

Neck Swelling: Risk Factors and The Presence of The Thyroid Cancer

Nagah Bobtina ^{1*}, Ashraf M. Elmansori ², Mohamed Bubteina ³

^{1,2} Histology Department, Faculty of Medicine, Benghazi University, Libya

³ BSc medical student, Faculty of Medicine, University of Benghazi-Libya

*Email (for reference researcher): Nbobtina@Aol.co.uk

تورم الرقبة وعلاقتها بعوامل الخطر ووجود سرطان الرقبة

نجاح بوبطينه ^{1*}، اشرف المنصوري ²، محمد بوبطينه ³
^{1,2} القسم علم الانسجه، الكلية الطب البشري، الجامعة بنغازي، المدينة بنغازي، ليبيا
³ طالب بكالوريوس، الكلية الطب البشري، الجامعة بنغازي، المدينة بنغازي، ليبيا.

Received: 07-07-2025; Accepted: 12-09-2025; Published: 04-10-2025

الملخص

تصادف تورمات الرقبة بشكل متكرر من قبل الجراحين في العيادات الخارجية بالمستشفيات. ونظرًا لوضوحها وأثارها التجميلية المحتملة، فقد تكون هذه أورامًا خبيثة، مما يستدعي استشارة طبية فورية. هدفت هذه الدراسة الرصدية إلى تحليل الخصائص السريرية والأسباب الكامنة وراء كتل الرقبة لدى مرضى مدينة بنغازي. تم تقييم التوزيع العمري والعوامل المسببة لتورم الرقبة لدى مختلف الفئات العمرية والأجناس كعوامل خطر تؤثر على المرضى. سعت الدراسة إلى استكشاف العلاقة بين العمر والجنس والحالات الطبية التي تُسهم في تورم الرقبة، مثل سرطان الغدة الدرقية. بلغ العدد الإجمالي للمرضى الذين عانوا من تورم الرقبة 250 مريضًا. كان لدى حوالي 103 منهم التهاب في الغدة الليمفاوية، و127 حالة تضخم في الغدة الدرقية. بينما عانت 5 حالات من التهابات الجهاز التنفسي، و9 حالات من سرطان الرقبة، و8 حالات مرتبطة بالأورام الدموية، حيث تُمثل هذه الحالات حوالي 40.2% و50.8% و3.2% من الحالات على التوالي. معظم المرضى من الإناث في جميع الفئات العمرية، وتتراوح أعمار المرضى المصابين بأمراض الغدة الدرقية بين 31 و39 عامًا، وفي العقد الليمفاوية بين 34 و44 عامًا. التهاب الشعب الهوائية بين 33 و44 عامًا، وأمراض السرطان بين 25 و35 عامًا، بالإضافة إلى الأورام الدموية بين 29 و39 عامًا. أُخذت خزعات من المرضى المصابين بسرطان الغدة الدرقية، وأُحضرت مقاطع من البارافين وفُحصت تحت المجهر لتحديد نوع الورم. خُللت البيانات باستخدام برنامج إكسل، وكانت قيمة الاحتمالية (p-value) < 0.05. ونتيجةً لذلك، كان معظم المرضى مصابين بأمراض الغدة الدرقية. يُعد إجراء المزيد من البحوث حول هذا الموضوع أمرًا ضروريًا للتخفيف من آثاره السلبية على الصحة العامة في المستقبل.

الكلمات المفتاحية: تورم الرقبة، التهاب، عدوى، ورم دموي، عقدة ليمفاوية، الغدة الدرقية، أورام الرقبة، العمر، والجنس.

Abstract:

Swellings in the neck are frequently encountered by surgeons in outpatient clinics in the hospitals. Given their visibility and potential cosmetic implications, these could be malignant tumors, often leading to prompt medical consultation.

Aims

This observational research aimed to analyze the clinical characteristics and underlying causes of neck masses in patients from Benghazi city. The age distribution and etiological factors of neck swelling across various age groups and genders were assessed as risk factors impacting patients. The study sought to explore the correlation between age, gender, and medical conditions contributing to neck swelling, such as thyroid cancer. The total number of patients who had neck swelling was 250. Approximately 103 had lymph node inflammation, and 127 cases had enlarged thyroid glands. While 5 cases were suffering from respiratory infections, 9 pertained to neck cancer, and 8 were linked with hematomas, accounting for around 40.2%, 50.8%, and 3.2% of cases, respectively. Most patients are female in the whole category, with critical ages in thyroid diseases from 31-39 years and in lymph nodes from ages 34-44 years. Bronchial infection from 33-44 years and cancer diseases from age 25-35 years, as well as hematomas between 29-39 years. The biopsies were taken from the patients who had thyroid cancer, and paraffin sections were prepared and examined under a microscope to identify the type of tumor. Data were analyzed using Excel, and the p-value was $p < 0.05$. As a result, most of the patients had thyroid disease. Additional research on this topic is essential to mitigate its adverse effects on public health in the future

Keywords: Neck swelling, Inflammation, Infection, Hematoma, Lymph node, Thyroid, Neck tumors, age, and gender.

