OSD) and Former Head of Department of Microbiology, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Marikavalasa, Madhurawada, Visakhapatnam, Andhra Pradesh, India

***Correspondence author:** Sriushaswini Bhamidipati, MS, FMAS, Associate Professor of Surgery, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Marikavalasa, Madhurawada, Visakhapatnam, Andhra Pradesh, India; Email: narasinga_bandaru@rediffmail.com

Citation: Bhamidipati S, et al. An Evaluation of Surgical Site Infections (SSIs) in Thyroidectomies Without a Prophylactic Antimicrobial in a Teaching Hospital of Suburban Setup. J Surg Res Prac. 2025;6(2):1-7.

https://doi.org/10.46889/JSRP.2025.6204

Received Date: 10-05-2025

Accepted Date: 26-05-2025

Published Date: 02-06-2025

Abstract

Background: The majority of wounds had been infected until mid-1800s, when Ignaz Semmelweis and Joseph Lister introduced antiseptic surgery, becoming "pioneers of infection management. This led to a 70-80% death rate in situations of deep or widespread infections. Since then, there have been numerous significant advancements that have made surgery safer, especially in field of microbiology. However, prevalence of Healthcare-Associated Infections (HAIs) remains high overall and contributes significantly to" disease burden. International recommendations do not regularly advocate systemic antibiotic prophylaxis since Surgical Site Infections (SSIs) in thyroidectomies are a rare and infrequent occurrence, according to various research conducted in developed countries.

Aim: The study is to evaluate Surgical Site Infections (SSIs) in thyroidectomies without any prophylactic antimicrobial as per the International standards.

Patients and Methods: Surgeons performed endotracheal intubation during thyroid surgeries, including thyroidectomy or total thyroidectomy. Every patient's postoperative signs and symptoms of SSI have been determined using criteria for SSI. In case of SSIs, exudates were collected with 2 sterile swabs and transported immediately to Department of Microbiology without any delay. The isolation, identification of the etiological agents and their antimicrobial susceptibility testing were performed as per the standard microbiological techniques and analysed.

Results: Current analysis comprised 244 patients with 2.45% incidence of SSIs (6 out of 244) that underwent either hemi or complete thyroidectomy. Male-to-female ratio had been 1:3.2, with majority of patients (64.75%) being female. Maximum number of patients (26.23%) were females in 31-40 yrs age group. Average age of research population has been 36±13yrs. (20-65years). Major number of patients (64.39%) underwent Hemithyroidectomy. Etiological Aerobic Bacteria caused SSIs in current research, where *Staphylococcus aureus* was "the major pathogen. *Staphylococcus aureus* was showing resistance to many common antimicrobials among gram-Positive bacteria (GPB)" whereas E. coli is sensitive to many common antimicrobials.

Conclusion: A thyroidectomy is a brief procedure with small incision that is categorised as clean or type-I incision with minimal infection. It might not be essential to employ preventative antibacterial treatment to prevent incision infection since the surgery is performed under stringent sterility and haemostasis conditions.

Keywords: Antimicrobials; Haemostasis; Sterility; Health Associated Infections (HAIs); *Staphylococcus aureus*; Thyroidectomy; Surgical Site Infections (SSIs)

Introduction

Majority of wounds developed infections until mid-1800s, when "Ignaz Semmelweis and Joseph Lister introduced antiseptic surgery," becoming pioneers of infection management. This led to 70-80% death rate in situations of deep or widespread infections [1]. Since then, there have been several significant advancements that have made surgery safer, especially in the field of microbiology". However, there remains significant burden of HAIs due to their high overall incidence.

The US Centers for Disease Control (CDC) updated its definition of 'wound infection' in 1992 by establishing the term 'SSI' to avoid confusing infections of traumatic wounds with infections of surgical incisions" [2]. Although majority of "SSIs are superficial, they significantly increase morbidity and mortality associated with surgical procedures [3,4]. Although estimating cost of SSIs has proven difficult, several research have concluded that the most significant aspect is an increased bed occupancy. SSI develops 30 days post-surgery or, in case of an implant, within a year (Table 1) [5].

