ORIGINAL ARTICLE

EVALUATION OF CERVICAL LYMPHNODES BY ULTRASONOGRAPHY IN CORRELATION WITH FNAC

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ABSTRACT: AIMS AND OBJECTIVES: To study and differentiate neoplastic (Malignant) and nonneoplastic (Reactive and tubercular)cervical lymph nodes by High resolution ultrasonography. To correlate the diagnostic accuracy of ultrasound with FNAC in differentiating neoplastic (malignant) and nonneoplastic (reactive and tubercular) cervical lymphadenopathy. **MATERIAL AND METHODS:** Data was collected from a total of 100 cases referred for ultrasound of neck to the Department of Radiodiagnosis, Sri R. L. Jalappa Hospital and Research Center over a period of 24 months from January 2012 to January 2014, with 5-10 MH linear transducer using SEIMENS G 40/G 50/ Acuson Ax 300 ultrasound equipment. Lymph nodes were assessed using grey scale and colour Doppler parameters like: nodal level and site, size, shape, L/S ratio, border, hilum, echotexture, necrosis, matting and angioarchitecture [hilar vessels, capsular vessels (peripheral) and mixed flow]. A provisional diagnosis was suggested after the ultrasound examination and these findings were correlated with Fine Needle Aspiration Cytology/ Histopathological findings. **RESULTS:** In our study out of 45 non neoplastic nodes (reactive and tubercular) only 41 nodes were identified as non-neoplastic (reactive/ tubercular) on ultrasound prior to FNAC/ histopathology. Out of 55 possible neoplastic (malignant nodes) detected on ultrasound only 46 lymph nodes turned out to be neoplastic on FNAC/ histopathology. Lymph node with oval shape (L/S ratio > 2) echogenic hilum, homogenous echotexture and hilar vascularity were considered as significant parameters in detecting non-neoplastic (reactive) lymph nodes, which showed matting with soft tissue edema were considered nonneoplastic lymphnodes (Tubercular lymphnodes). Nodes which were Round shape (L/S ratio < 2), absent hilum, heterogeneous echotexture, hilar, capsular vessels and mixed vascularity were considered as significant parameters in detecting neoplastic (malignant) lymph nodes. Correlation of sonographic findings with Fine Needle Aspiration Cytology/ Histopathological findings was performed. Sensitivity and Specificity of ultrasound in differentiating neoplastic from non-neoplastic cervical lymphadenopathy was found to be 90% and 74% respectively. **CONCLUSIONS:** This study concludes that: 1) High resolution ultrasonographic examination proved as a valuable primary investigation to identify lymph nodes and differentiate nonneoplastic and neoplastic lymphadenopathy. 2) Combination of ultrasonographic features with vascular pattern of the lymph nodes have a high sensitivity, specificity in differentiating neoplastic and non-neoplastic lymphadenopathy.
KEYWORDS: Ultrasonography, Doppler, Cervical lymphadenopathy.

INTRODUCTION: The highest numbers of lymph nodes in the human body are found in cervical region containing nearly 300 of the body's total of 800 lymph nodes. These nodes are surrounded by varying amounts of fibroadipose tissue.

ORIGINAL ARTICLE

Cervical lymphadenopathy is one of the most common cause of mass in head and neck region there are various causes of CL common among them are reactive, tuberculosis, metastasis and lymphoma.

The differentiation helps in both planning treatment and prognosis. Imaging modalities for the evaluation of cervical lymphadenopathy are ultrasound, CT, MRI and USG guided FNAC. Recent advances include PET, PET CT and ultrasound elastography.[1]Biopsy and other pathological tests are invasive and time consuming.

Ultrasound is preferred because it is easily available, cost effective, radiation free and safe investigation over CT and MRI.

Ultrasound has been shown to have higher sensitivity than palpation for detecting enlarged lymph nodes in patients who have suspected regional lymph node enlargement. Ultrasound can evaluate the internal architecture of lymph nodes due to improve spatial and contrast resolution which helps in identifying etiology of lymphadenopathy.

