ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 03 | March - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

SONOLOGICAL EVALUATION OF NECK MASSES

Radiodiagnosis

Dr. ShailyPanwar MD Assitant Professor, Department of Radio Diagnosis, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh

Dr. Km. Saraswati* MD Senior Resident, Department of Radio Diagnosis, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh.*Corresponding Author

ABSTRACT

Introduction: A neck mass in an adult patient is a frequently encountered entity in clinical practice. The present study was undertaken to evaluate the role of High-resolution ultrasonography imaging in evaluating neck masses. **Material and methods:** This study was conducted in the Department of Radio diagnosis in co-ordination with the Departments of Surgery and Pathology at maharani Laxmi bai medical college, Jhansi (U.P). A total of 125 patients with palpable neck masses were included in our study. **Observation & Results:** Of the 125 cases included in the study, 65 (52 %) masses were thyroid origin and 60 cases(48 %) were non thyroid in origin. Out of 60 non thyroid masses ,41 (68.3%) was benign and 19 (31.6%) were malignant. Out of 65 thyroidal masses 56 were benign (86.15%)& 9 (13.8%) were malignant. In total, 125 cases 97(77.6 %) had benign lesions and 28 (22.4%) cases had malignant lesions. **Conclusion:** Grey scale High resolution sonography and color doppler is a useful modality for diagnostic evaluation of neck masses in every age group. It is simple, non-invasive and inexpensive diagnostic tool.It can provide information regarding benign or malignant nature of lesions.

KEYWORDS

Ultrasonography, Neck Masses, FNAC

INTRODUCTION

A neck mass is a frequently encountered entity in clinical practice. Neck masses are any swellings or enlargements of the structures in the area between the inferior border of mandible and clavicle.[1]Because of its complex anatomy and physiology, neck diseases manifesting as neck swelling can vary from etiological, pathological and prognostic points of view. Despite a vast array of etiology, the most common neck masses are congenital lesions, lymphadenopathy and neoplasia, both benign and malignant[2]

Ultrasound is a useful screening modality because of the lack of ionizing radiation and is non-invasive. It is easilytolerated by patients especially children's and is inexpensive.[3]

USG can define the location, size and extent of the mass, relation to surrounding normal structures and the internal characteristics of the mass.[1] It can differentiates whether the mass is cystic or solid. It may alert us of the probabilities of malignant versus benign nature of neck swelling.

The advent of color doppler sonography has added a new dimension to diagnostic sonography. It can be extremely valuable in demonstrating the vascular nature of the neck masses.[2]

On the basis of sonographic finding, selection of additional imaging modalities including CT and MR imaging can be done more judiciously.[4]

AIM

The aim of this study was to assess the role of ultrasonography in the diagnosis of neck masses and to correlate it with clinical diagnosis along with confirmation of USG diagnosis and histopathology.

MATERIALAND METHODS

The study included 125 cases of neck swelling attended various out patient department of MLB medical college Jhansi & refer to department of radiodiagnosis of same institute where they underwent high resolution ultrasound.

This is an observational prospective study and was conducted from JAN 2010 to SEP 2011 over period of 18 month.

Inclusion criteria:

Patients who presented with a clinically palpable neck mass and underwent Ultrasonography and FNAC.

Exclusion criteria:

- Post-operative patients.
- Patients with contraindications to intravenous administration to contrast medium.
- Pregnant females

Technique:

After taking detailed history, local and general physical examination was performed to asses size, point of tenderness, site of swelling, movement with deglutination, movement with protrusion of tongue, pulsating or non-pulsating mass.

The ultrasound examination was done with high resolution linear probe (5-12MHZ). A systemic examination protocol was followed. The patient is examined in full extension of neck in supine position with small pad placed under shoulder. Grey scale and colour doppler USG were performed and diagnosis were correlated with clinical and pathological diagnosis obtained by FNAC or biopsy.

Equipment's:

- Real time USG MACHINE X8 with colour doppler and sonographic thermal printer.
- Medison SA 8000 SE machine with colour doppler and sonographic printer.
- 8-22 G FNAC needle with 10-20 ml syringe.