Introduction:

Neck swelling is characterized by the visible accumulation of fluid and inflammation in the neck tissues. This condition typically arises from the enlargement of lymph nodes due to viral or bacterial infections [1, 2], and in certain instances, it may indicate the presence of cancer, including malignancies of the head and neck [3, 4]. Common causes of neck swelling encompass benign reactive lymphadenopathy [1], bacterial lymphadenitis (such as that caused by *Bartonella henselae*), lymphoma, leukemia, hematomas, congenital anomalies (e.g., thyroglossal duct cysts, branchial cleft cysts, cystic hygromas), and benign tumors (e.g., lipomas, keloids) [1, 2]. Upper respiratory infections are the most frequent cause of lymph node enlargement in the neck [5], which typically resolve within 10 to 14 days. Thyroid conditions can also lead to neck swelling; for instance, iodine deficiency may cause the thyroid gland to enlarge in an effort to capture more iodine for adequate thyroid hormone production. In emergencies, intraregional bleeding from a thyroid adenoma must also be considered [6, 7]. The parotid glands, which are major salivary glands, can also contribute to neck swelling. Additionally, the Epstein-Barr virus may lead to fever, sore throat, and swollen lymph nodes, particularly in the neck [8]. Symptoms associated with neck swelling include tissue inflammation, enlarged lymph nodes, thyroid enlargement (due to thyroid disease), fever, tenderness or pain, restricted movement, redness or warmth, changes in voice, and difficulty swallowing (which may result in loss of appetite and weight loss).[9]

The diagnostic process for neck swelling begins with a review of the patient's medical history and a physical examination. Depending on the swelling's location, further tests may be recommended, including blood tests, X-rays, ultrasounds, magnetic resonance imaging (MRI),

and positron emission tomography (PET) scans. A biopsy, which involves the removal and microscopic examination of lymph node tissue, may also be performed [9, 10, 11]. To alleviate neck swelling, pain relievers such as aspirin, ibuprofen, naproxen, or acetaminophen may be used. In certain cases, urgent surgical intervention may be necessary based on the patient's condition. Treatment options may include antibiotics or antiviral medications for infections that cause swollen lymph nodes, with specific medications like dicloxacillin, cephalexin, cefazolin, nafcillin, and trimethoprim-sulfamethoxazole prescribed as needed. For swollen lymph nodes attributed to cancer, surgical removal of tumors and affected lymph nodes, as well as chemotherapy, may be required. The treatment approach is tailored to the underlying cause [9,10,11]

The aims of the study:

- 1- To evaluate the risk factors for developing Neck swelling.
- 2- To estimate the number of Neck swelling patients compared with causes.
- 3- To determine the seriousness of the Neck swelling in the future.

Patients and Method

A total of 250 patient files from individuals experiencing neck swelling at Al Jalla Hospital's surgery department from 2021 to 2024 were analyzed retrospectively. Among these cases, 103 involved lymph node inflammation, 127 involved enlarged thyroid glands, 5 were linked to respiratory infections, 9 pertained to neck cancer, and 8 were associated with hematomas, accounting for approximately 40.2%, 50.8%, 2.0%, 2.8%, and 3.2% of cases, respectively. This analysis examined risk factors such as age, gender, and geographic variations related to neck swelling based on patient records. The biopsy from the patients who were diagnosed with malignant tumor in thyroid gland were included in this study. Hematoxylin and eosin (H&E)-stained sections were examined under light microscope to determine the type of tumor. Data were analyzed using Excel, with a significance threshold set at $p < 0.05$. Statistical analysis was conducted to identify factors that may influence the development of neck swelling.

Gender	Lymph Node	Thyroid disease	Bronchi infection	Cancer disease	Hematoma
M	73	6	4	6	6
F	30	121	1	3	1
Total	103	127	5	9	7

Results

1-Thyroid gland disease (age and Gender)

The curve shows that most of thyroid disease patients are between the age of 31- to- 39 years (Figure-1).

