

Original Research Article

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Clinicopathological evaluation of benign neck masses with emphasis on correlation of preoperative ultrasound and cytology with postoperative histopathology in tertiary care hospital

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ABSTRACT

Background: Benign neck mass is a common clinical condition which an ENT clinician routinely encounters. Commonly presenting benign neck masses occur within lymph nodes, thyroid, parotid and other salivary glands. Less common pathologies presenting as neck swellings are from thyroglossal cysts, branchial cleft cysts, carotid body tumors, cystic hygromas, pharyngeal pouch abnormalities and lumps of skin appendages.

Methods: This is prospective observational based study. Duration of study is 1 yr 6 months. All palpable neck masses which are clinically diagnosed as benign were selected.

Results: Study was conducted in Shri Vasantrao Naik Government Medical college, Yavatmal of 123 patients out of which 84 were thyroid swellings, 18 were salivary gland swellings and 21 were other swellings out of which 9 were lymph node swellings. 80.48% were female patients and 19.51% were male patients. Maximum number of patients were between the age group 31-40 years (28.45%) followed by 26.05% in 41-50 years. This is 1yr 6months observational study of epidemiological and clinicopathological spectrum and outcome of management of benign neck masses. This study also determines the histopathological correlation and accuracy of FNAC in the diagnosis of benign neck masses.

Conclusions: We conclude from present study, that fine needle aspiration cytology is a safe, simple and more accurate than USG that can be done in diagnosing wide range of neck swellings. Probably USG guided fine needle aspiration cytology will be better investigation one can ask for. However confirmatory and accurate diagnosis is given by histopathology.

Keywords: Thyroid, FNAC, Benign

INTRODUCTION

Benign neck mass is a common condition routinely encountered. The first goal is to determine if the mass is malignant or benign. Etiologies can be grouped according to whether the onset/duration is acute (e.g., infectious), subacute (e.g., squamous cell carcinoma), or chronic (e.g., thyroid), and further narrowed by patient demographics.¹

While infections cause most of the neck masses in children, most persistent neck masses in adults are neoplasms.²

Due to the availability of high frequency probes role of ultrasonography (USG) in evaluation of neck region is becoming increasingly important, which permit visualization of more anatomical and pathological details.³ High resolution B- mode sonography has

improved in the past few years and has become a very valuable tool in the diagnosis of the disease of the head and neck. Ultrasonography is far more sensitive than palpation because it detects nodules of any size in up to 67% of the general population.⁴

Fine needle aspiration cytology (FNAC) is a simple, quick and cost effective method to sample superficial masses in the neck. This technique is performed in the outpatient clinic. Masses located within the region of head and neck including salivary glands and thyroid masses can be readily diagnosed using this technique.⁵ There is no evidence suggesting that the tumor spreads through the skin track created by the fine hypodermic needle used in this technique.⁶ FNAC is useful in diagnosis of salivary gland tumor where it can differentiate between a benign and malignant tumor with 90% accuracy. FNAC is not substitute for histopathology, especially in determination of nodal architecture in lymphoma, follicular thyroid tumor, intracapsular spread in squamous carcinoma or in the distinction of pleomorphic from monomorphic adenoma.⁷

The purpose of this study is to evaluate the efficacy of USG and FNAC in diagnosis of neck masses.

METHODS

Study design

This is prospective observational based study. Study was carried out from January 2016 till June 2017. Sample size is 123 patients of all age group. Samples were selected attending ENT OPD of our hospital.

Inclusion criteria

All palpable neck masses which are clinically diagnosed as benign.

Exclusion criteria

Following were exclusion criteria of our study:

- Malignant neck masses.
- Acute neck space infections.
- Neck abscess.
- Immunocompromised host.
- Tubercular lymphadenopathy.

All patients clinically diagnosed as benign, attending ENT OPD were selected and checked. These swellings were not hard, not fixed to surrounding structure, not associated with complications like nerve palsy. According to proforma history was taken and clinical examination was done. USG and FNAC was carried on OPD basis. After taking informed consent patients underwent surgical procedure, and histopathological reports were compared with USG and FNAC reports.