RESULT

Table1: Distribution of cases according to thyroidal and non-thyroidal pathologies (N=125)

S.n	Distribution	Cases no.	Percentage
1.	Thyroidal	65	52
2.	Non-thyroidal	60	48
	total	125	100

Above table shows that out of 125 patients majority belongs to thyroidal group 65(52%) and rest were taken up to non-thyroidal pathologies 60(48%), So among neck lumps most common cause were due to thyroid.

Table 2: Age group distribution

S. n	Age group	Cases no.	Percentage
1.	5-20	10	8.0
2.	21-35	42	33.6
3.	36-50	47	37.6
4.	51-65	20	16.0
5.	66-80	6	4.8

Above table shows age group distribution ranging between age group 5-80 years having 15 years interval distribution. Out of 125 patient maximum belongs to age group 36-50yr,47(37.6%) and second highest to 21-35yrs,42(33.6%), So neck masses were the disease of middle age group, usually 3rd,4rth,5th decade.

Table 3: Sex group distribution

Group	Sex	No. of cases	Percentage
Thyroid n1=60	Male	15	23
	Female	50	77
Non thyroid n2=65	Male	33	55
	Female	27	45

This table showed,50/65 (77%) females and15/65 (23%) males were affected in thyroid pathologies while among non-thyroid pathologies 33/60 (55%) males & 27/60(45%) females.

Table 4: Distribution of thyroidal disease (n1=65)

S. n	Disease				
				No.	%
1.	Benign	Nodular	solitary	19	29.0
			multinodular	23	35.0
		Diffuse	thyroiditis	14	21.5
2.	Malignant			9	14.8
	Total			65	100

The above table shows that among thyroid group majority cases were of multinodular goiter 23/65 (35%), then solitary adenoma 19/65 (29%), thyroiditis 14/65(29.5%) and least were malignant 9/65 (14.8%).

Table 5: Distribution of non-thyroidal disease (n2=60)

S. n	Final diagnosis	No.of cases	%
1.	Nodal masses	34	56.7
2.	Non-Nodal masses		
a.	Salivary gland lesions	5	8.4
b.	Masses of Developmental origin	6	10
c.	Masses of neurogenic origin	2	3.5
d.	Masses of vascular origin	4	6.6
e.	Masses of mesenchymal origin	4	6.6
f.	Masses of skeletal origin	1	1.6
g.	Masses of pharyngeal/laryngeal origin	4	6.6
	Total	60	100

Nodal masses constituted approximately 56.7% which included metastasis 4 (1.7%), lymphomas 4 (11.7%), tubercular 24 (70%),reactive adenopathy 2 (5.8%). Non nodal masses constituted approximately 26(43.3) % and included salivary gland lesions (8.4%), masses of developmental origin (10%), masses of neurogenic (3.5%), vascular (6.6%), mesenchymal origin (6.6%), Skeletal masses (1.6%) and masses of pharyngeal/laryngeal origin (6.6%).

Table 6: Benign vs Malignant lesions

Final diagnosis	Thyroidal masses		Non-thyroidal masses		Total	
	NO.	%	NO.	%	NO.	%
Benign	56	86.1	41	68.3	97	77.6
Malignant	9	13.8	19	31.6	28	22.4
Total	65		60		125	

Out of 65 thyroidal masses 56 was benign (86.1%) &9 were malignant (13.8%). Out of 60 non thyroidal masses 41 were benign (68.3%) & 19 cases were malignant (31.6%). In total 125, 97 cases (77.6%) had benign lesions and 28 (22.4%) cases had malignant lesions (table-2).

DISCUSSION

It is important to have a focused approach when evaluating a patient with a neck mass. As in all medical problems, the first steps are a detailed history and a comprehensive examination of the entire head and neck region and the rest of the body. The patient's age, when the mass was first noticed, the duration and characteristics of the symptoms, the physical characteristics and growth pattern, and a review of other organ systems should be recorded. Depending on the differential diagnosis, further evaluation may include laboratory and/or radiologic studies.

125 patients with clinically palpable neck masses were evaluated using Ultrasonography the masses were characterized based on location and sonographical appearance into thyroidal and non-thyroidal, non-thyroidal pathologies were further divided into masses of nodal and non-nodal origin.

Age of the patients included in the present study ranged from 05-80 years. Maximum numbers of patients were in the age group 36-50 years (47%).

