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Original article:

Study of role of ultrasonography and Doppler in evaluation of neck masses

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Abstract:

Background: Neck masses are a common cause of diagnostic dilemma to clinicians. The differential diagnosis of swelling in the neck is broad and extensive and includes both malignant and benign aetiologies. ,Sonography is the initial imaging modality after clinical examination for evaluation of neck masses. It is widely available and easily tolerated by the patients . The advent of color doppler sonography has added a new dimension to diagnostic accuracy. It can be extremely valuable in demonstrating the vascular nature of the neck masses.

Methodology: Hospital based Cross sectional study, Study setting - Radiology Department of tertiary care centre. All the patient with the complaints of neck swelling referred to the radiology department of medical college where the study was conducted.

Results: Out of 100 patients with neck lesion maximum patients were found amongst the age group of <30 with 31 (31 %) no. of cases. 26 (26 %) cases were found amongst age group 41 to 50. Number of patients found in age group 31 to 40 were 23 (23 %), 51 to 60 were 13 (13 %) and >60 were 7 (7 %). maximum no. of cases 58 (58 %) were Females and rest were Males 42 (42 %). maximum 49 (49 %) cases showed thyroid lesions. Parathyroid lesion were found in 2 (2 %), Lymph node lesion in 24 (24 %), Parotid in 4 (4 %), submandibular space in 12(12%), Interfacial plane of neck in 1 (1 %), Suprasternal location in 1 (1 %), Floor of mouth in 1 (1 %), Supraclavicular in 1(1 %), Carotid space in 2 (2 %), Midline neck within strap muscle in 1 (1 %), Visceral Space in 1 (1 %),

Conclusions: Ultrasonography is a useful modality for diagnostic evaluation of neck masses in every age group. It is simple, non-invasive and inexpensive diagnostic imaging modality. It provides accurate and reproducible results. Ultrasonography highly accurate for diagnosing benign and malignant lesions of neck. It is also useful to guide the FNAC of neck lesions.

Keywords: Echotexture, Echogenicity, Calcificaion, Necrosis, Vascularity, Resistive Index,USG and Doppler

INTRODUCTION:

Neck masses are any swellings or enlargements in the region between inferior border of mandible and clavicle[1]. Neck masses are a common cause of diagnostic dilemma to clinicians.[2] The differential diagnosis of swelling in the neck is broad and extensive and includes both malignant and benign aetiologies.[3,4] Thyroid gland pathology which manifests as a neck swelling is most frequent cause of neck masses and the carcinoma that has metastasized to cervical lymph nodes comprise the second most prevalent source of neck masses[3] . Sonography is the initial imaging modality after clinical examination for evaluation of neck masses. It is widely available and easily tolerated by the patients [1], It has several advantages over other modalities as it is harmless,uses no ionizing radiations, easy to use ,

unaffected by metallic artefacts, causes no health problems, may be repeated as often as necessary. It is relatively inexpensive and easily reproducible[5] . It is helpful in delineating the presence of multiple lymph nodes and the course of resolution of infectious diseases. It is used in cases of oral carcinoma to observe the presence of regional lymph node metastasis. Ultrasound is also helpful in detecting sialolithiasis and in the diagnosis of conditions involving the salivary gland.[6]

On the basis of the sonographic findings selection of additional imagining modalities including CT and MRI imaging can be applied. In view of this, the pre-operative evaluation of neck masses is crucial to distinguish between benign and malignant lesions so as to avoid unnecessary biopsies or surgeries in the vast majority of patients who have benign lesions. In addition to facilitating the diagnosis of clinically apparent lesions, the wide spread use of ultrasonography has result in uncovering a multitude of clinically unapparent lesions, while differentiating majority of them which are benign from malignant nodules.

Owing to the complex anatomy of the neck a comprehensive knowledge of regional anatomy and recognition of the patterns of disease presentation are vital to arriving at a meaningful differential diagnosis . To permit early recognition of neck pathology, detailed anatomic correlation is mandatory. Current imaging permits a detailed analysis of the complex anatomy in this region and is the key to understanding many of its disorders including mass lesions.[8.] The present study aims to determine the role of USG and doppler in diagnosing patients with neck soft tissue swellings as well as differentiating benign and malignant swellings. The advent of color doppler sonography has added a new dimension to diagnostic accuracy. It can be extremely valuable in demonstrating the vascular nature of the neck masses. After obtaining ethical committee clearance from institute, the study was conducted in the department among 100 patients to determine the USG findings of various soft tissue swellings in the neck region.