Statistical analysis

The statistical data was entered in MS excel 2007 and analysed using SPSS16.0 version. Results on continuous measurements are presented on mean SD (min–max) and results on categorical measurements are presented in number (%). Diagnostic statistics i.e., sensitivity, specificity, and accuracy have been computed to find the correlation of USG and FNAC in diagnosis of benign neck masses.

RESULTS

It was found in present study that 87% of patients were of rural population and 13% of patients belonged to urban population.

Table 1: Age distribution of patients studied.

Age in years	No of patients	Percentage (%)
1-10	9	7.31
11-20	10	8.13
21-30	21	17.07
31-40	35	28.45
41-50	32	26.05
51-60	6	4.87
61-70	6	4.87
71-80	4	3.25

The maximum number of benign neck swelling were in 31-40yrs age group (28.45 %) and minimum were in 71-80 yrs age group which is 3.25%.

Total 123 patients were studied out of which 84 patients were of thyroid swellings, 18 patients were of salivary gland swellings and 21 patients were of other neck swellings. For ease of our study we have categorized the swellings in three categories i.e., thyroid swellings, salivary gland swellings and other neck swellings. Tubercular lymphadenopathy and acute neck space infections is excluded in our study. Thyroid swellings were 35.71% in age group 31-40 yrs and 29% in age group 41-50 yrs. It was found that in present study maximum number of patients of salivary gland swellings were in age group of 41-50 yrs comprising 33.33%. In our study of other neck swellings which includes swelling of chronic cervical lymphadenopathy, thyroglossal cyst, dermoid, lipoma etc, maximum number of patients were in age group of 1-10 yrs.

In gender wise study of our patients it was found that thyroid swellings is more common in females i.e., 90.47%, whereas in salivary gland swellings equal gender distribution was found. Female preponderance was more in other neck swellings which includes cervical lymphadenopathy, thyroglossal cyst, dermoid, lipoma.

In present study of total 123 patients, 80.48% patients were females and 19.51% were males, as most of patients in the present study were of thyroid swellings which are more common in females.

Table 2: Age wise distribution of different neck swellings.

Age in years	No of thyroid swellings	% of thyroid swellings	No. of salivary gland swellings	% of salivary gland swellings	No. of other swellings	% of other swellings
1-10	0	0	1	5.55	8	38.09
11-20	4	4.76	2	11.11	4	19.04
21-30	14	16.66	3	16.66	4	19.04
31-40	30	35.71	3	16.66	2	9.52
41-50	24	28.57	6	33.33	2	9.52
51-60	4	4.76	1	5.55	1	4.76
61-70	5	5.95	1	5.55	0	0
71-80	3	3.57	1	5.55	0	0
Total	84		18		21	

Table 3: Gender wise distribution of patients studied.

Type of swellings	No. of male patients	% of male patients	No. of female patients	% of female patients
Thyroid swelling	8	9.52	76	90.47
Salivary gland swelling	9	50	9	50
Other swelling	7	33.33	14	66.66
Total	24	19.51	99	80.48

Table 4: Clinical diagnosis of 123 patients.

Clinical diagnosis	No. of patients	Percentage (%)
Thyroid swellings		
Colloid goitre	59	47.96
Solitary thyroid nodule	17	13.82
Multinodular goitre	7	5.69
Thyroiditis	1	0.81
Salivary gland swellings		
Chronic sialoadenitis	7	5.69
Pleomorphic adenoma	7	5.69
Ranula	2	1.62
Cystic lesion	1	0.81
Wartins tumour	1	0.81
Other swellings		
Cervical lymphadenopathy	9	7.31
Thyroglossal cyst	4	3.25
Lipoma	3	2.43
Epidermal cyst	2	1.62
Branchial cyst	1	0.81
Dermoid cyst	1	0.81
Sebaceous cyst	1	0.81

On studying clinical symptoms of 123 patients, it was found that 94.30% of patients had complaints of swelling over neck with no other symptoms, 3.25% of patients had complaints of dysphagia, 1.62% patients had complaints of swelling with difficulty in breathing and 0.81% patients had swelling with hoarseness of voice. On studying consistency of neck masses it was found that 111 patients had swelling firm in consistency (90.24%), in 9 patients it was cystic (7.31%), whereas in 3 patients it was soft comprising 2.43%.