The thyroidal pathologies showed female predominance where as non-thyroidal showed male predominance (Table 2,3).
Out of 125 cases studied 77.6% were benign in nature however 22.4% were malignant (table 6).

Thyroidal Masses:

In our study majority cases were considered originating from the thyroid gland i.e., 65 (52%) out of 125 cases of neck masses, **Thapa nb[1]et al** also reported in their study that thyroidal masses (63%) are most common cause of neck swelling.[1]

Majority (77%) patients were females in the age group 31-50 years in our study which corresponds to study done by **Rojeski M T et al[5]** who found women being more frequently affected by nodular thyroid disease.

Out of thyroidal pathologies, majority were benign in nature i.e., 85.5 % including 35% multinodular colloid goitre,29 % solitary thyroid nodules &21.5% thyroiditis which is corresponds to **Henneman et al[6]** found in their study 80 % of nodular thyroid disease is benign.14.8% was proven to be malignant (papillary, follicular carcinoma) on FNAC.

The US features such as marked hypo-echogenicity, poorly defined margins, absent or thick irregular halo, microcalcifications, and a taller-than-wide shape are found to be good predictors of malignancy. The features such as hyper-echogenicity or cystic character, well-defined margins, well-defined thin peripheral halo, wider than tall shape& macrocalcifications or peripheral eggshell calcificationsare commonly seen in benign nodules and are good predictors of benign nature of a nodule.[1]

Non-thyroidal masses

60 out of 125 (48%) cases was of non-thyroidal origin and majority of them were nodal masses.

Nodal masses: Nodal masses were the most common masses encountered and constituted 48.3% of the total non- thyroidal masses.
In our study, most common cause of cervical lymphadenopathy was tubercular70.5 % than neoplastic 13.4% (metastasis 11.7 & lymphoma 1.7%) than reactive 5.8%. All feature wasaccordance with those described by **Ying M., Ahuja A[7,8,9]**

Tubercular: 24 out of 34 (70.5%) cases of cervical lymphadenopathy was diagnosed as tubercular adenopathy. USG showed absent hilum, unsharp nodal border, hypoechoic echotexture, intranodal necrosis, had matting with central vascularity with displaced hila.

Metastasis: 4 out of 34 cases (11.7%) were diagnosed as metastatic due to primary thyroid malignancy and they were round, hypoechoic with loss of central echogenic hilum, had sharp borders, and had central necrosis or intranodal calcification with presence peripheral vascularity.

Reactive: 2 out of 34 (5.8%) cases were diagnosed as reactive. On USG they were oval in shape, hypoechoic with presence of central echogenic hilum, had unsharp borders, had no nodal calcification or ancillary features like necrosis or matting. On colour doppler US, a lymph node was considered reactive if central vascularity was maintained.

Lymphoma:4 out of 34 (1.7%) cases were diagnosed as Hodgkin lymphoma they were round in shape with absent hilum, sharp nodal borders, hypoechoic echotexture with intranodal reticulation, absence of ancillary features and mixed vascularity.

Non nodal masses

Masses of salivary gland origin: 5 cases (13.3%) of salivary gland pathology were observed in the present study which comprised of 3 tumors (2 benign,1maligant),2 infections.

2 of these were benign and diagnosed as pleomorphic adenomas. **Yousem et al[10]**observed that nearly 80% of benign parotid neoplasms are pleomorphic adenomas. On ultrasonography pleomorphic adenoma appear as well define, homogenous, regular sometime lobulated shape, with poor vascularity **(Dumitriu D et al).[11]**

Only 1 malignant salivary gland tumor was diagnosed in our studyi.e., mucoepidermoid carcinoma involving the right parotid gland. On ultrasound it appeared as a large ill defined, heterogeneous, predominantly hypoechoic lesion with moderate vascularity.

2 cases were diagnosed to be infectious diseases involving the parotid gland. Among that 1 case was pyogenic parotid abscess. On USG the parotid gland was bulky with heterogenous echotextures and showing multiple pockets of collection.1 case showed multiple abscesses in the parotid gland on imaging and was proven to be tuberculosis involving the parotid gland on cytological examination and staining for acid fast bacilli was positive. Patient was given anti tubercular therapy and responded with decreased lesion size. Alex L et al[12]described parotid tuberculosis as a rare lesion with non specific imaging findings.