Class I/Clean	Primarily closed, nontraumatic, elective and not emergency; there is no acute inflammation, no break in technique and no emergence into gastrointestinal, biliary, genitourinary or respiratory systems.
Class II/ Clean-Contaminated	An elective opening of the respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage (such as an appendectomy) and no contact with contaminated urine or bile; minor technique break; an urgent or emergency case that is otherwise clean.
Class "III/ Contaminated	Non-purulent inflammation; gastrointestinal tract discharge; biliary or genitourinary system entrance when bile or urine is infected; significant technical failure; penetrating trauma that is less than 4 hours old; persistent open wounds that require to be covered or grafting.
Class IV/Dirty	Purulent inflammation (which includes an abscess); penetrating trauma more than 4 hours; preoperative perforation of gastrointestinal, biliary, genitourinary or respiratory tracts.

Table 1: Surgical wound classification grades I-IV as defined by CDC.

Numerous research conducted in developed countries have demonstrated that infection during clean surgical operations, including thyroidectomy and SSI, is a rare occurrence. Current research emphasises SSIs in thyroidectomies and systemic Antibiotic Prophylaxis (AP) isn't often recommended by global standards [6-10].

Initial individuals "in the history of thyroid surgery" who will always be honoured and recognised are "Theodor Billroth, Theodor Kocher, William Halsted, Charles Mayo, George Crile, Frank Lahey and Thomas Dunhill". Let us honour "Magnificent Seven," group of pioneers that developed thyroidectomy procedures between 1873 and 1910 [11].

Clean surgical treatments include surgeries on head and neck. (Infection rate: below 5%). A clean surgical surgery, that includes thyroidectomy and SSI, is rare and uncommon result, according to many research conducted in highly developed countries (6-8) and systemic antibiotic prophylaxis isn't typically recommended by international standards [9].

Current research attempts to determine SSIs of thyroidectomies by strictly following the international guidelines without administering Antimicrobial Prophylaxis (AP), the etiological agents of aerobic bacteria causing SSIs and the recent trend in their antimicrobial sensitivity patterns. 244 patients who had thyroidectomies at our teaching hospital between 2022-24 are included in statistics.

Materials and Methods

The Institutional Ethics Committee approved protocol for this prospective cross-sectional research. Patients from 7 General Surgery units who had either partial or total thyroidectomies between April 2023 and April 2025 have been included in research; majority of these patients have been from nearby tribal areas. All study participants gave written informed consent, as did "patients undergoing thyroid surgery using conventional cervical approach.

Inclusion Criteria
Patients posted for all thyroid surgeries through conventional open cervical approach without any other complications.

Exclusion Criteria
Patients with an unknown fever or cold on the day of operation.
Patients with immunosuppressed therapy
Patients who underwent other methods of thyroidectomy, like Robotic or endoscopic.
All patients who underwent concurrent neck surgeries or required sternotomy for retrosternal extension
Patients with an obvious infection on the neck at the time of surgery

Primary objective of current research is to determine SSIs cases in patients undergoing thyroid surgery without AP as per international guidelines as all thyroid surgeries are Class 1/Clean (Infection rate - less than 5%) as per the classification of CDC [2,12]. To know the etiology of aerobic bacterial isolates from SSIs and to find out their antimicrobial sensitivity patterns. Microsoft Excel has been employed for data collection and compilation, while SPSS version 26.0 has been employed for statistical analysis.

Common thyroid surgeries, which include hemi thyroidectomies and total thyroidectomies, have been performed by surgeons with an open cervical technique and endotracheal intubation. According to requirements of SSI, all patients' signs and symptoms throughout postoperative stages have been evaluated. Two sterile swabs have been employed for collecting exudates in case of SSIs and they were swiftly delivered to Department of Microbiology. Standard microbiological procedures have been followed in isolation, identification and antimicrobial sensitivity testing of etiological agents [13,14].

Results
Current analysis comprised 244 patients with 2.45% incidence of SSIs (6 out of 244) who had either hemi or total thyroidectomy. As shown in Fig. 1, among the sex distribution, most of the patients (65%) were females with a male and female ratio is 1:3.2.

Fig. 2 shows the distribution of patients by age and in this study, maximum patients (26.23%) were females in 31-40 yrs age group. Research population had been 36±13y/o on average (20-65y/o).

Major Number of patients (64.39%) underwent Hemithyroidectomy (Fig. 3).

Table 2 documented the Etiological Aerobic Bacteria causing SSIs in current research, where *Staphylococcus aureus* was the major pathogen (3 out of 6).