In our study of 123 patients 68.28% of benign neck swelling was of thyroid, 14.63% of swelling was of salivary gland and 17.07% were other neck swelling.

It was observed that, out of 84 cases of thyroid maximum number of patients was of colloid goitre i.e., 71%, followed by solitary thyroid nodule 14.28%, multinodular goitre comprising 11.68%, and thyroiditis 2.59%.

Table 5: FNAC and USG efficacy of all swellings.

HPE-> FNAC↓	Benign	Non benign	Total	HPE-> USG↓	Benign	Non benign	Total
Benign	84	4	88	Benign	85	7	92
Non benign	9	26	35	Non benign	10	21	31
	93	30	123		95	28	123

Table 6: Efficacy of FNAC and USG in thyroid swellings.

HPE-> FNAC↓	Benign	Non benign	Total	HPE-> USG↓	Benign	Non benign	Total
Benign	63	1	64	Benign	60	3	63
Non benign	4	16	20	Non benign	7	14	21
	67	17	84		67	17	84

Table 7: FNAC and USG efficacy in salivary gland swellings.

HPE--> FNAC↓	Benign	Non benign	Total	HPE-> USG↓	Benign	Non benign	Total
Benign	10	1	11	Benign	12	2	14
Non benign	2	5	7	Non benign	1	3	4
	12	6	18		13	5	18

Table 8: FNAC and USG efficacy in other neck swellings.

HPE-> FNAC↓	Benign	Non benign	Total	HPE-> USG↓	Benign	Non benign	Total
Benign	11	2	13	Benign	13	2	15
Non benign	3	5	8	Non benign	2	4	6
	14	7	21		15	6	21

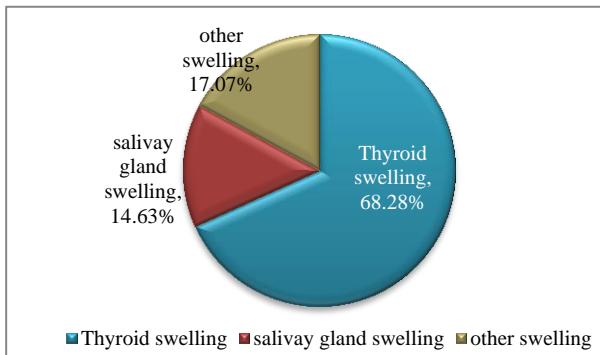


Figure 1: Types of benign neck masses.

In patients with salivary gland swellings 38.88% patients were of chronic sialadenitis and pleomorphic adenoma, 11.11% patients were of Ranula, 5.55% patients of Wartins tumour, and 5.55% patients of cystic lesion in parotid gland.

Out of 21 patients of other neck swellings 42.85% were cervical lymphadenopathy, 14.28% of lipoma, 19.04% of thyroglossal cyst, 9.52% of epidermal cyst and 1 each patient of dermoid cyst, branchial cyst, sebaceous cyst i.e., 4.76%.

On observing anatomical site of swelling, maximum number of the swellings were in midline i.e., 44.71%. In 16.26% patients the swelling was upper lateral, in 15.44% patients the swelling was midlateral, in 13.82% patients swelling was lower lateral, in 5.69% patients the swelling was submandibular, in 2.43% patients swelling was submental, and in posterior triangle it was 1.62%.

Correlation of usg and fnac reports of all swellings with hpe

Comparision of sonography report of all swellings with that of hpe

- Similar to HPE reports- 77.23%.
- Not similar to HPE reports- 18.69%.
- Inconclusive reports- 4.06%.

Comparision of fnac report of total swellings with that of hpe

- Similar to HPE reports- 85.36%.
- Not similar to HPE reports- 13%.
- Inconclusive reports- 1.62%.

Difference in findings of FNAC and HPE in our study may be due to differences in the method of aspiration of the neck lump. In our study, blind FNAC was performed by different technicians without ultrasound guidance.