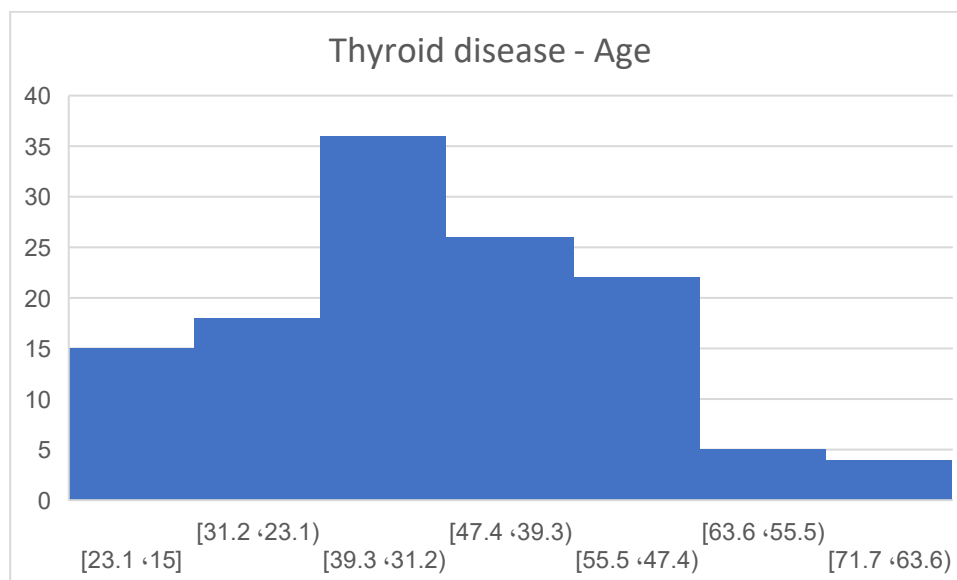


Figure-1. Thyroid gland disease and age

The curve shows that the number of females with thyroid disease was very high when compared with the number of males (Figure-2).

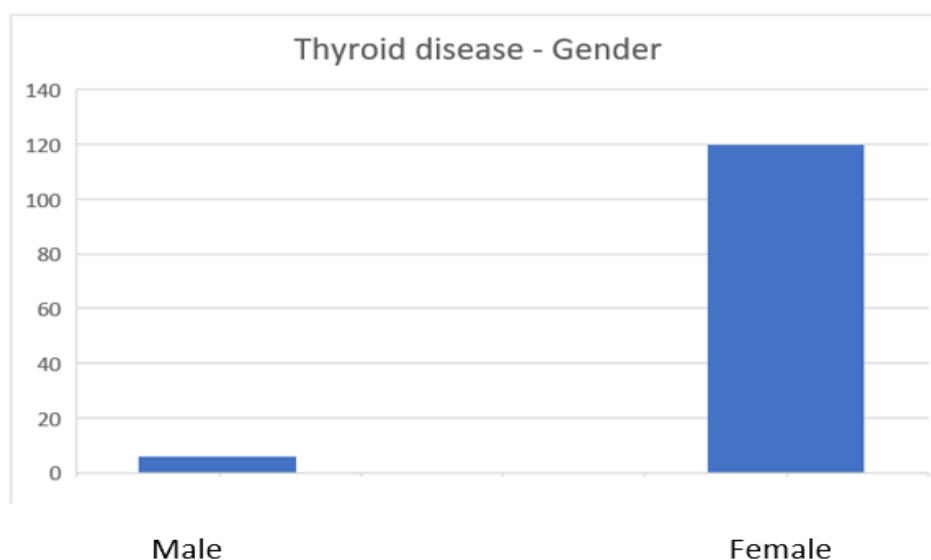


Figure-2. Thyroid gland disease and Gender.

2- Lymph node disease (age and gender)

The most of patients have neck swelling with lymph nodes between 34 to 44 years and very few at ages 64 to 74 years (Figuer-3).

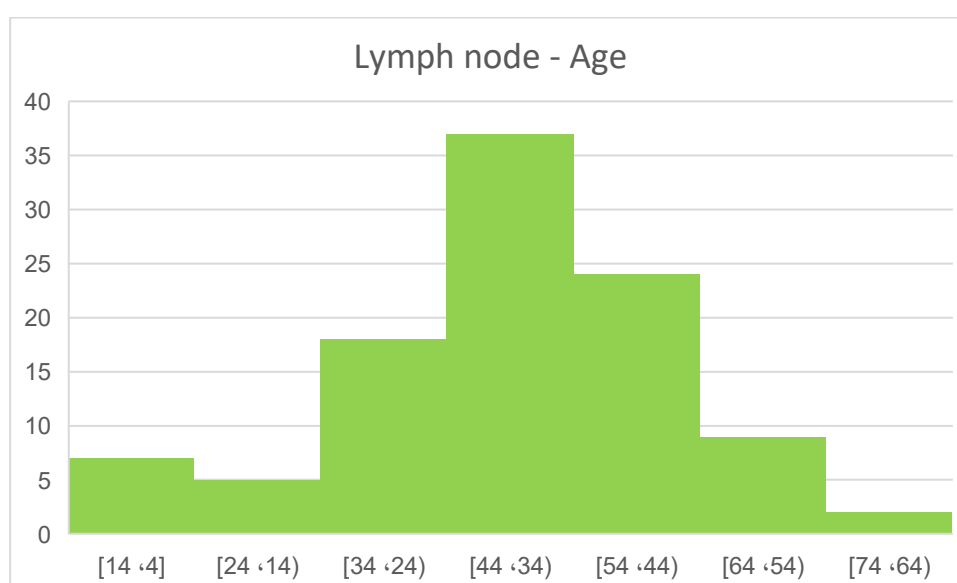


Figure-3. Lymph node disease and age.

The curve shows the number of females who have a problem with lymph node twists numbers of males who have the same problem (Figure-4).