Methodology

Study design: Hospital based Cross sectional study

Study setting: Radiology department of tertiary care centre

Study duration: 2 years (from October 2018 to December 2020)

Study population: All the patients with the complaints of neck swelling referred to the radiology department of medical college where the study was conducted.

SAMPLE SIZE

A total of 100 patients with the complaints of neck swelling attending the department of radiology of medical college where study is being conducted

Sample size: 100 patients

Inclusion criteria:

1. All patients with palpable neck swelling.
2. Patients of all age groups

Exclusion criteria:

1. Swelling caused by trauma or fracture
2. Primary swellings arising from bone.
3. Apical chest lesions with extension into neck.

STUDY PROCEDURE:

The ultrasonography examination was performed with high-resolution small parts transducers on ALOKA PROSOUND alpha 7 and Philips HD11 X E ultrasound equipment using high frequency 5412/5-16 MHz and L-12-3/5-16 MHz probe. A systemic examination protocol was followed. The patient was examined in supine position with neck extended. A small pad placed under shoulder to provide better exposure of neck particularly in patients with short stocky habitus. The USG examination begins with the examination of thyroid gland where instrument is adjusted and frequency and gain is optimized. The examination then continued to evaluate suprahyoid and infrahyoid neck spaces and then to the status of lymph nodes followed by evaluation of cervical esophagus. Color Doppler USG was performed as and when required.

The lesions were assessed on the basis of site, number of lesions, shape of the lesion, margins internal consistency, echogenicity, calcifications and internal vascularity. Site of the lesion was assessed on the basis of organ of origin and location within spaces and soft tissue of neck.The number of lesions were assessed as solitary, multiple (more than 1) or diffuse enlargement of organ. Shape of the lesion was classified as taller than wider, wider than taller, round or oval. Round and oval shape predominantly assessed in lymph nodal masses. Taller than wider (Anteroposterior dimension more than transverse dimension) and wider than taller (transverse dimension more than anteroposterior dimension) were assessed in non-nodal masses.

Margins of the lesion were described as well defined, ill defined (more than 50% of its border is not clearly demarcated), irregular, lobulated or with local invasion. Internal consistency of the lesion was assessed as solid, predominantly solid (<50% cystic changes), cystic, predominantly cystic (>50% cystic changes) or mixed solid cystic (50% solid and 50% cystic). Echogenicity were defined as anechoic, hypoechoic, isoechoic, hyperechoic compared to the organ of origin or adjacent muscles. Hetero-echoic echogenicity were noted when the lesion showed mixed echoes. Calcifications when present were characterized as comet tail artifacts, microcalcifications (tiny calcifications <1mm without shadowing), macrocalcifications (>1mm) which includes coarse as well as curvilinear, and “rim” calcifications. Presence of both internal, perilesional (surrounding the lesion) or absent vascularity on Doppler was documented. In cases with internal vascularity, it was defined as central, peripheral or mixed (both central and peripheral). Resistive index (RI) were calculated in lesions with internal vascularity as > 0.7 or < 0.7 All the above features were used to differentiate benign and malignant lesions of neck.Inflammatory, soft tissue cystic and benign neoplastic lesions were included in benign category whereas lesions suspicious for malignancy and malignant lesions were included in malignant category.The results of ultrasonography were compared with FNAC as and when required and diagnostic accuracy of USG calculated considering FNAC as reference standard.

Informed Consent has been taken after detail explanation to patient and patients relatives. Data was entered in windows excel format and presented with the help of frequency and percentage tables. Association among the study groups is assessed with the help of chi-square test using OpenEPI statistical software version 3.01. P value less than 0.05 was taken as significant. Graphical representation is done in MS excel 2010.This study was conducted after proper permission of ethical committee.