Ultrasonographic criteria for distinguishing neoplastic and non-neoplastic lymph nodes have been studied under site, shape, size, echogenicity, hilum, matting, nodal border, long/short axis ratio, intra nodal necrosis and angioarchitecture.[2]

Ultrasonographic features that help to identify abnormal nodes as well as giving clues to neoplastic nodes are heterogeneous echogenicity, absent hilus, invasion, and intranodal necrosis. The shape is the best method to attempt the differentiation between neoplastic and non-neoplastic lymph nodes. The Long/short diameter ratio of lymph node provides excellent criteria for differentiation between neoplastic and non-neoplastic cervical lymphadenopathy.[3]

By using colour/ power Doppler Sonography can further characterize lymphnodes as non-neoplastic (Reactively, tubercular) and neoplastic. The non-neoplastic (Reactive) nodes show increased central hilar vascularity, with radial symmetry whereas, neoplastic (Malignant) nodes show absent hilar vascularity and increased peripheral vascularity.[2]

This study has been conducted to evaluate the efficacy of ultrasonography and doppler to differentiate non-neoplastic (Reactive and tubercular) from neoplastic (Malignant) cervical lymphadenopathy and findings are correlated with other diagnostic procedures like fine needle aspiration cytology (FNAC)/ histopathology.

MATERIALS AND METHODS:
SOURCE OF DATA: A total of one hundred cases referred for ultrasonography of neck to the Department of Radio Diagnosis, Sri R.L. Jalappa Hospital and Research Center over a period of January 2012 to January 2014 are included in this study.

METHOD OF COLLECTION OF DATA: Data was collected from one hundred cases referred for ultrasonography of neck by purposive sampling.

All scans are done carried out on 5-10 MH linear transducer using SEIMENS G 40, SIEMENS G 50 and Acuson Ax 300 ultrasound equipment.

INCLUSION CRITERIA:
1. All patients coming for ultrasound neck.
2. Patients more than 12 years of age of either sex.

ORIGINAL ARTICLE

EXCLUSION CRITERIA:
1. Patients with other neck masses.
2. Moribund patients.
3. Post-operative cases.
4. No FNAC available

TECHNIQUE: The patient was asked to lie down in supine postion with a pillow placed below the shoulder and the neck extended. Ultrasound jelly was then applied evenly on both sides for good acoustic medium and ensure good contact of the transducer with the skin.

The ultra sonographic technique was done methodical from superior to inferior aspect of the neck. The cervical lymph nodes classified based on the location in the neck into VII levels according to AJCC classification, merely to simplify the sonographic examination of the neck. The examination begins with a transverse scan of the submental region. After that the patient's head is turned towards the right side and the scanning is followed with a sequence from the submandibular area to the posterior triangle on left. The same procedure is followed on opposite side.

That is: submandibular region → parotid → upper cervical, middle cervical lower cervical → supraclavicular fossa → Superior mediastinal nodes and the posterior triangle, next head is turned to left side and whole sequence is done on right.

Common ultrasound scan planes used in the examination of cervical nodes in different regions of the neck.

Regions	Scan plane(s)
Submental	Transverse
Submandibular	Transverse
Parotid	Transverse and longitudinal
Upper cervical	Transverse
Middle cervical	Transverse
Lower cervical	Transverse
Supraclavicular fossa	Transverse
Posterior triangle	Transverse and longitudinal

The largest or most suspicious lymph node on ultrasonography which will yield good results, will be marked and then patient will be sent for FNAC or ultrasound guided FNAC. The criteria that are followed in this study to differentiate between Reactive, tubercular, and neoplastic (malignant) lymph nodes:
1. Distribution – includes levels and side.
2. Number.
3. Size.
4. Shape – includes L/S ratio.
5. Echogenic hilum – wide, narrow and absent.
6. Border – sharp and unsharp.
7. Homogenecity and heterogenecity.
8. Central necrosis and cystic necrosis.

ORIGINAL ARTICLE

9. Matting.
10. Vascularity and angioarchitecture: hilar vessels, peripheral vessels, mixed vessels, focal absence of perfusion and absence of perfusion.

