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Benign neck swellings: a clinico-radio-pathological study

Ayshath Irfana, Sheetal Rai*, K. S. Gangadhara Somayaji

Department of ENT, Yenepoya Medical College and Hospital, Derlakatte, Mangalore, Karnataka, India

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***Correspondence:**
Dr. Sheetal Rai,
E-mail: sheetalrai81@yahoo.com

ABSTRACT

Background: The present study aimed to know the common pathologies presenting as neck swellings in our region and their clinical, radiological, and cytopathological correlation in order to understand the nature of the lesion and accuracy of the diagnostic tools in finding a definitive diagnosis.
Methods: Patients presenting with neck swelling to the ENT department of a tertiary care centre in Mangalore between June 2013 to July 2018 were included in the study based on retrospective and prospective sampling. Appropriate cytolopathological and radiological investigations were done and analyzed.
Results: Out of 160 cases analyzed histopathology diagnosed 86.9% as benign and 13.1% as malignant. Radiologically 94.9% were diagnosed to be benign and 5.6% malignant whereas in cytological investigation 89.4% were diagnosed as benign and 6.9% as malignant while the remaining 3.8% cases were cytologically inconclusive. Intra operatively 6.9% cases had features of malignancy and rest 93% were benign. Thyroid was the most common benign neck swelling (73.2%) followed by cervical lymphadenopathy (6.9%) and thyroglossal cyst (5.6%).
Conclusions: Discrepancy in clinico-radio-cytopathological correlation was highest in cases of thyroid swelling (more so in case of solitary thyroid nodule). None of the pre-operative investigations for neck swellings is 100% specific or definitive in diagnosing a benign from a malignant lesion in the neck.

Keywords: Benign, Neck swelling, Ultrasonography, Fine needle aspiration cytology

INTRODUCTION

In routine ENT practice, we come across wide variety of neck swellings ranging from inflammatory to neoplastic, many of which pose a clinical dilemma in definitive diagnosis and management. The common pathologies encountered as neck swellings are lymphadenopathies (specific and non-specific, acute and chronic), metastatic carcinoma, lymphoma, thyroid swellings (goitre, nodules and cysts) and salivary gland swellings (sialadenitis, cysts, adenomas and carcinomas). The less common causes for neck swellings are carotid body tumour, bronchial cyst, thyroglossal cyst, cystic hygroma, pharyngeal pouch and lumps arising from skin appendages.[1] Most thyroid swellings though benign, carry a 5% risk of malignancy.[2]

Neck swellings can be classified in relation to the triangles of the neck. The various triangles of the neck are anterior, digastric, carotid, muscular, and posterior. The anatomical knowledge of these triangles is very important for understanding the differential diagnosis of various pathologies presenting as neck swellings.[3] Radiological and cytological tools such as USG (ultrasound) neck, CT (computed tomography)/ MRI (magnetic resonance imaging) and FNAC (fine needle aspiration cytology) often give valuable information to aid the diagnosis. However, a good clinical, radiological and cytological correlation is a must to plan an effective surgical intervention.[4-6]

Our study aimed to know the common pathology of benign neck swellings in our set up and to study the

clinico- radio-cytopathological correlation of benign neck lesions so as to know the pitfalls in radiological and cytopathological diagnosis and accuracy of the diagnostic tools in finding a definitive diagnosis.

METHODS

Patients presenting with neck swelling to the Department of ENT, Yenepoya Medical College Hospital, Mangalore were included in our study based on retrospective and prospective sampling. The retrospective sample included patients who presented during the period between June 2013 to June 2017 (4 years) and prospective sample included those who presented from July 2017 to July 2018 (1 year). All patients clinically diagnosed as having benign neck swelling planned for surgical management were enrolled in the study. Patients with clinical diagnosis of malignant neck swelling, patients with benign neck swelling managed medically and those patients not willing to participate in the study were excluded from the study. Detailed history and clinical examination was performed on all patients. Those with a benign neck swelling were subjected to cytological (FNAC) and radiological investigations (USG). Further radiological investigations such as CT and/or MRI were done in cases where the USG findings were suspicious of malignancy or were inconclusive. Data for retrospective samples was collected from the inpatient records of the patients and tabulated.

RESULTS

A total of 160 cases were studied and their clinic-radio-pathological correlations were analysed. Out of these, 116 (72.5%) were females and 44 (27.5%) were males.

Table 1: Causes of benign neck swelling.

Causes of neck swelling	Total no	%
Thyroid swelling	117	73.2
Cervical lymphadenopathy	10	6.3
Thyroglossal cyst	9	5.6
Parotid swelling	8	5
Submandibular gland cyst	5	3.1
Branchial cyst	5	3.1
Cystic hygroma	1	0.6
Laryngocele	1	0.6
Epidermal cyst	1	0.6
Lipoma	1	0.6
Lymphatic cyst	1	0.6
Submental lymph node	1	0.6
Total	160	100.0

Majority of our patients fell in the age group between 20–50 years (68%).