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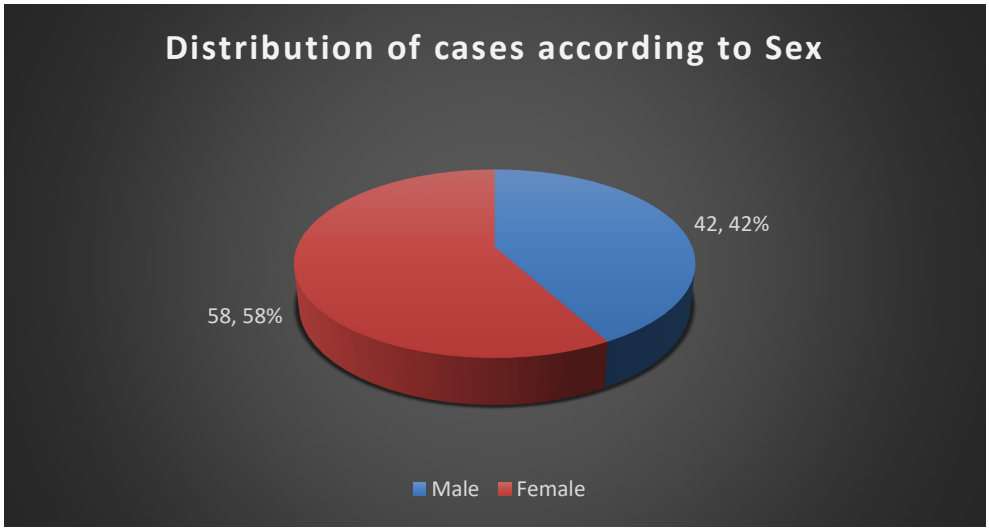
Observations and Results

The observations and results of the present study are as follows

Table No. 1: Distribution of cases according to Age

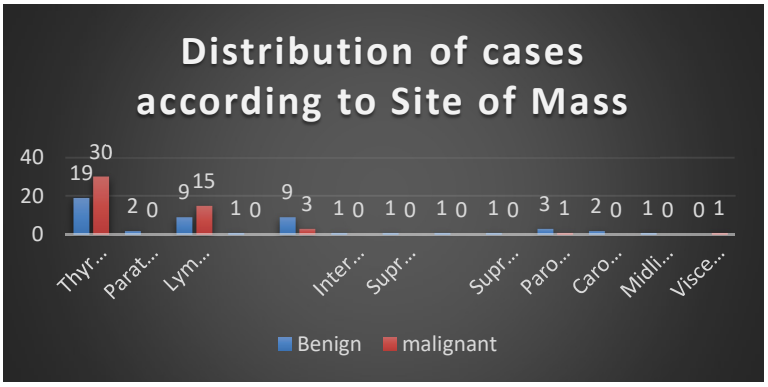
Age (Years)	Number of Cases (N)	Percentage (%)
≤ 30	31	31 %
31 to 40	23	23 %
41 to 50	26	26 %
51 to 60	13	13 %
>60	7	7 %
Total	**100**	**100 %**

Table no. 1 shows the age distribution of patients with neck lesion. Out of 100 patients with neck lesion maximum patients were found amongst the age group of <30 with 31 (31 %) no. of cases. 26 (26 %) cases were found amongst age group 41 to 50. Number of patients found in age group 31 to 40 were 23 (23 %), 51 to 60 were 13 (13 %) and >60 were 7 (7 %)



Graph No. 1: Distribution of cases according to Sex

Graph 1 shows Distribution of cases of neck lesion according to Sex. Out of 100 patient's maximum no. of cases 58 (58 %) were Females and rest were Males 42 (42 %).



Graph No. 2: Distribution of cases according to Site of Mass

Shows Distribution of cases of neck lesion according to Site of Mass. Out of 100 patients of neck lesion maximum 49 (49 %) cases showed thyroid lesions. Parathyroid lesion were found in 2 (2 %), Lymph node lesion in 24 (24 %), Parotid in 4 (4 %), submandibular space in 12(12%), Interfacial plane of neck in 1 (1 %), Suprasternal location in 1 (1 %), Floor of mouth in 1 (1 %), Supraclavicular in 1(1 %), Carotid space in 2 (2 %), Midline neck within strap muscle in 1 (1 %), Visceral Space in 1 (1 %),

Out of 49 cases of thyroid 30 were malignant and 19 were benign. Out of 24 cases of lymph nodes ,15 were malignant and 9 were benign. 9 out of 12 lesions in submandibular space were benign and 3 were malignant. 3 out of 4 parotid gland lesions were benign and 1 was malignant. All the cases of parathyroid gland were benign. Lesions in Interfacial plane of neck, Suprasternal location, Floor of mouth, carotid space, Supraclavicular location ,midline neck in strap muscle and in visceral space were all benign.