Table 5 shows,

- Sensitivity of FNAC of all swellings, $\{TP/(TP+FN) \times 100 = (84/93) \times 100\} = 90.32\%$.
- Specificity of FNAC of all swellings, $\{TN/(TN+FP) \times 100 = (26/30) \times 100\} = 86.66\%$.
- Diagnostic accuracy of FNAC of all swellings, $\{TN+TP/TOTAL \times 100\} = (84+26)/123 \times 100 = 89.43\%$.
- Sensitivity of USG in all swellings, $\{TP/(TP+FN) \times 100 = 85/95 \times 100\} = 89.47\%$.
- Specificity of USG in all swellings, $\{TN/(TN+FP) \times 100 = 21/28 \times 100\} = 75\%$.
- Diagnostic accuracy of USG in all swellings, $\{TN+TP/TOTAL \times 100\} = (85+21)/123 \times 100 = 86.84\%$.

Table 6 shows,

- Sensitivity of FNAC in thyroid swellings, $\{TP/(TP+FN) \times 100 = (63/67) \times 100\} = 93.44\%$.
- Specificity of FNAC in thyroid swellings, $\{TN/(TN+FP) \times 100 = (16/17) \times 100\} = 94.11\%$.
- Diagnostic accuracy of FNAC in thyroid swellings, $\{TN+TP/TOTAL \times 100\} = (63+16)/84 \times 100 = 94.04\%$.
- Sensitivity of USG in thyroid swellings, $\{TP/(TP+FN) \times 100 = 60/79 \times 100\} = 89\%$.
- Specificity of USG in thyroid swellings, $\{TN/(TN+FP) \times 100 = 4/5 \times 100\} = 80\%$.
- Diagnostic Accuracy of USG in thyroid swellings, $\{TN+TP/TOTAL \times 100\} = (60+14)/84 \times 100 = 76.19\%$.

Table 7 shows,

- Sensitivity of FNAC in salivary gland swellings, $\{TP/(TP+FN) \times 100 = 10/12 \times 100\} = 82\%$.
- Specificity of FNAC in salivary gland swellings, $\{TN/(TN+FP) \times 100 = 5/6 \times 100\} = 83.33\%$.
- Diagnostic accuracy of FNAC in salivary gland swellings, $\{TN+TP/TOTAL \times 100\} = (10+5)/18 \times 100 = 83\%$.
- Sensitivity of USG in salivary gland swellings, $\{TP/(TP+FN) \times 100 = 12/13 \times 100\} = 92.30\%$.
- Specificity of USG in salivary gland swellings, $\{TN/(TN+FP) \times 100 = 3/5 \times 100\} = 85.7\%$.
- Diagnostic accuracy of USG in salivary gland swellings, $\{TN+TP/TOTAL \times 100\} = (12+3)/18 \times 100 = 83.33\%$.

Table 8 shows,

- Sensitivity of FNAC in other neck swellings, $\{TP/(TP+FN) \times 100 = 11/14 \times 100\} = 78.57\%$.

- Specificity of FNAC in other neck swellings, $\{TN/(TN+FP) \times 100 = 5/7 \times 100\} = 71.42\%$.
- Diagnostic accuracy of FNAC in other neck swellings, $\{TN+TP/TOTAL \times 100 = (11+5)/21 \times 100\} = 76.19\%$.
- Sensitivity of USG in other neck swellings, $\{TP/(TP+FN) \times 100 = 13/15 \times 100\} = 87.50\%$.
- Specificity of USG in other neck swellings = 75%.
- Diagnostic accuracy of USG in other neck swellings, $\{TN+TP/TOTAL \times 100\} = (13+4)/21 \times 100 = 83.33\%$.

DISCUSSION

The present study was carried out at the department of ENT, from January 2016 to June 2017. Out of 123 cases clinically evaluated, 84 were thyroid swellings, 18 were salivary gland swellings and 21 were other swellings out of which 9 were lymph node swellings. 80.48% were female patients and 19.51% were male patients. Maximum number of patients was between the age group 31-40 years (28.45%) followed by 26.05% in 41-50 years. Maximum no. of patients presented with complaints of swelling over neck with no other symptoms (94.30%), swelling was in midline neck (44.71%), firm (90.24%). Thyroid swelling aspiration was carried on in 84 cases, which was the commonest swelling in our study. Out of 84 thyroid cases, cytology reports of 65 patients were similar to HPE report. 19 were not similar to HPE.