In our study, thyroid was the most common benign neck swelling (73.2%) followed by cervical lymphadenopathy (6.9%), thyroglossal cyst (5.6%), pleomorphic adenoma (5%), submandibular gland cyst (3.1%), branchial cyst (3.1%). Other lesions like cystic hygroma, laryngocele, epidermal cyst, lipoma, lymphatic cyst constituted 0.6% each. Of the thyroid swellings, multinodular goitre constituted 42.5% followed by simple goitre (14.4%) and solitary thyroid nodule (16.3%). Of the solitary thyroid nodules, 13.2% were right sided and 3.1% were left sided.

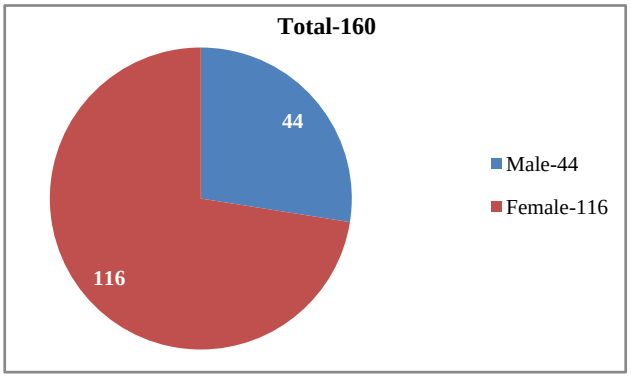

Figure 1: Sex ratio.

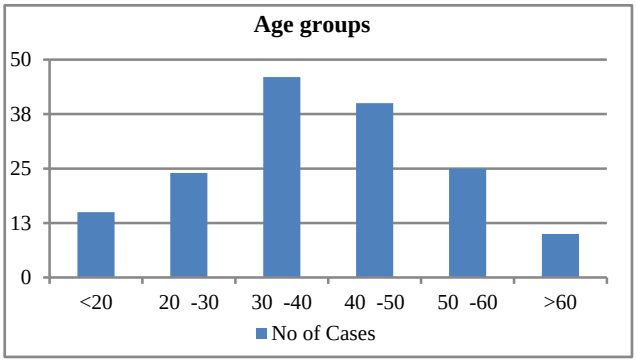

Figure 2: Age group.

Out of all cases that were clinically benign, histopathology diagnosed 86.9% as benign and 13.1% as malignant. Radiologically 94.9% were diagnosed to be benign and 5.6% malignant whereas in cytological investigation 89.4% were diagnosed as benign and 6.9% as malignant while the remaining 3.8% cases were cytologically inconclusive. Intra operatively we found 6.9% cases having features suggestive of malignancy and rest 93% were found to be benign. All cases which were suggestive of malignancy radiologically, cytologically and intra operatively were proved to be malignant on histopathological examination. In addition to that, few benign cases were also proven to be malignant on histopathology which was missed by other investigation methods.

In our study we found that histopathological and intraoperative correlation shows 52.4% sensitivity and 100% specificity with positive predictive value 100% and negative predictive value is 93.2%. Accuracy rate is 93.8%. Histopathological and cytological correlation

shows sensitivity of 42.9% and specificity of 98.5%, positive predictive value is 81.8% and negative predictive value is 91.6%. Accuracy rate is 90.9%. Histopathological and radiological correlation shows sensitivity of 28.6% specificity of 97.8% with positive predictive value 66.7% and negative predictive value 90.1%, accuracy rate 88.8%.

Table 2: Comparison of common neck swellings according to different studies.

Study	Present study	Basista[3]	Tariq et al[4]	El hag et al[5]	Kamal[6]
Location	Mangalore	Rajasthan	Peshawar	Saudi Arabia	Lahore
Year of study	2017	2015	2008	2003	1996
No of patients	160	55	50	225	845
Duration of study (years)	4	112	1	5	1
Most common neck swelling	Thyroid	Thyroid	TB lymphadenitis	Reactive lymphadenitis	TB lymphadenitis
2nd common	Cervical lymphadenitis	Lymph node	Reactive lymphadenitis	TB lymphadenitis	Malignancy
3rd common	Thyroglossal cyst	Salivary gland	Malignancy	Malignancy	Cysts

Out of 160 cases, 136 correlated well clinico-radio-cytopathologically whereas 145 correlated well clinio-radio-cytologically. Nine cases were proven to be malignant in histopathological examination alone.