Masses of developmental origin: In our study 6 cases were diagnosed as masses of developmental origin which included thyroglossal cyst (5 cases) and cystic hygroma (1 cases).

Thyroglossal duct cysts are the most common congenital cyst in the head and neck. They arise from a remnant of the thyroglossal duct. It can be found at any level from the base of the tongue to the isthmus of the thyroid gland in midline or just off midline in position. Most are infrahyoid. On USG they appear as a well-defined, thin-walled, anechoic lesion with posterior acoustic enhancement.[14]

Cystic hygromas are congenital malformations resulting from blockage of lymphatic channels. usually present at birth but can see before the age of two years. They are situated posterior to the sternocleidomastoid muscle in the posterior triangle. On USG an anechoic or mixed echogenicity mass with septae of variable thickness will be identified. Additionally, they can have increased vascularity seen with in internal septa when doppler applied.[15]

Masses of neurogenic origin: 2 cases were diagnosed as Neurofibromas. Neurofibroma are benign neurogenic tumors which arise from nerve sheaths; they can be sporadic but are frequently seen with hereditary disease neurofibromatosis type one. [16,17]On USG they were well-defined hypoechoic fusiform masses with internal low-level and homogeneous echoes showing split-fat sign (hyperechoic fat around the entering/exiting nerve) and had targeted appearance (echogenic fibro-collagenous center and surrounding hypoechoic myxoid area). Finding was corresponding to **Jon A. Jacobson David P. Fessell[18]study.** Usually, Schwannomas has Similar appearance on USG, except there heterogenicity due to cyst formation.[18]

Vascular origin:2 out of 4 cases of vascular masses were hemangioma appears well-defined hypoechoic lesion with heterogeneous echotexture and the presence of cystic and sinusoidal spaces within, as well as the occasional presence of phleboliths. Color Doppler imaging demonstrated flow inside the lesion.Finding was corresponding to **W T Yanget al [19]**study

2 out of 4 masses of vascular origin were internal juglar Venous aneurysms. Venous aneurysm has been reported in several anatomic locations in the neck, the commonest site being the internal jugular vein.[20,21]

Masses of mesenchymal origin: 4 cases were found to lipoma and they were well-defined, compressible, elliptical masses with the longest diameter parallel to the skin surface. All contained multiple echogenic lines parallel to the skin surface with no evidence of posterior enhancement or attenuation and no flow on color Doppler sonography. Compared with adjacent muscle, majority of them were hyperechoic and few of them were isoechoic, and hypoechoic. Same finding was described by A T Ahuja[22]study.

Masses of skeletal muscle origin:1 case was diagnosedas Rhabdomyosarcoma. Rhabdomyosarcoma is the commonest form of soft tissue sarcoma encountered within the pediatricpopulation however, the soft tissues of the neck are the least likely location for the primary lesion. Cervical lymph nodes may become involved in presence primary ocular rhabdomyosarcoma. The mass lesion was solid on US with internal inhomogeneity and increased vascularity on doppler which corresponds to findings of **Ruth Elizabeth Brown**[3]study.

Masses of pharyngeal/laryngeal origin: 4 cases were found to be laryngeal carcinoma involving hypopharynx which were corelated with CT and confirmed by biopsy. Ultrasound can identify the majority of laryngeal tumor's and detect extra laryngeal spread.[23]

CONCLUSION

Based on our results and review of literature, the following can be drawn:

High resolution sonography and colour Doppler is a useful modality for diagnostic evaluation of neck masses in every age group. It is simple, non-invasive and inexpensive diagnostic tool. It provides accurate and reproducible results. In many clinical conditions it can be used as first linemodality for evaluating cervical soft tissue masses especially in young and paediatric populations.

On the basis of sonographic finding, selection of additional imaging modalities including CT and MR imaging can be done more judiciously for accurate anatomical localization, extent and characterization of lesions.