Antimicrobial Sensitivity pattern was depicted in Fig. 4, where *S. aureus* showed resistance to many common antimicrobials among gram-positive bacteria, whereas *E. coli* is sensitive to many common antimicrobials.

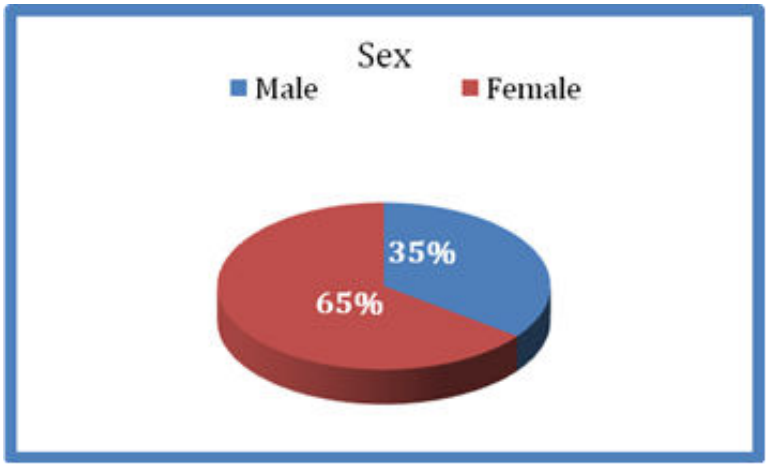

Figure 1: Distribution of patients by sex: (n-244).

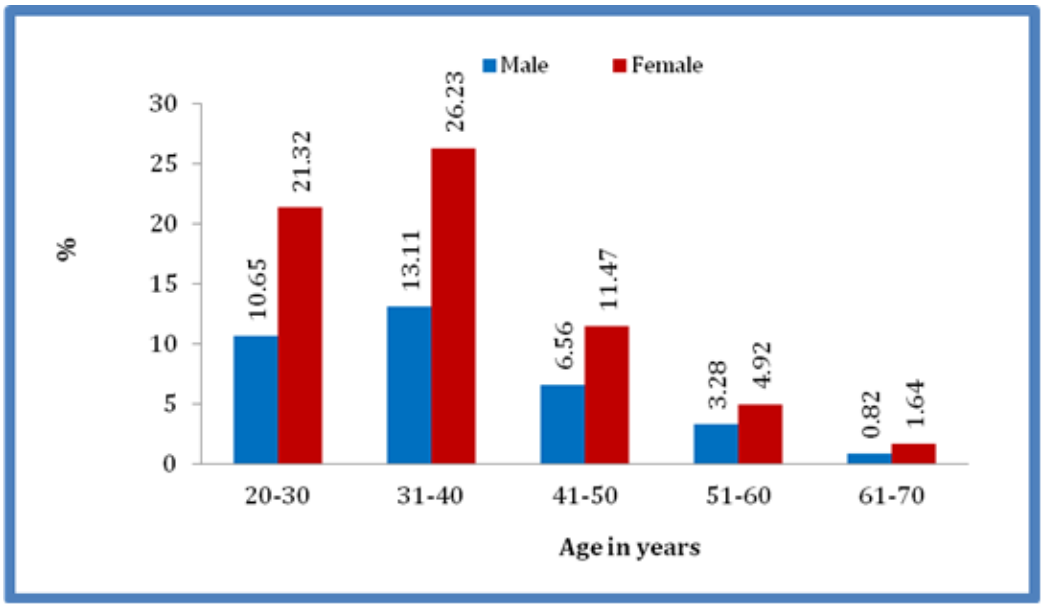

Figure 2: Distribution of patients by age: (n-244).