Ultrasound in diagnosis of neck masses

The role of USG in evaluation of neck region is becoming increasingly important due to the availability of high frequency (7.5 to 15 MHZ) probes, which permit visualization of more subtle anatomical and pathological details.⁸ The patient's age, the location, size and duration of mass are important pieces of information in the diagnosis of the neck masses. High resolution B-mode sonography has improved in the past few years and has become a very valuable tool in the diagnosis of the disease of the head and neck.

In study of Thapa et al of hundred patients (70 female and 30 male) showed USG scanning was 100% sensitive and 91% specific for the diagnosis of benign thyroid nodules with positive predictive value (PPV) of 97% and negative predictive value (NPV) of 100% ($p=0.0$).⁹ For the diagnosis of the malignant thyroid nodule USG is 91% sensitive and 100% specific with PPV of 100 percent and NPV of 97% ($p=0.0$). Similarly, the USG diagnosis was 100 percent sensitive and 81% specific for malignant lymphnode with PPV of 81% and NPV of 100% ($p=0.0003$).

Solbiati et al reported peripheral and egg shell calcification were more common and reliable features of benign nodule and microcalcification for malignant nodule.¹⁰ In the study 47% of benign nodules, 9% shows coarse calcification, 27% of malignant nodules show

microcalcification, and 2 percent shows eggshell calcification.

In study of Sardar et al of 73 subjects the sonographic consistency of neck masses shows 65.8% solid masses, 15.1% cystic masses and 19.2% are mixed consistency. Comparison of diagnostic accuracy of ultrasonography with FNAC revealed that in infective neck masses diagnostic accuracy is 27.4% on sonography as compared to 24.7% on FNAC. Cystic neck mass diagnostic accuracy was 19.2% on both FNAC as well as sonography. The diagnostic accuracy in benign neck masses showed 26.0% on FNAC and 37.0% on sonography. The sensitivity of USG was 100% and specificity was 85.2%.¹¹

In present study of 123 patients in a tertiary care hospital, sonographic consistency showed 57.72% swelling were solid, 39.83% swelling were mixed and 2.43% swelling were purely cystic. 112 patients out of 23 patients presented with single swelling, maximum swellings were isoechoic 52.03%, 102 swellings had well defined margins and 31.70% swelling had coarse calcification. Micro calcification was not seen in any thyroid swelling.

The sensitivity of ultrasound for all swellings was 89.47%, specificity 75% and diagnostic accuracy 86.84%. 85 swellings which were clinically palpable as benign were benign on histopathology, whereas 7 swellings which were benign on ultrasound turned out to be malignant on histopathology. Follow up of all patients was taken post operatively on 1st month, 3rd month and 6th month. One patient of ranula showed recurrence at 6th month.

On studying ultrasonographic features in present study of 123 patients it was found that, the masses were solitary in 112 patients (90.36%) whereas in 11 patients (9.64%) it were multiple. The masses were purely cystic in 3 patients (2.43%), mixed solid &cystic in 49 patients (39.83%) and solid in 71 patients (57.72%). The masses were hyperechoic in 32 patients (26.01%), isoechoic in 64 patients (52.03%), and hypoechoic in 27 patients (21.95%). The margins were well defined in 102 patients (82.92%), and poorly defined in 21 patients (17.07%). It was found that 3 patients (2.43%) had eggshell calcification, 39 patients (31.70%) had coarse whereas 81 patients (65.85%) had no calcification.

On comparing the efficacy of USG of present study with other studies it was found that in present study that the sensitivity of USG is 89.47% with specificity of 75%. In study of Sardar et al conducted in 2009 sensitivity of USG was 100% with specificity of 85.2%.²⁵ In study of Thapa conducted in 2008, sensitivity of USG was 100% with specificity of 91%.³ In study of Solbiati et al conducted in 1992, sensitivity of USG was 36% with specificity of 91%.¹⁰

Our study evaluated 123 patients we found that overall sensitivity of FNAC in the diagnosis of neck masses to be 90.32% and specificity to be 86.66%. 84 swellings which were benign on fine needle aspiration cytology were benign on histopathology. 4 swellings which were diagnosed as benign turned out malignant on histopathology. FNAC cannot differentiate between follicular adenoma and follicular carcinoma of thyroid. 2 swellings were diagnosed as follicular adenoma were follicular carcinoma on histopathology. The sensitivity of FNAC for thyroid swellings in my study is 93.44%, specificity is 94.11% and diagnostic accuracy is 94.04%.