Of the 160 cases, 21 were proven to be malignant out of which majority i.e. 17 cases were thyroid swellings - 8 were multinodular goitre (MNG), 6 were solitary thyroid nodules, 3 were goitres. One case of goitre was suggestive of malignancy radiologically but later proved benign histopathologically. Two cases of MNG were reported to malignant cytologically and then proven to be benign by HPE. However in case of solitary thyroid nodule, out of the 26 cases 6 were radiologically reported as benign and cytopathologically shown to be malignant.

In case of cervical lymphadenopathy, 3 out of 10 cases turned out to be malignant. Two cases were benign radiologically but proven to be malignant by histopathology whereas one case of cervical lymph-adenopathy which was showed to be benign in both radiological and cytological investigations was finally diagnosed to be malignant by histopathological examination.

Out of 8 cases of parotid swellings included in our study, 3 were found to be malignant. Two cases were benign radiologically and cytologically but finally proven to be malignant by HPE and one case reported as benign radiologically was proven to be malignant by HPE.

One among the 9 cases of thyroglossal cyst was proven to be malignant by histopathology which is a rare presentation.

DISCUSSION

The neck region is divided into anterior and posterior triangles by the sternocleidomastoid muscle. The anterior triangle extends from the inferior border of the mandible to the sternum below, and is bounded by the midline and the sternocleidomastoid muscle. The posterior triangle extends backwards to the anterior border of trapezius and inferiorly to the clavicle. The upper part of anterior triangle is commonly subdivided into the submandibular triangle above the digastric muscle and the submental triangle below.

Various structures of the neck region are located in these triangles and their lesions can be identified by their specific anatomic site but can also be confused with the lymph node swellings which can be found in any of these triangles as well as various swellings of skin and soft tissues. Knowledge of the lymphatic drainage of the head and neck is of utmost importance in this regard. The most important chain of nodes are the jugular nodes (also called cervical), which run adjacent to the internal jugular vein. The other main groups are the submental, submandibular, pre and post-auricular, occipital and posterior triangle nodes. Metastatic spread of squamous cell carcinoma, mostly occurs from tumors of the nasopharynx, tongue base, tonsil, pyriform fossa and supraglottic larynx. When a metastatic lymph node is detected, these five primary sites should be carefully examined and investigated.

In our study the most commonly encountered benign neck swelling was thyroid (73.2%) followed by cervical lymphadenopathy (6.3%), thyroglossal cyst (5.6%), pleomorphic adenoma (5%), submandibular gland (3.1%), branchial cyst (3.1%). The clinio-radio-cyto-pathological discrepancy was highest in cases of thyroid swellings (more in case of solitary thyroid nodule) followed by cervical lymphadenopathy and parotid swelling.

In our study 30% of cases of cervical lymphadenopathy were Tubercular lymphadenopathy. According to a study done by Narang et al in 2005, 43% of the peripheral lymphadenopathy in the developing world is due to

tuberculosis alone.[7] In our study, one out of 10 cases of cervical lymphadenopathy was reported as multiple lymphadenopathy by USG and reactive lymphadenitis on cytology and later proved to be tubercular lymphadenitis on histopathological examination. Two cases were reported as granulomatous lymphadenopathy in cytology and proven to Tubercular lymphadenopathy later on by histopathological examination. Focal epithelioid granulomas may be missed during aspiration. Therefore the pathologist must make multiple passes in various directions so as to avoid false negative result in cytological examination.

Two cases of cervical lymphadenopathy were reported as follicular hyperplasia by FNAC and lymphoproliferative disorder by ultrasound neck, one of which turned out to be Hodgkin's lymphoma and the other non Hodgkin's lymphoma on histopathology. Cytology cannot always differentiate lymphoma from follicular hyperplasia. Therefore excision biopsy should be considered for the primary diagnosis of such masses. Another case diagnosed as Kikuchi's lymphadenitis on histopathological examination was reported as Tubercular lymphadenitis on FNAC and ultrasound neck. Cytological diagnosis of granulomatous lymphadenitis suggestive of tuberculosis was offered on basis of findings of necrotic background, epitheloid histiocytes. Characteristics features like central necrotic debris, peripheral palisading histiocytes, plasmacytoid monocytes and immunoblast suggest Kikuchi's lymphadenitis on cytology.

Two cases of pleomorphic adenoma of parotid gland as per cytology and radiology were diagnosed as mucoepidermoid and basal cell carcinoma respectively on histopathological examination.

One case reported as a follicular neoplasm of thyroid on cytology turned out to be follicular carcinoma on histopathological examination. It is a well known fact that FNAC cannot differentiate a thyroid adenoma from a carcinoma. Two cases of nodular colloid goitre turned out to be follicular adenoma histopathologically. Six cases of MNG reported as multinodular goitre by FNAC and 4 cases of solitary thyroid nodule reported as colloid goitre by FNAC turned out to be papillary carcinoma thyroid on histopathology. This discrepancy could be due to aspiration of material from follicular focus within the nodular goiter. This can be avoided by passing multiple passes from different areas. The procedure (FNAC) may need to be repeated several times to obtain adequate material for cytological analysis.[8]

The differential diagnosis of neck masses is extensive and varies with the age of the patient at presentation. A detailed work-up with proper history and clinical examination helps narrow the diagnostic possibilities, thus obviating the need for unnecessary tests and invasive procedures.