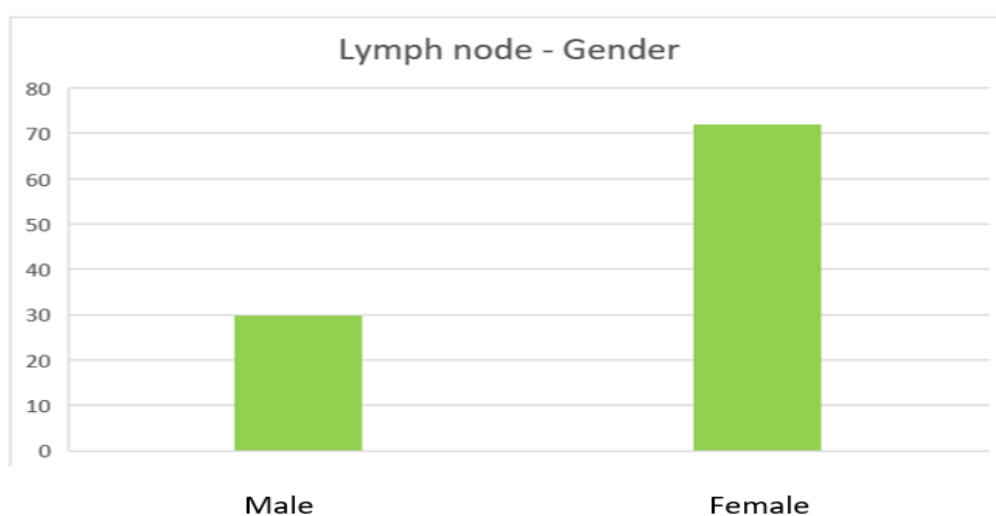


Figure-4. Lymph node disease and gender.

3-The bronchi infection (Age and gender)

The illustration of the par chart shows that there were no patients in-between age 44 to 54. However, there were the same chance of incidence of Neck swelling at ages 14 to 34 and 54 to 64 (Figure-5).

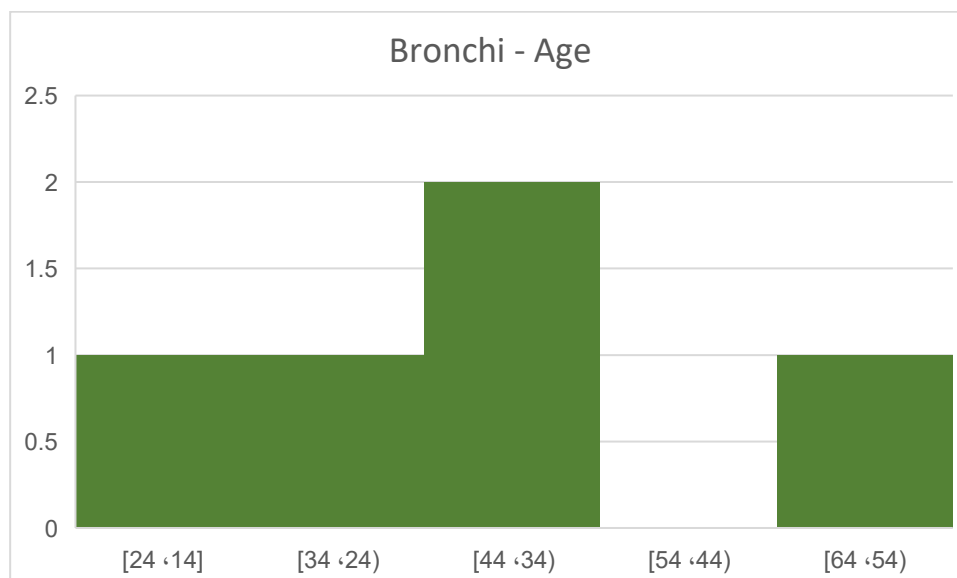


Figure-5. The bronchi infection and Age

The par chart shows the number of females four times of the number of males with Bronchi infection (Figure-6)

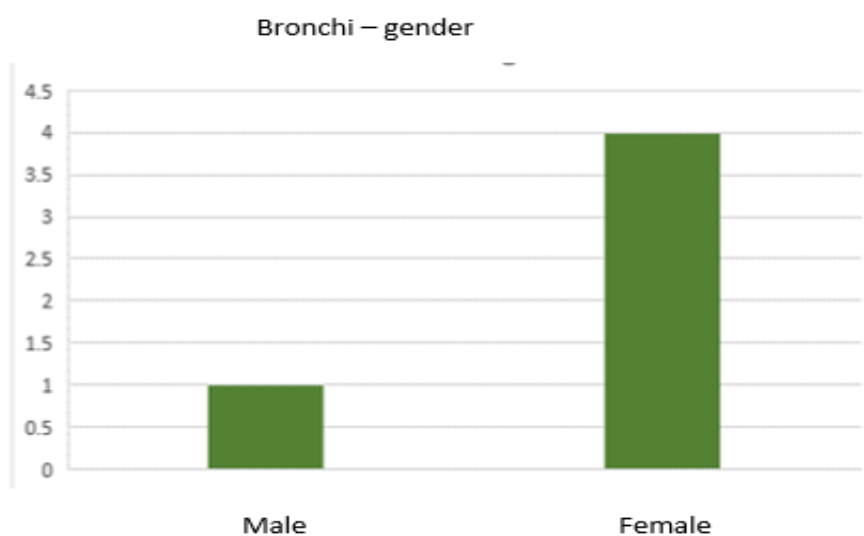


Figure-6. The bronchi infection and gender.