Study done by Pradeep et al of 100 patients, maximum no. of patients were thyroid swellings followed by lymph node swellings.¹² 60% of patients were females. 43% of patients presented with midline neck swelling. The sensitivity of FNAC was 71.43%, specificity was 98.85% with diagnostic accuracy for neck swelling 96%. The sensitivity of FNAC for thyroid swelling was 75% specificity was 97.29% and accuracy was 97.5%.

Study by Soni et al had sensitivity of 83.01% and specificity of 78.94%.¹³ Out of the 59 patients, 28 were of neck nodes, 14 were thyroid, 13 were of salivary gland masses and 4 were other types of neck masses, while in our study out of 123 cases thyroid swellings were commonest i.e., 84, salivary gland swellings were 18 and other swellings including cervical lymphadenopathy were 21.

A retrospective study was conducted between February 2004 to August 2005 by Chauhan et al, fine needle aspiration diagnosis was correlated with detail of relevant clinical findings and investigations.¹⁴ Patients between the ages of 1 to 80 years were taken into the study. A total of 100 patients with a head and neck swelling underwent FNAC. Out of 100 fine needle aspiration procedures, 51% were of lymph node, 20% were thyroid, 15% from salivary gland, 08% from soft tissue and 06% were miscellaneous swellings, while in our study out of 123 neck swellings, thyroid swellings were 68.28%, 7.31%, were lymph nodes (excluding those lymphnode swellings occurring during acute neck infections, tubercular lymphadenopathy and metastatic lymphnodes; as per exclusion criteria of my study) 14.63% were salivary gland swellings and other swellings were 9.75%. Howlett et al studied a total of 276 patients and found FNAC of neck nodes to have a sensitivity of 89% and a specificity of 57% while in our study sensitivity is 93.44% and specificity is 94.11%, for thyroid masses, and for salivary glands, the sensitivity was 64% and specificity was 100% while in our study the sensitivity of FNAC for salivary gland swelling is 82% and specificity is 83.33%.¹⁵

Tilak et al studied 550 patients and found the overall sensitivity of FNAC for neck masses to be 90.91% which is almost similar that our study and specificity to be 93.18% which is lesser than our study which is 86.66%.¹⁶

Difference in the specificity between our study and others may be due to differences in the method of aspiration of the neck lump. In our study, blind FNAC was performed by different technicians without ultrasound guidance.

In Howlett et al study, ultrasound guided FNAC was used in 50% of the thyroid group and a few parotid patients.¹⁵ The differences might also be explained by differences in the patient population. In India, most patients are illiterate and unaware of their health problems until they are at an advanced stage. The majority of patients present with a huge neck mass which is obvious and easy for the cytopathologist to locate with FNAC without the use of ultrasound guidance. In addition, in such large lesions there may well be a sampling error within the mass itself with different regions of the mass having different grades of pathology.

On comparing FNAC results of present study with other studies it was that in present study that the sensitivity of FNAC is 90.32% with specificity of 86.66%. In study of Kumarsingh et al, conducted in 2012-13 sensitivity of FNAC was 71.43%, with specificity of 98.85%.¹² In study of Razmpa et al conducted in 2000 sensitivity of FNAC was 92.3% with specificity of 88.1%.²⁶ In study of Abdulqadir et al conducted in 2003 sensitivity of FNAC was 90% with specificity of 100%.²¹

CONCLUSION

In our study, 123 patients were studied and it was observed that most of benign swellings of neck were arising from thyroid gland, common in females (Ratio 9:1) in age group of 31-40 yrs. USG and fine needle aspiration cytology offers a simple method of diagnosis of neoplastic and non neoplastic lesions in the neck.

In our study, accuracy of FNAC (89.43%) is more as compared to USG (86.84%). Fine needle aspiration cytology of neck masses with clinical correlation and ultrasonography provide most useful information to surgeon to determine the further mode of management.

Hence we conclude from present study, that fine needle aspiration cytology is a safe, simple and more accurate than USG that can be done in diagnosing wide range of neck swellings. Probably USG guided fine needle aspiration cytology will be better investigation one can ask for. However confirmatory and accurate diagnosis is given by histopathology.

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