Table No. 2: Distribution of cases according to Number of Lesions

Sr. No.	Number of Nodules	Benign N(%)	Malignant N(%)	Total N(%)
1	**Solitary**	30(56%)	24(44%)	54(54%)
2	**Multiple**	16(38%)	26(62%)	42(42%)
3	**Diffuse Enlargement**	4(100%)	0(0%)	4(4%)
	Total	50(50%)	50(50%)	100

Table No. 2 shows Distribution of cases of neck lesion according to Number of lesions. Out of 100 patients of neck lesion 54(54%) showed Solitary Nodules,42(42 %) showed Multiple Nodules and 4 (4 %) showed diffuse enlargement. Out 54 solitary lesions 30 were benign and 24 were malignat. Out of 42 multiple lesions 16 were benign and 26 were malignat. Out of 4 lesions which showed diffuse enlargement of the gland were benign in nature

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Table No. 3: Distribution according to Margin

Sr. No.	Margin	BENIGN N(%)	MALIGNANT N(%)	**Total** N(%)
1	**Well defined**	37(54%)	32(86%)	69(69%)
2	**Ill Defined**	8(40%)	12(60%)	20(20%)
3	**Irrerular**	0(0%)	3(100%)	3(3%)
4	**Lobulated**	1(50%)	1(50%)	2(2%)
5	**Local invasion**	0(0%)	2(100%)	2(2%)
6	**NA**	4(100%)	0(0%)	4(4%)
Total		**50(50%)**	**50(50%)**	**100**

Table No. 3 shows Distribution of cases of neck lesion according to Margin. Out of 100 Patients 69 (69 %) cases showed well defined margin, 20 (20 %) showed Ill defined margin, 3 (3 %) showed Irregular margin, 2 (2 %) showed lobulated margin. Local invasion was found in 2 (2 %) . In 4 (4 %) cases it was not assessible and it was benign.

Out of 69 cases with well defined margins 37 were benign and 32 were malignant.out of 20 cases with ill defined margins 8 were benign and 12 were malignant. All cases with irregular margins and with local invasion were malignant.

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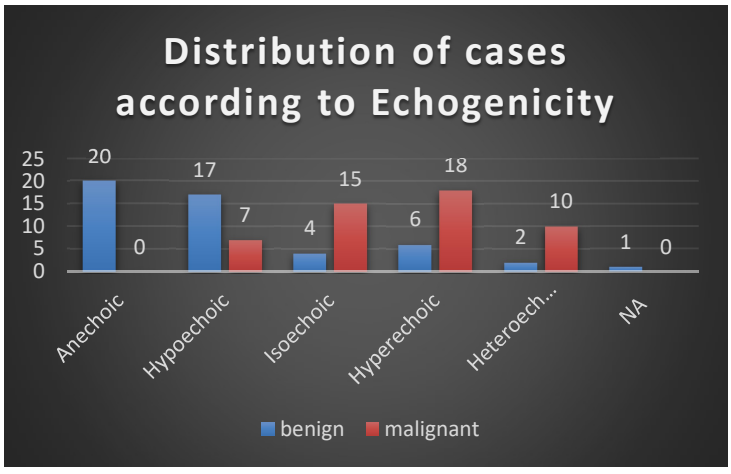
Table No. 4: Distribution of consistency

Sr. No.	Echotexture	Benign N (%)	Malignant N(%)	Total N(%)
1	**Spongiform**	4(100%)	0(0)	4(4%)
2	**Predominant Solid**	0(0%)	12(100%)	12(12%)
3	**Solid**	20(36%)	35(64%)	55(55%)
4	**Predominant Cystic**	2(67%)	1(33%)	3(3%)
5	**Cystic**	15(100%)	0(0%)	15(15%)
6	**Mixed Solid Cystic**	04(67%)	02(33%)	06(6%)
7	**NA**	05(100%)	00(0%)	05(5%)
Total		**50(50%)**	**50(50%)**	**100**

Table No. 4 shows Distribution of cases of neck lesion according to Consistency. Out of 100 Patients 4 (4 %) were Spongiform, 12 (12 %) were Predominant Solid, 55 (55 %) were Solid, 3 (3 %) were Predominant Cystic, 15 (15 %) were Cystic, 6(6 %) were Mixed Solid Cystic in composition. In 5 (5 %) cases shape was not applicable.
Out of 4 spongiform lesions all were benign, out of 12 predominant solid lesions all (12) were malignant;out of 55 completely solid lesions 20 were benign and 35 were malignant; out of 3 predominant cystic lesions 2 were benign and 1 was malignant; all of the 15 cystic lesions were benign;out of 6 mixed solid cystic lesions 4 were benign and 2 were malignant. In 5 out of 100 cases consistency was not accessible due to diffuse enlargement of organ of origin in 4 cases and due to rim calcification in one case.