4-The cancer disease (Age and gender)

The illustration of the par chart shows that were not patients in-between age 45 to 55. However, there was the high numbers between age 25 to 35 and high risk to neck swelling problem (Figure-7)

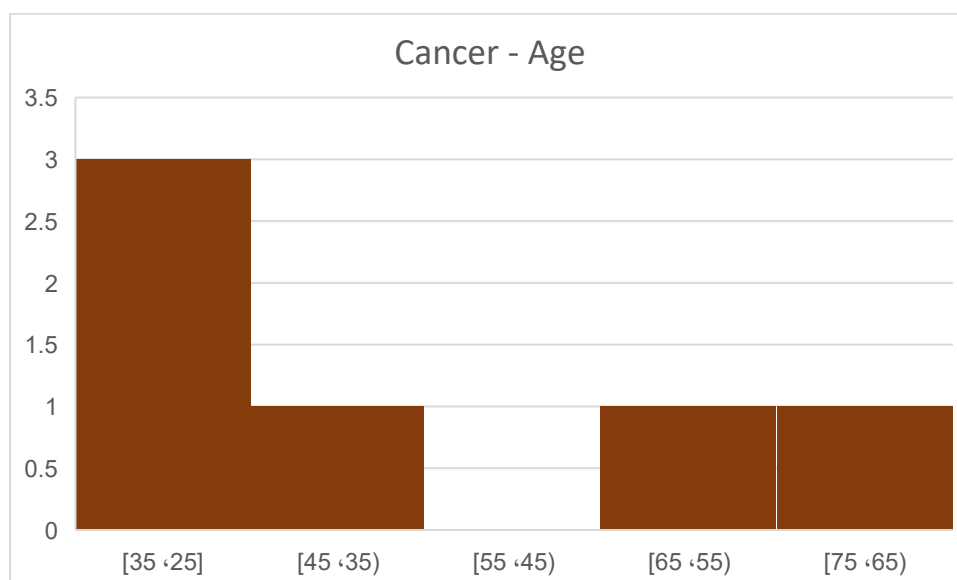


Figure-7. The cancer disease and Age.

The par chart shows the number of females were two times of the number of males with cancer disease (Figure-8).

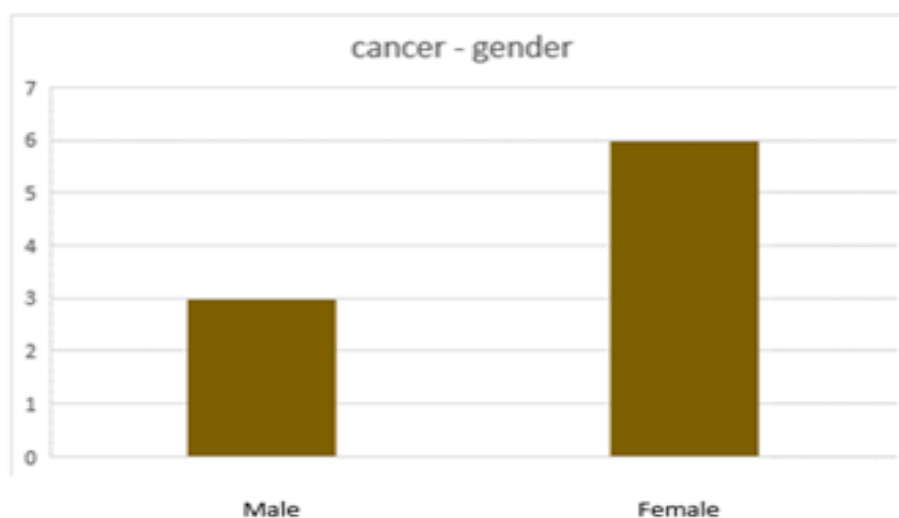


Figure-8. The cancer disease and Gender.

5-The Hematoma (Age and gender)

There were the equal number of patients who had hematoma at age (9 to 19) (19 to29) and (49 to59) and as well as at age (29 to 39) and (49 to 59) (Figure-9)

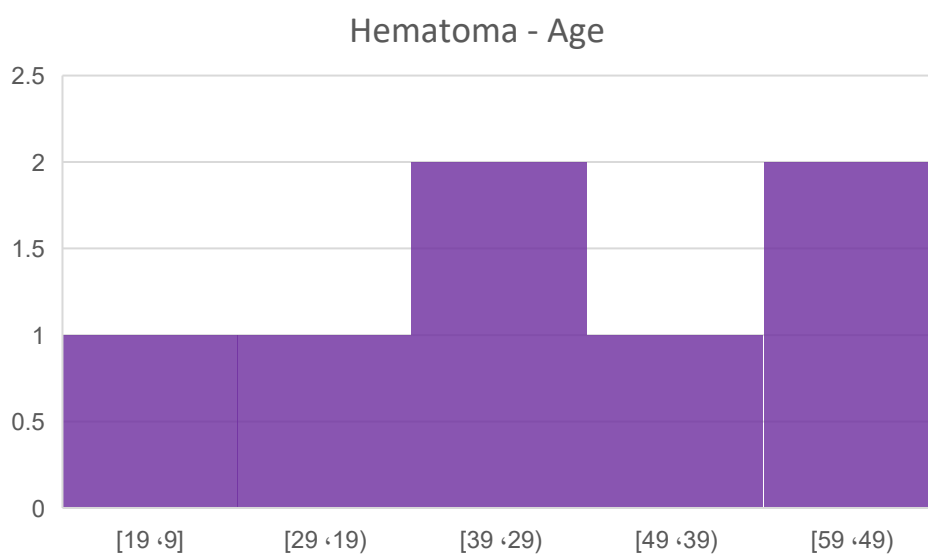


Figure-9. The Hematoma and age.