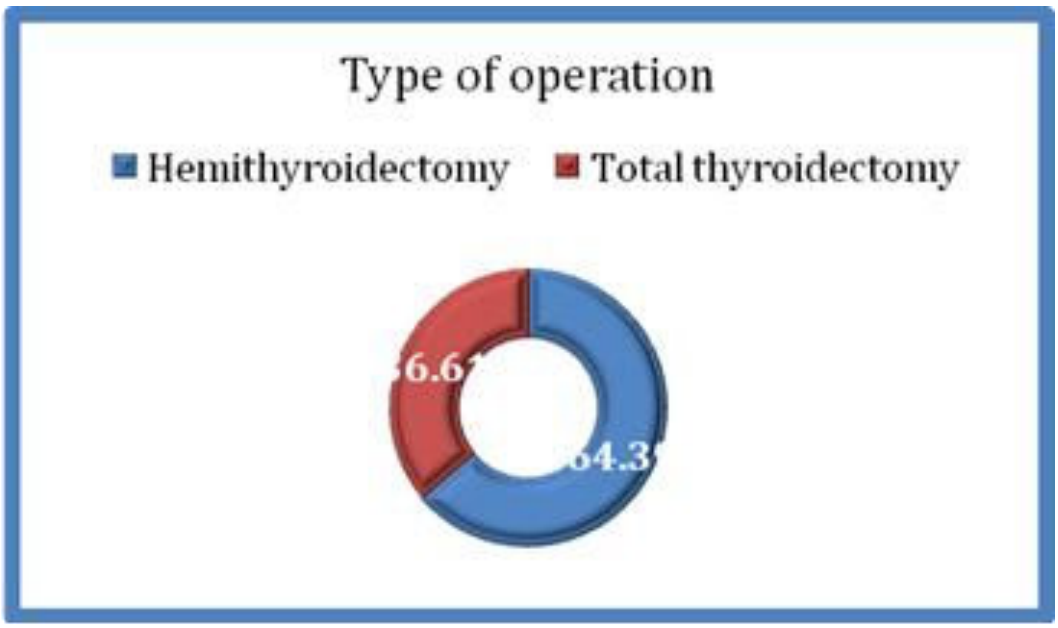

Figure 3: Type of operation: (n-244).

Bacteria Isolated	Gram Positive		Gram Negative	
	No.	%	No.	%
Staphylococcus aureus	3	50	-	-
Corynebacterium Spp.	1	16.66	-	-
E. coli	-	-	2	33.33
Total	4	66.67	2	33.33

Table 2: Etiological Aerobic Bacteria caused SSIs (n=6).