Graph No. 3: Distribution of cases according to Echogenicity

Graph no 3 shows Distribution of cases of neck lesion according to Echogenicity. Out of 100 patients of neck lesion maximum 24(24 %) showed echogenicity as Hyperechoic in 24 (24 %) it was Hypoechoic, in 20(20%) it was Anechoic, in 12 (12 %) it was Heteroechoic in 19 (19 %) it was Isoechoic and in 1 % it was not assessible due to calcification which was benign. All cases which were anechoic were benign. Out of 24 hypoechoic cases 17 were benign and 7 were malignant. Out of 19 isoechoic cases 4 wsere benign and 15 were malignant ; out of 24 hyperechoic cases 6 were benign and 18 were malignant. Out of 12 heteroechoic cases 2 were benign and 10 were malignant.

Table No. 5: Distribution of cases according to Necrosis

Necrosis	BENIGN N (%)	MALIGNANT N (%)	Total N (%)
Present	07(35%)	13(65%)	20(20%)
Absent	4354%	37(46%)	80(80%)
Total	**50(50%)**	**50(50%)**	**100**

Table No. 5 Shows Distribution of cases according to Necrosis. Out of 100 Patients it was present in 20 (20 %) and absent in 80 (80%) cases.

Out of 50 benign cases necrosis was seen in 7 cases and was absent in 43 cases. Out of 50 malignant cases necrosis was present in 13 cases and absent in 37 cases.

Table No. 6: Distribution of cases according to Vascularity

Sr. No.	Vascularity		BENIGN N (%)	MALIGNANT N (%)	Total N (%)	Test of significance
1	**Present**	**Central**	11(50%)	11(50%)	22(22%)	χ^2 =9.89 p-vaue<0.05
		Peripheral	04(57%)	06(43%)	10(10%)	
		Perilesional	06(80%)	01(20%)	07(7%)	
		Mixed	04(15%)	22(85%)	26(26%)	
2	**Absent**		25(71%)	10(29%)	35(35%)	
Total			**50(50%)**	**50(50%)**	**100**	

Table No. 6 shows Distribution of cases of neck lesion according to Vascularity. Out of 100 patients Vascularity were Present in 65 (65 %) patients with Central in 22(22%),Peripheral in 10(10%),perilesional in 7(7%) and mixed in 26(26%) cases. In 35 (35%) cases whereas it was absent including 25 benign and 10 malignant.

Out of 22 cases with central vascularity 11 were benign and 11 were malignant. Out of 10 cases with Peripheral vascularity, 4 were benign cases and 6 were malignant cases; out of 7 cases with perilesional vascularity 6 were benign and 1 was malignant. Out of 26 cases with mixed vascularity 4 were benign and 22 were malignant. Association between vascularity and type of lesion was found to be significant

Table No. 7 Distribution of cases according to Dopler Parameter

Resistive Index	BENIGN N (%)	MALIGNANT N (%)	Total N (%)
<0.7	**17(61%)**	**11(39%)**	**28(28%)**
>0.7	**02(8%)**	**22(92%)**	**24(24%)**
NA	**31(65%)**	**17(35%)**	**48(48%)**
Total	**50(50%)**	**50(50%)**	**100**

Table No. 7 Shows Distribution of cases of neck lesion according to Doppler Parameter. Out of 100 Patients RI <0.7 was present in 28(28 %), RI >0.7 was present in 24 (24 %) and in 48 (48 %) it was not applicable due to absent vascularity.

Out of 28 cases with RI < 0.7 , 17 were benign and 11 were malignant. Out of 24 cases with RI >0.7 , 22 were malignant and 2 were benign.

Table No. 8: Correlation of USG and FNAC Findings

Sr. No.	USG Finding	FNAC Finding		Total
		Benign	**Malignant**	
1	**Benign**	47	3	50
2	**Malignant**	11	39	50
Total		58	42	(100 %)
Sensitivity 81 **%** Specificity 92**%** POSITIVE PREDICTIVE VALUE (PPV) 94% 95% CI NEGATIVE PREDICTIVE VALUE (NPV) 78% DIAGNOSTIC ACCURACY: 86%				