The bar chart shows that the number of males who suffering with hematoma six time of the number of females (Figure-10).

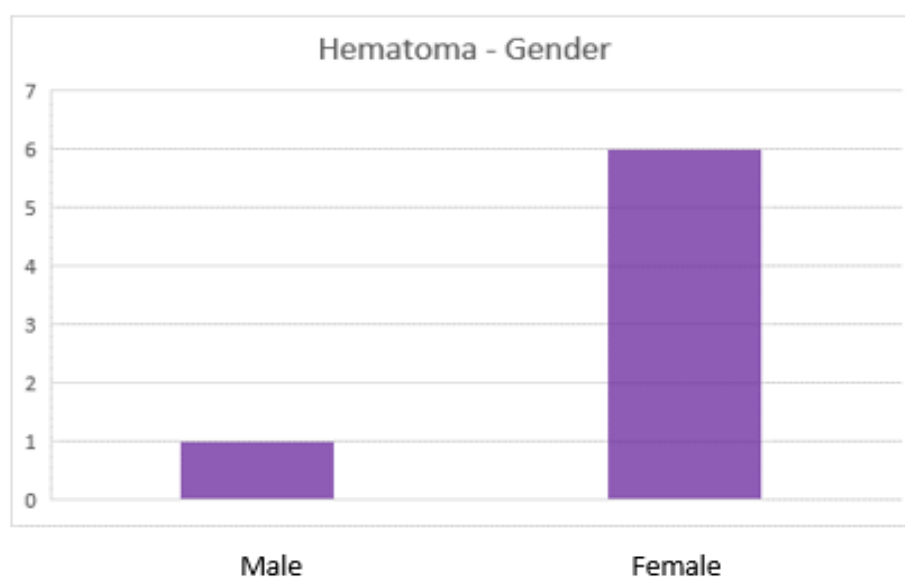


Figure-10. The Hematoma and Gender.

6-The comparative study between the normal tissue of thyroid gland and abnormal tissue of thyroid gland (thyroid cancer)

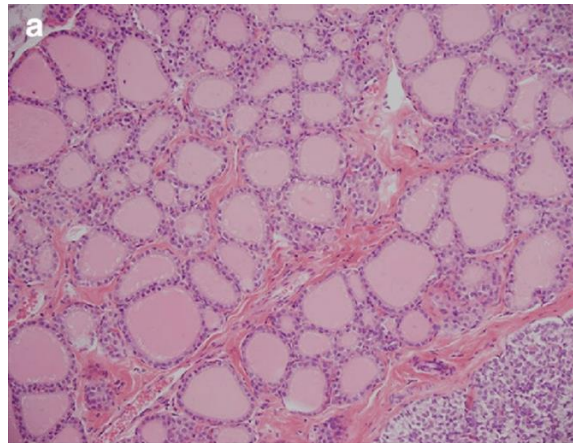
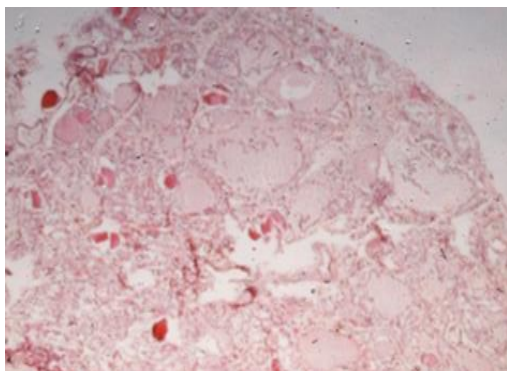
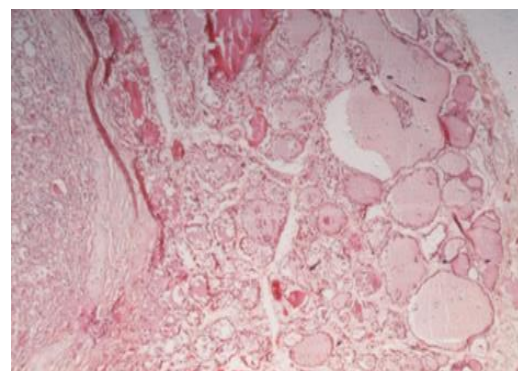


Figure-11. The normal thyroid gland (H&E)

The figure 11 Show the follicles are lined by a simple epithelium and their central cavity contains a gelatinous substance called colloid. The gland is covered by a loose connective tissue capsule that sends septa into the parenchyma. As these septa gradually become thinner, they reach all the follicles, separating them from one another by fine, irregular connective tissue composed mainly of reticular fibers.