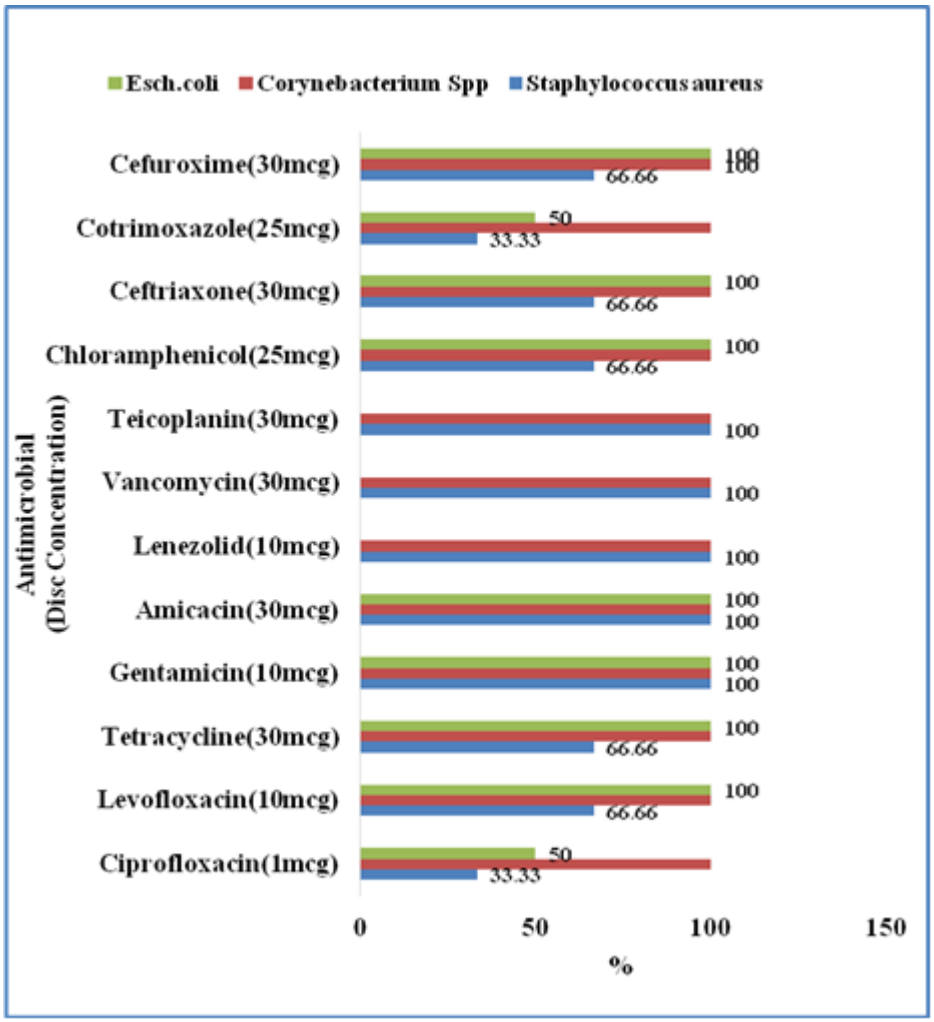

Figure 4: Antimicrobial sensitivity pattern.

Discussion

According to recent research, SSI incidence within 30 days after thyroidectomy had been 2.45% (6 out of 244). Since cervical thyroidectomies are considered clean cases, standard antibiotic prophylaxis is not recommended by international recommendations, that we adhered to while performing our thyroidectomy surgeries.

Investigating this issue is challenging since case of SSI post-thyroidectomy is very low, ranging from 0.5-3% 6-7,15-16]. Since majority of thyroidectomy patients are at very low risk of SSI because they are classified by CDC as Class1/Clean surgeries, research investigations that have been conducted to date on procedure are likely to demonstrate statistically significant difference in SSI rates with application of prophylactic antibiotics because antibiotics are either administered or not administered to all patients in research. When employed, benefit of prophylactic antibiotics could be small and insignificant.

According to our survey, thyroid problems affect more women (64.75%) than men, with male-to-female ratio of 1:3.2. Similar results have been identified by Md. Abul Hossan, et al., [18]. In our study, maximum patients (26.23%) were females in 31-40 yrs age group. Average age of research population had been 36 ± 13yrs. (20-65yrs). Other investigations discovered similar results elsewhere [18,19]. Autoimmune nature of many thyroid conditions assists to explain this gender disparity. Women are more inclined to suffer from autoimmune diseases, primarily as a result of immune system's response to sex steroids [20]. Majority of patients (64.39%) underwent hemithyroidectomy, as also a common finding in other studies [18,19]. In our study, the incidence of SSIs due to thyroidectomies is 2.45% (6 out of 244) and different incidences were observed by different authors in the world, ranging from 05% to 3% [6-7,15-17]. Trachea, larynx, pharynx and oesophagus are well-vascularized regions that aren't brought into contact with upper aerodigestive tract, making thyroid surgery clean procedure. Furthermore, since thyroid gland is an anatomically superficial organ, 95.8% of SSIs constituted superficial incisional wounds. Our results are under Bures, et al.,

observation that superficial incisional wounds accounted for 93.8% of SSIs after thyroid surgery [20]. Among 6 patients, 4 female, 2 male, in the age groups of 50-70 years. This shows age plays function because immunity decreases as age advances, which leads to infections, which may be from an external or internal source [6,20]. Among the 6 SSIs, 5 of superficial nature and one of Deep nature. The deep SSI is found in a female having Diabetes mellitus type 2 and obese. All occurred between 4th to 6th postoperative day of surgery. The etiological agents are shown in Table 2, where *S. aureus* is major pathogen among GPB group and *E. coli* in gram gram-negative group. All *S. aureus* spp. were non-MRSA, non-VISA and VRSA. The wounds healed with the usage of drugs as per the antimicrobial sensitivity pattern shown in Fig. 4. Similar findings were observed by Tsuguo Iwatani, Shinya Saito [21].

Conclusion

A thyroidectomy is a procedure with incision that is categorised as clean or type-I incision with minimal bleeding. It might not be required to employ antibacterial treatment to prevent incision infection since the surgery is performed under stringent sterility and haemostasis conditions. Initial step for managing post-thyroidectomy SSIs is early detection and prompt care. For all patients who develop SSI, we advise early investigation and evacuation in addition to close wound monitoring and surveillance after thyroidectomy. Patients who have no progression and superficial wound infections may benefit from conservative therapy. Following determining causal agent's antimicrobial sensitivity pattern, appropriate antibiotic coverage is recommended when infection occurs after surgery.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

No funding from any institution or organization.