DISCUSSION

In the present research we studied 100 patients, clinically diagnosed with neck swelling attending to the tertiary care centre and medical college where the study was conducted. In Table no. 1 we showed the age distribution of patients with neck lesion. Out of 100 patients with neck lesion maximum patients were found amongst the age group of <30 with 31 (31 %) no. of cases. 26 (26 %) cases were found amongst age group 41 to 50. Number of patients found in age group 31 to 40 were 23 (23 %), 51 to 60 were 13 (13 %) and >60 were 7 (7 %)

In a similar study by Subramanyam.N et al[7] found the most common age range between 21-40 years and next common age group was 41-60 year old. Another study by Md Atik bijapur et al [9] the most common age range were between 21-40 years and 41 to 60 years. Study done by Ajay K Goutam et al [8]showed maximum numbers of patients in the age group 21-30years. A study done by Akriti Rastogi et al [3] showed maximum patients in the age group of 21-30 years with frequency of 27 %, 31-40 years with 22 % and 41- 50 years with 21 %. Study done by Naaz F et al [10] showed Maximum number of cases between 30-39 year age group (30%) followed by 20-29 year age group (20%). A study done by Mantri G. et al[6] showed most of the cases clustered between 31 and 60 years of age group. In Graph no 1 we showed Distribution of cases of neck lesion according to Sex. Out of 100 patient's maximum no. of cases 58 (58 %) were Females and rest were Males 42 (42 %).In the similar study by Md Atik bijapur et al [9] showed that out of 60 patients 37 (62 %)were female and 23 (38%)were males. In a study done by Akriti Rastogi et al [3] there were 71% females and 29% males out of 100 patients. In a Study done by Naaz F et al [10] the incidence of male to female was 24% and 76% respectively.

In Graph no 2 we have showed the Distribution of cases of neck lesion according to Site of Mass. Out of 100 patients of neck lesion maximum 49 (49 %) cases showed thyroid lesions. Lymph node lesion in 24 (24 %), Parathyroid lesion were found in 2 (2 %), Parotid in 4 (4 %), submandibular space in 12(12%), Interfacial plane of neck in 1 (1 %), Suprasternal location in 1 (1 %), Floor of mouth in 1 (1 %), Supraclavicular in 1(1 %), Carotid space in 2 (2 %), Midline neck within strap muscle in 1 (1 %), Visceral Space in 1 (1 %).In similar study done by Md Atik bijapur et al [9] showed the most common lesions encountered were those arising from the thyroid and lymph node pathologies. Subramanyam.N et al[7] in their study also showed that the most common lesions were 36 out of 100 patients arising from thyroid followed by lymph nodes seen in 20 out of 100 patients. In a Study done by Naaz F et al[10] maximum number of patients 80% (40 patients) had swelling in the region of thyroid. Ajay K Goutam et al[8] showed maximum number of cases arisig from lymph nodes (38%) followed by thyroid lesions (20 %). In a study done by Akriti Rastogi et al[3] most common lesions were thyroid (42%) followed by lymph nodes (16 %). A study done by Mantri G. et al [6] showed most common 35 out of 100 lesions were from thyroid.

Table No. 2 shows the Distribution of cases of neck lesion according to Number of lesions. Out of 100 patients of neck lesion 54(54%) showed Solitary lesions and 42(42 %) showed Multiple lesions and 4 (4 %) showed diffuse enlargement. In a similar study by Subramanyam.N et al [7], out of 100 cases, multiple neck masses were predominant and seen in 57 patients and solitary neck masses seen in 43 patients.In a study done by Naaz F et al[10] 23 patients (46%) each were found to have single and multiple swellings and diffuse swelling was found only in 4 patients (8%). In Table No. 3 we showed Distribution of cases of neck lesion according to Margin. Out of 100 Patients 69 (69 %) cases showed well defined margin, 20 (20 %) showed Ill defined margin, 3 (3 %) showed

Irregular margin, 2 (2 %) showed lobulated margin, Local invasion was found in 2 (2 %) . In 4 (4 %) cases it was not assessible and it was benign.

Out of 69 cases with well defined margins 37 were benign and 32 were malignant.out of 20 cases with ill defined margins 8 were benign and 12 were malignant. All cases with irregular margins and with local invasion were malignant. In as similar study done by Naaz F et al [(10)], 90% of the examined swellings had regular margin while only 10% had irregular margins.In as similar study by Shah JS, Asrani VK [(5)] showed maximum 3 out of 5 cases of malignant lesions were having irregular margins and 3 out of 25 benign cases were having irregular margins. The also showed 7 out of 25 benign cases with very clear (well defined margins) and none of the malignant lesions were having well defined margins.