A



B

Figure-12. The abnormal thyroid gland

The figure 12-A. show of a follicular neoplasm of the thyroid gland. Follicular architecture: Numerous variably sized follicles, some filled with colloid. Irregular follicle shapes and loss of typical uniformity. Dense cellular areas intermixed with colloid-filled follicles. Shows capsular and vascular invasion; possible capsular involvement (follicular carcinoma, malignant). B. Mild hemorrhage and degenerative changes are present (seen as red blood cells and colloid disruption).

Discussion

Neck masses encompass any swelling or enlargement of structures located between the inferior border of the mandible and the clavicle, representing a common clinical finding across all age demographics. These swellings can be categorized into four primary groups: lymph node swelling, thyroid swelling, salivary gland swelling, and skin and soft tissue swelling. Neck swelling can significantly impact patients' activities due to pain and restricted movement, as well as difficulties in swallowing that can affect appetite and lead to weight loss. This study

aimed to identify the risk factors and causes of neck swelling among patients. The findings revealed a total of 250 patients with neck swelling: 103 (41%) with lymph node inflammation, 127 (50%) with thyroid gland enlargement, 5 (2.0%) with respiratory infections, 8 (3.2%) with cancer, and 7 (2.8%) with hematomas. These results align with those of Anupama and Probal (2024) and Fang et al. (2015), who indicated that secondary metastatic lymph nodes constitute a common form of non-thyroidal neck swelling (23.2%). The thyroid gland frequently serves as the primary source for secondary cervical lymph node swellings, accounting for over 60% of cases. Ramli et al. (2024) identified a correlation between painful neck swellings and hyperthyroidism. Additionally, Fang et al. (2015) reported that primary malignant tumors and metastatic tumors constituted 9.79% and 15.42% of cases, respectively. Neck trauma may lead to injuries affecting bones, muscles, nerves, blood vessels, and/or the digestive tract. Although rare, hemorrhage from the thyroid gland can result in life-threatening conditions requiring immediate intervention [15]. Post-thyroidectomy hematomas, though infrequent, can lead to severe complications, presenting as hoarseness, dysphagia, and respiratory difficulties, potentially culminating in airway obstruction and death [16]. This study found that hematomas represented 2.8% of the total patient population. Furthermore, there was an observed increase in the incidence of thyroid diseases among patients aged 31 to 39, particularly among females. This is consistent with findings by Gupta et al. (2020), which reported that out of 122 patients with thyroid lesions, 20 were male (16.8%) and 102 were female (83.2%), resulting in a male-to-female ratio of 1:4.95, indicating a predominance of female patients. The most commonly affected age group was 16 to 30 years. The present study identified that younger individuals and females were more frequently affected by neck swelling. However, contrasting findings by Anupama and Probal (2024) indicated that neck swelling was more prevalent in males (72%), with 83% of patients being over 40 years old. This differs from observations by Tyagi et al. (2024), which noted that most patients with neck swelling were around 60 years of age [18]. The current research established that patients with respiratory infections, cancer, and hematomas generally fell within the 30 to 50-year age range, with females comprising over 50% of the total neck swelling cases. This aligns with findings from Thakur et al. (2024), which indicated that individuals aged 21 to 30 (30%) and 11 to 20 (22%) were included in their study, with females constituting 68% of the total, resulting in a male-to-female ratio of 0.6:1. The predominant etiologies identified were infective or inflammatory (42%) that could be the effect of female steroid hormones [19], followed by thyroid-related conditions (35%). Among infective causes, tubercular lymphadenitis was the most common, accounting for 36% of cases [20]. Understanding the causes and risk factors associated with neck swelling is crucial in preventing serious symptoms that can negatively impact patients'

Thyroid cancers were recorded in this study, and the histology cross-section shows follicular, variably sized follicles, some filled with colloid, and irregular shapes with a loss of typical uniformity. In addition, there were capsular and vascular invasion, mild hemorrhage, and degenerative changes present. This study found that thyroid cancer is associated with age and gender as risk factors. This reaches agreement with Crnčić et al. 2020 and Parad et al. 2021, who reported more females than males at risk for thyroid cancer. It could be the effect of the estrogen hormone, obesity, and lifestyle. Further studies are needed to investigate the pathophysiological mechanisms of estrone hormones to control the increase in thyroid cancer occurrence (21,22).

Conclusions

Neck swellings manifest in various forms and originate from diverse causes. Gaining insight into their characteristics and patterns of onset is essential for conducting appropriate preoperative examinations and comprehensive diagnoses, which are critical to enhancing patient health. Consideration of risk factors such as age and gender is necessary, as the underlying causes of neck swelling can significantly influence patients' health and necessitate urgent surgical interventions.

Recommendation

Neck swelling need more research to help the patents overcome of the symptoms of disease and awareness of people about the disease.

Limitation

Need more information about another risk factors that effect on the develop neck swelling such as the habits if they were smooching or alcoholic patients. In addition, family history and immune disease.