REFERENCES

1. Thapa nb et al Ultrasound in the Diagnosis of neck masses journal of Nepal health research council vol.4 no.1 april.
2. Ultasonography and CT Evaluation of Neck Masses Ajay K Goutam**1**, Avadhesh P S Kushwah**2**, Sonjjay Pande**3** International Journal of Contemporary Medical ResearchVolume 4 | Issue 6 | June 2017 | ICV (2015): 77.83 | ISSN (Online): 2393-915X; (Print): 2454-7379.
3. Diagnostic imaging of benign and malignant neck masses in children—a pictorial review ,Ruth Elizabeth Brown, Srikrishna Harave department of Radiology, Alder Hey Children's Hospital, Liverpool, UK Quant Imaging Med Surg 2016;6(5):591-604
4. Dietmar Kuischwitz ,Norvert Gitzman et al : ultrasound of neck , RCNA 2000;38:1029-43.
5. Rojeske MT et al ; nodular thyroid disease:N Engl J Med 1985;313:428-36
6. Hennemann G. et al :Nox toxic goiter. Cli Endocrinal Metab1979;8:167-79
7. Ying M., Ahuja A. Sonography of neck lymph nodes: Part I: Normal lymph nodes. Clin Radiol. 2003;58:351–358.
8. Ahuja A., Ying M. Sonography of neck lymph nodes: Part II: abnormal lymph nodes. Clin Radiol. 2003;58(5):359–366.
9. Ahuja A.T., Ying M. Sonographic evaluation of cervical lymph nodes. Am J Radiol. 2005;184(5):1691–1699.
10. Yousem DM, Kraut MA, Chalian AA. Major Salivary Gland Imaging. Radiology. 2000;216:19-29.
11. Dumitriu D, Dudea SM, Botar-jid C. Ultrasonographic and sonoelastographic features of pleomorphic adenoma of salivary gland. 2010;12:175-83.
12. Alex L, Balakrishnan M, Ittyavirah AK. Tuberculosis of parotid gland - a case report. Indian J Radiol Imaging. 2006;16:689-90.
13. Ahuja AT, Wong KT, King AD, Yuen EH. Imaging for thyroglossal duct cyst: the bare essentials. Clin Radiol2005;60:141-8.
14. Blandino A, Salvi L, Scribano E, Chirico G, Longo M, Pandolfo I. MR findings in thyroglossal duct cysts: report of two cases. Eur J Radiol1990;11:207-11.
15. Kraus J, Plzák J, Bruschini R, Renne G, Andrle J, Ansarin M, et al. Cystic lymphangioma of the neck in adults: a report of three cases. Wien KlinWochenschr2008;120:242-5.
16. Mittal MK, Malik A, Sureka B, Thukral BB. Cystic masses of neck: A pictorial review. Indian J Radiol Imaging 2012;22:334-43.
17. Fortman BJ, Kuszyk BS, Urban BA, Fishman EK. Neurofibromatosis type 1: a diagnostic mimicker at CT. Radiographics2001;21:601-12.
18. Jon A. Jacobson David P. Fessell Soft Tissue MassesRadiologyKey July 27,2016.
19. Hemangioma. : Ultrasound Med1997 Jan;16(1):39-44.doi: 10.7863/jum.1997.16.1. 39 sonographic features of head and neck hemangiomas and vascular malformations: review of 23 patientsW T Yang 1, A Ahuja, C Metreweli PMID; 8979225DOI: 10.7863/jum.1997.16.1.39
20. R. A. McCready, M. A. Bryant, J. L. Divelbiss, and B. A. Chess, "Subclavian venous aneurysm: case report and review of the literature," Journal of vascular Surgery, vol. 45, no. 5, pp. 1080–1082, 2007.
21. Y. L. Hwa, M. Y. Seung, I. S. Song, H. Yu, and B. L. Jong, "Sonographic diagnosis of a saccular aneurysm of the internal jugular vein," Journal of Clinical Ultrasound, vol. 35, no. 2, pp. 94–96, 2007.
22. Head and neck lipomas: sonographic appearanceA T Ahuja 1, A D King, J Kew, W King, C Metreweli AJNR Am J Neuroradiol 1998 Mar;19(3):505-8PMID: 9541308.
23. Ultrasound imaging in laryngeal cancer: A preliminary studyAuthor links open overlay panel E.J.LovedayaN.R.Bleach*C.A VanHasselt C.Metrewelia Clinical Radiology Volume 49, Issue 10, October 1994, Pages 676-682