FNAC should be done for all neck masses.[9] It is a safe, accurate and cost-effective test. FNAC does not give the same architectural detail as histopathology but it can provide representative cells from the entire lesion.[10-12] In case of cystic swellings, it is of diagnostic as well as therapeutic importance.[13]

According to a study done by Goutam et al ultrasound had a diagnostic accuracy of 76.0% while CT had a diagnostic accuracy of 94.0%. Ultrasound and CT together had a combined diagnostic accuracy of 94% [14] whereas the accuracy of ultrasound in our study was 88.8%. USG with CT/ MRI was done for 10 cases in our study and the combined diagnostic accuracy was 100%. Ultrasound serves as the first line modality for evaluation of neck swellings especially in young and paediatric patients. CT helps in accurate localization and characterization of benign lesions. In malignant lesions, it is useful for staging and provides essential information about the tumour extent. With the advent of new generation Multi detector CT scanners (MDCT) there have been tremendous improvements in scanning time, tissue resolution and quality of three dimensional (3D) reconstructions.[15]

However in our study we have found that USG in thyroid swellings had a lot of discrepancy from cytology and histopathology so alternate radiological investigation may need to be considered. Ultrasound features are extremely useful in selecting the site within a nodule for fine needle aspirate biopsy (FNAB) in order to improve diagnostic yield, or to select appropriate nodules to aspirate within a multinodular thyroid.[16-18]

According to Lovner et al, the main role of cross-sectional imaging in thyroid neoplasms is not to characterize an intrathyroid lesion, as there are no imaging findings that are histologically specific. The role of the radiologist is to assess the findings related to a thyroid mass which will influence treatment decisions, including invasion through thyroid capsule and infiltration of adjacent tissues and structures of neck and to identify presence of cervical lymph node metastasis.[19]

However thyroid scan does not have much role in differentiating benign and malignant thyroid nodule. Although primary or secondary carcinomas of the thyroid almost invariably appear as non-functioning ('cold') areas on the radionuclide images, most (>90%) 'Cold' lesions are due to benign processes (e.g. thyroiditis, cyst, and adenoma). However, if a 'cold nodule' is found on thyroid scan, further investigation, such as ultrasound and/or fine needle biopsy needs to be considered.[20]

Both CT and MRI have no role in the initial evaluation of a thyroid nodule, and are rarely indicated in the initial workup. However, in case of large substernal goitres which may be compressing nearby structures they are both 100% sensitive for evaluating the extent.[21]

Papillary carcinoma thyroid is the only malignant pathology reliably diagnosed through fine needle aspiration, as features such as 'Orphan Annie' nuclei, nuclear grooves, intra-nuclear inclusions, and psammoma bodies are sufficient for a diagnosis. Medullary carcinoma, anaplastic carcinoma, lymphoma, poorly differentiated carcinoma, and metastatic disease can also be reported based on cytology.[22] As tissue architecture is required to make the diagnosis of malignancy through observation of capsular or angiolymphatic invasion benign and malignant follicular neoplasms and oncocytic (formerly called Hurthle cell) adenomas and carcinomas cannot be distinguished on the basis of cytology alone. Recent advances in the application of molecular markers to FNAB are changing these concepts.[23] If the results of the ultrasound scan and fine needle aspiration cytology (FNAC) are inconclusive, excisional biopsy of the cyst is essential for early diagnosis and management.[24]

Once a clinical or tissue diagnosis has been made, it is possible to determine whether any further tests or imaging are required. No further imaging may be required if the diagnosis is infective or inflammatory, other than a plain chest X-ray. If a neoplastic lesion is diagnosed, computed tomography (CT) scanning, magnetic resonance imaging (MRI) and positron emission tomography (PET) scanning alone or a combination may be required to determine the exact anatomical location, extent and radiological staging of the lesion.[25]

CONCLUSION

Discrepancy in clinico-radio-cytopathological correlation is highest in cases of thyroid swellings (more so in case of solitary thyroid nodule). None of the other pre-operative investigations for neck swellings are 100% specific for differentiating a benign from a malignant lesion in the neck. Radiological investigations should be considered pre operatively for surgical planning with regards to anatomy, the extent of disease and plane of the swelling. All cases suggestive of malignancy intraoperatively turned out to be malignant histo-pathologically. There is a need to counsel the patient well for surgery with regards to this possibility that the lesion on clinical examination could at times turn out to be malignant on histopathological examination.

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