References

1. Keraawa, C., & Newlands, C. (Eds.). (2014, July 10). *Oral and maxillofacial surgery*. Oxford, UK: OUP Oxford.
2. Bruch, J. M., & Treister, N. S. (2010). *Clinical oral medicine and pathology*. New York, NY: Humana Press.
3. Scully, C., & Kalantzis, A. (2005). *Oxford handbook of dental patient care*. Oxford, UK: Oxford University Press.
4. Pynnonen, M. A., Gillespie, M. B., Roman, B., Rosenfeld, R. M., Tunkel, D. E., Bontempo, L., Brook, I., Chick, D. A., Colandrea, M., Finestone, S. A., & Fowler, J. C. (2017). Clinical practice guideline: Evaluation of the neck mass in adults. *Otolaryngology–Head and Neck Surgery*, 157(2 Suppl), S1–S30.
5. Dellian, M. (2005, March 1). Mass in the neck—the view of the ENT specialist. *MMW Fortschritte der Medizin*, 147(9), 26–27.
6. Giotakis, E. I., Hildenbrand, T., & Dodenhöft, J. (2011). Sudden massive neck swelling due to hemorrhage of a thyroid adenoma: A case report. *Journal of Medical Case Reports*, 5(1), 1–4.
7. Ramli, S. A., Draman, N., & Muhammad, J. (2023, April 1). Sudden onset of painful neck swelling: A case report. *Visual Journal of Emergency Medicine*, 31, 101665.
8. Zhang, Y., Chen, J., Chen, L., & Tang, W. (2024, April). Epstein–Barr virus infection–associated facial swelling: A case report. *Cureus*, 16(4).
9. Medcover Hospitals. (2024). *Understanding neck swelling symptoms, causes and treatment*. Retrieved December 20, 2024, from <https://www.medcoverhospitals.in/symptoms/neck-swelling>
10. Balm, A. J., Van Velthuisen, M. L., Hoebers, F. J., Vogel, W. V., & Van Den Brekel, M. W. (2010). Diagnosis and treatment of a neck node swelling suspicious for a malignancy: An algorithmic approach. *International Journal of Surgical Oncology*, 2010(1), 581540.
11. Ahuja, A. T., Ying, M., Ho, S. Y., Antonio, G., Lee, Y. P., King, A. D., & Wong, K. T. (2008). Ultrasound of malignant cervical lymph nodes. *Cancer Imaging*, 8(1), 48.
12. Rai, A., & Chatterji, P. (2021). *Clinical study of neck swellings and their correlation with pathological findings in a tertiary care centre in Western Uttar Pradesh*. Retrieved

December 20, 2024, from https://www.aimdrjournal.com/wp-content/uploads/2021/06/EN_O1_NECK-SWELLINGSDR.-ANUPAMA-RAI-edit.pdf

13. Fang, X., Yang, X. C., & Shang, W. (2015, October 1). Clinical analysis of 817 cases of neck mass. *Shanghai Journal of Stomatology*, 24(5), 627–631.
14. Tsukahara, K., Sato, K., Yumoto, T., Iida, A., Nosaka, N., Terado, M., Naito, H., Orita, Y., Naito, T., Miki, K., & Sugihara, M. (2016). Soft tissue hematoma of the neck due to thyroid rupture with unusual mechanism. *International Journal of Surgery Case Reports*, 26, 217–220.
15. Thakkar, K., Nwangene, N. L., Maharjan, R., Francis, S., Carredo, C. K., Dahal, R., & Khan, A. (2023, July). A comprehensive management of neck hematoma in post-thyroidectomy patient for papillary thyroid cancer: A case report. *Cureus*, 15(7).
16. Gupta, H., Gupta, N., & Karode, R. (n.d.). To evaluate the role of fine needle aspiration cytology in the initial assessment and the clinical management of patients of palpable mass lesions in anterior triangle of neck with respect to the age and sex. *Thyroid*, 122, 23–64.
17. Tyagi, R., Tripathi, S., Aggarwal, R., & Kumar, M. (2024, September 1). Neck swelling with hoarseness of voice and dysphagia. *Lung India*, 41(5), 379–380.
18. Vidaillac, C., Yong, V. F., Jaggi, T. K., Soh, M. M., & Chotirmall, S. H. (2018). Gender differences in bronchiectasis: A real issue? *Breathe*, 14(2), 108–121.
19. Thakur, C. K., Dhasmana, G., Bhardwaj, H., & Vindrani, N. (2024, November 15). Neck masses: A study of clinico-epidemiological and cytological profile. *The Egyptian Journal of Otolaryngology*, 40(1), 148.
20. Crnčić, T. B., Tomaš, M. I., Giroto, N., & Ivanković, S. G. (2020). Risk factors for thyroid cancer: What do we know so far? *Acta Clinica Croatica*, 59(Suppl 1), 66.
21. Parad, M. T., Fararouei, M., Mirahmadizadeh, A. R., & Afrashteh, S. (2021). Thyroid cancer and its associated factors: A population-based case-control study. *International Journal of Cancer*, 149(3), 514–521.