S Wu*, G Liu, R Chen and Y Guan [(11)] in their study showed maximum number 23 cases with lobulated margins were benign and 2 cases were malignant. Narayan B Thapa [(1)] in his study showed 95 percent of benign nodule with well defined margin and 90 percent of malignant nodule having poorly defined margin.Manoj kumar et al[(12)] in their study showed that all the cases with local invasion were malignant. Table No. 4 shows Distribution of cases of neck lesion according to consistency. Out of 100 Patients 4 (4 %) were Spongiform, 12 (12 %) were Predominant Solid, 55 (55 %) were Solid, 3 (3 %) were Predominant Cystic, 15 (15 %) were Cystic, 6(6 %) were Mixed Solid Cystic in composition. In 5 (5 %) cases shape was not applicable.

In our study out of 55 completely solid lesions 20 were benign and 35 were malignant; all of the 15 cystic lesions were benign;out of 6 mixed solid cystic lesions 4 were benign and 2 were malignant. In 5 out of 100 cases consistency was not accessible due to diffuse enlargement of organ of origin in 4 cases and due to rim calcification in one case. In study done by Manoj kumar et al(12) out of 151 benign lesions 93 were solid lesion and out of 43 malignant lesions 31 were solid. They also showed cystic lesions to be benign as in our case. In Graph no 3 we showed Distribution of cases of neck lesion according to Echogenicity. Out of 100 patients of neck lesion maximum 24(24 %) showed echogenicity as Hyperechoic in 24 (24 %) it was Hypoechoic, in 20(20%) it was Anechoic, in 12 (12 %) it was Heteroechoic in 19 (19 %) it was Isoechoic and in 1 % it was not assessible due to calcification which was benign . Similar study by Naaz F et al[(10)] showed Hypoechogenicity in 36 patients (72%). 5 patients (10%) had combined hypo and hyperechoic features. 4 patients (8%) had heteroechoic features. 3 patients (6%) had hyperechogenic features. Only 2 patients (4%) had anechogenicity. In our study all cases which were anechoic were benign. Out of 24 hypoechoic cases 17 were benign and 7 were malignant. Out of 19 isoechoic cases 4 were benign and 15 were malignant ; out of 24 hyperechoic cases 6 were benign and 18 were malignant. Out of 12 heteroechoic cases 2 were benign and 10 were malignant.

In Table No. 5 we Showed the Distribution of cases according to Necrosis. Out of 100 Patients it was present in 20 (20 %) and absent in 80 (80%) Out of 20 cases with necrosis 7 were benign and 13 were malignant. Out of 80 cases without necrosis 33 were benign and 37 were malignant. Similar study done by Akriti Rastogi et al[(3)] showed the presence of necrosis in 5 out of 15 malignant lesions and it was absent in 10 out of 15 malignant lesions Shah JS and Asrani VK [(5)] in their study revealed the presence of necrosis in 4 out 5 malignant lesions whereas necrosis was present in 3 out of 25 benign lesions.In 20 cases with necrosis 14 were lymph nodal lesions. In lymph nodal lesions presence or absence of necrosis helps in diffenetiating reactive lymph from those malignant and

tubercular. In our study out of 14 those cases of lymph nodal necrosis 10 were malignant and 4 were tubercular. None of the ractive lymph nodal masses showed necrosis. In study done by Pooja Jaiswal et al[13] they showed 18 out of 23 cases of tubercular lymph nodes were having necrosis.

Out of 22 cases with central vascularity 8 cases were originating from thyroid gland, in that 8 cases only 1 case of thyroid lesion showed central vascularity and rest cases were malignant. These findings are consistent with findings described by Manoj kumar et al[12] who showed out of 37 cases with central vascularity only was benign and 36 were malignant. Out of 22 cases with central vascularity 9 cases were lymph nodal lesions in that 6 were benign with maintained central hilar flow and 3 were malignant. Pooja Jaiswal et al[13] in their study, approximately showed 78% of lymphomatous and 90% of metastatic lymph nodes demonstrated malignant vascularity (peripheral or mixed). Benign vascularity (hilar or absent) was observed in 100% and 69.6% of reactive and tuberculous lymph nodes respectively and none of the reactive nodes showed peripheral or mixed vascularity. In study done by Arpana and Panta OB et al[14] perinodular vascularity was seen 23 cases out of which 16 benign lesions and 7 malignant lesions.