References

1. Leaper DJ. Wound infection. In: Russell RCG, Williams NS, Bulstrode CJK, editors. Bailey and Love's Short Practice of Surgery. 24th Ed. London: Arnold. 2004;118-32.
2. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG. CDC definitions of nosocomial surgical site infections, 1992: A modification of CDC definitions of surgical wound infections. Am J Infect Control. 1992;20(5):271-4.
3. Kirkland KB, Briggs JP, Trivette SL, Wilkinson WE, Sexton DJ. The impact of surgical-site infections in the 1990s: Attributable mortality, excess length of hospitalization and extra costs. Infect Control Hosp Epidemiol. 1999;20(11):725-30.
4. National Nosocomial Infections Surveillance (NNIS) System. NNIS report, data summary from October 1986-April 1996, issued May 1996. A report from the NNIS System. Am J Infect Control. 1996;24(5):380-8.
5. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for the prevention of surgical site infection. The Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol. 1999;20(4):247-80.
6. Dionigi G, Rovera F, Boni L, Castano P, Dionigi R. Surgical site infections after thyroidectomy. Surg Infect (Larchmt). 2006;7(Suppl 2):S117.
7. Rosato L, Avenia N, Bernante P, de Palma M, Gulino G, Nasi PG, et al. Complications of thyroid surgery: Analysis of a multicentric study on 14,934 patients operated on in Italy over 5 years. World J Surg. 2004;28(3):271-6.
8. de Palma M, Grillo M, Borgia G, Pezzullo L, Lombardi CP, Gentile I. Antibiotic prophylaxis and risk of infections in thyroid surgery: Results from a national study (UEC-Italian Endocrine Surgery Units Association). Updates Surg. 2013;65(3):213-6.
9. Avenia N, Sanguinetti A, Cirocchi R, Docimo G, Ragusa M, Ruggiero R, et al. Antibiotic prophylaxis in thyroid surgery: A preliminary multicentric Italian experience. Ann Surg Innov Res. 2009;3:10.
10. Woods RK, Dellinger EP. Current guidelines for antibiotic prophylaxis of surgical wounds. Am Fam Physician. 1998.
11. Alam Hannan S. The magnificent seven: A history of modern thyroid surgery. Int J Surg. 2006;4(3):187-91.
12. National Institute for Health and Care Excellence (NICE). Surgical site infection: Prevention and treatment. 2019.
13. Winn W, Allen S, Janda W, Koneman E, Procop G, Schreckenberger P, et al. Color atlas and textbook of diagnostic microbiology. 6th Ed. Baltimore: Lippincott Williams and Wilkins. 2006.
14. Bauer AW, Kirby WMM, Sherris JC, Turck M. Antibiotic susceptibility testing by a standardized single disk method. Am J Clin Pathol. 1966;45:493-6.
15. Bergenfelz A, Jansson S, Kristoffersson A, Mårtensson H, Reihnér E, Wallin G, et al. Complications to thyroid surgery: results

as reported in a database from a multicenter audit comprising 3,660 patients. Langenbecks Arch Surg. 2008;393(5):667-73.
16. Dionigi G, Rovera F, Boni L, Castano P, Dionigi R. Surveillance of surgical site infections after thyroidectomy in a one-day surgery setting. Int J Surg. 2008;6(Suppl 1):S13.
17. Hossan MA, Islam MA, Chakraborty T, Khan FA, Islam MM. Incidence of post-operative surgical site infection in thyroid surgery following single dose of prophylactic antibiotic. Bangladesh J Otorhinolaryngol. 2016;22(1):15-20.
18. Khan I, Jacob P. Prospective study evaluating incidence of surgical site infection in thyroidectomy: Is antibiotic prophylaxis required? Int J Med Rev Case Rep. 2022;6(22):3-6.
19. Mulder JE. Thyroid disease in women. Med Clin North Am. 1998;82(1):103-25.
20. Bures C, Klatte T, Gilhofer M, Haidenberger A, Müller MR, Passler C. A prospective study on surgical-site infections in thyroid operation. Surgery. 2014;155(4):675-81.
21. Iwatani T, Saito S. Surgical site infections in thyroid and parathyroid surgery in Japan: An analysis of the Japan Nosocomial Infections Surveillance database from 2013 to 2020. Int Wound J. 2023;20(6):1874-80.