In Table No. 7 we showed Distribution of cases of neck lesion according to Dopler Parameter. Out of 100 Patients RI <0.7 was present in 28(28 %), RI >0.7 was present in 24 (24 %) and in 48 (48 %) it was not applicable due to absent vascularity. Out of 28 cases with RI < 0.7 , 17 were benign and 11 were malignant. Out of 24 cases with RI >0.7 , 22 were malignant and 2 were benign. Manoj kumar et al[12] in their study showed out of 43 malignat lesion 33 were having RI > 0.73 and 10 were < 0.73;out of 148 benign lesions 126 were eith RI < 0.73 and 22 were with > 0.73. Singh D et al[15] in their study showed out of 5 lesions with RI >0.75 all were malignant nodules and out of 45 lesions with RI <0.75, 44 were benign and 1 was malignant.

Conclusions:

Ultrasonography is a useful modality for diagnostic evaluation of neck masses in every age group. It is simple, non-invasive and inexpensive diagnostic imaging modality. It provides accurate and reproducible results. Ultrasonography highly accurate for diagnosing benign and malignant lesions of neck. It is also useful to guide the FNAC of neck lesions.

References:

1. NARAYAN BIKRAM THAPA, Ultrasound in Diagnosis of neck masses journal of Nepal Health Research Council, Vol 4 no.1 April 04 2016 page 17,18.
2. Simo R, Jeannon JP. Benign Neck Disease. In: Bradley P, editor. Stell and Maran's Textbook of Head and Neck Surgery and Oncology. 5th ed. London: Hodder Arnold; 2012:217-38.
3. Rastogi A, SHARMA K,GAUBA N.An evaluation of efficacy of ultrasound in diagnosis of neck swellings. Int.J Otorhinolaryngology Head Neck Surg 2018;4:169-75
4. Chandak R, Degwekar S, Bhowte RR, Motwani M, Banode P, Chandak M,*et al.* An evaluation of efficacy of ultrasonography in the diagnosis of head and neck swellings. Dentomaxillofac Radiol 2011;40:213-21.
5. Shah JS, Asrani VK. Clinical applications of ultrasonography in diagnosing head and neck swellings. J Oral MaxillofacRadiol 2017;5:7-13

6. Mantri G, Jaiswal AA, Pal RK, Sharma N. Role ofultrasonography and fine-needle aspiration cytology in the evaluation of neck masses. Med J DY Patil Vidyapeeth 2020;13:486-97
7. Subramanyam.N.Reliability of ultrasonography in neck masses evaluation. IOSR Journal of dental and medical sciences (IOSR-JDMS), Vol.16,no,10,2017,pp.33-40
8. Ajay K Gautam ,Avadhesh P S Kushwah, Sonjjay Pande. Ultrasonography and CT evaluation of neck masses. International journal of contemporary medical research 2017;4(6):1392-1397
9. Mohamed Atik Ahemad et'al, ROLE OF HIGH RESOLUTION ULTRASOUND AND DOPPLE IN THE EVALUATION OF NECK MASSES WITH HISTOPATHOLOGICAL CORRELATION, international journal of medicaland applied sciences:vol 4 suppl 5;2015
10. Naaz F et al, Role of ultrasonography in the diagnosis of neck mass;J M e d A l l i e d S c i 2 0 1 8 ; 8 (2) : 6 6 - 7 2.
11. S Wu*, G Liu, R Chen and Y Guan; Role of ultrasound in the assessment of benignity and malignancy of parotid masses; Dentomaxillofacial Radiology (2012) 41, 131–135; doi: 10.1259/dmfr/60907848
12. Manoj KumarPalaniappan1,Role of Gray Scale, Color Doppler and Spectral Doppler in Differentiation Between Malignant and Benign Thyroid Nodules; Journal of Clinical and Diagnostic Research. 2016 Aug, Vol-10(8): TC01-TC06
13. Pooja Jaiswal, Prakash Sharma; Value of ultrasound in evaluation of cervical lymphadenopathy: correlation with FNAC / histopathology; JSSN 2016; 19 (1)
14. Arpana, Panta OB, Gurung G, Pradhan S. Ultrasound findings in thyroid nodules: A radio–cytopathologic correlation. J Med Ultrasound 2018;26:90-3.
15. Singh D, Makwana M, Verma GL, Lal K. Evaluation of thyroid nodules by Gray scale and Doppler sonography and correlation with fine needle aspiration cytology. Int Surg J 2017;4:2197-204

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