Non neoplastic lymph nodes include reactive and tubercular. Lymph node oval shape, echogenic hilum, homogenous echotexture, matting, L/S ratio > 2 and hilar vascularity were considered as reactive lymphadenopathy. Nodes hypoechoic, round without echogenic hilus, intranodal cystic necrosis, nodal matting, and adjacent soft-tissue edema were considered tubercular lymphadenitis.

Round shape, absent hilum, heterogenous echotexture, sharp borders, L/S ratio < 2, capsular vessels (Peripheral), mixed vascularity, displacement of vessels and focal absence of perfusion were considered in detecting neoplastic lymph nodes. Since there was no difference between primary malignancy and metastasis sonologically, results of examination were grouped as malignant under neoplastic category.

USG GUIDED FNAC: The most promising contribution of ultrasound is in the guidance of FNAC in non-palpable lymphnodes. Under aseptic precaution and ultrasound guidance, 21/22 gauge needle with syringe is introduced into enlarged abnormal lymph nodes and sample is sent for analysis.

METHOD OF STATISTICAL ANALYSIS: The following methods of statistical analysis have been used in this study.

The results for each parameter (numbers and percentages) for discrete data are presented in tables and figures.

Proportions were compared using Chi-square test of significance.

Chi-Square ($\chi2$) test for (r x c tables).

DF = (r-1)*(c-1), where r=rows and c=columns.

DF = Degrees of Freedom (Number of observation that are free to vary after certain restriction have been placed on the data).

In the above test the "p" value of less than 0.05 was accepted as indicating statistical significance.

Sl. No.	Age groups (in years)	No. of cases
1.	13-20	18
2.	21-30	12
3.	31-40	15
4.	41-50	18
5	51-60	19
6	61-70	12
7	>70	6
Table 1: Age distribution		

ORIGINAL ARTICLE

Diagnosis on USG	No. of lymphnodes
Malignant	55
Tubercular	18
Reactive	27
Total	**100**
Table 2: Diagnosis of cervical lymphadenopathy on USG	

Diagnosis on USG	No. of lymphnodes
Malignant	46
Tubercular	26
Reactive	28
Total	**100**
Table3: Diagnosis of cervical lymphadenopathy on FNAC/ histopathology	

USG DIAGNOSIS	FNAC DIAGNOSIS			
	Malignant	**Tubercular**	**Reactive**	**Total**
Malignant	42	7	6	55
Tubercular	0	18	0	18
Reactive	4	1	22	27
Total	46	26	28	100
Chi Square = 110.2 p value <0.001				
Table 4: Comparison of USG diagnosis with FNAC diagnosis				

Our study had a high sensitivity of 91.3%, Specificity of 75.93%, positive predictive value of 91.11% and also a negative predictive value of 76.36% in differentiating neoplastic from non-neoplastic lymphadenopathy.

	Malignant	**Tubercular**	**Reactive**	**Total**
Level 1	10 (45%)	1	12(55%)	23
Level 2	20 (58%)	10 (29%)	4 (13%)	34
Level3	12 (55%)	3 (14%)	7 (31%)	22
Level 4	3 (30%)	2 (20%)	5 (55%)	10
Level5	1 (9%)	10 (91%)	0	11
Total	46	26	28	100
Table 5: Distribution of lymph node level according to AJCC classification on USG diagnosis with FNAC diagnosis				

ORIGINAL ARTICLE

	L/S <2	L/S>2	TOTAL
Malignant	36 (78%)	10 (22%)	46
Tubercular	16 (61%)	10 (39%)	26
Reactive	6 (21%)	22 (79%)	28
Total	**58 (58%)**	**42 (42%)**	**100**
Chi square – 23.26 p value <0.001			
Table 6: Distribution of L/S ratio on USG to FNAC/histopathology diagnosis			

	Sharp border	Unsharp border	Total
Malignant	24 (52%)	22 (48%)	46
Tubercular	8 (31%)	18 (69%)	26
Reactive	9 (32%)	19 (68%)	28
Total	**41 (41%)**	**59 (59%)**	**100**
Chi square = 4.4 p value = 0.11			
Table 7: Distribution of border according to USG in comparison with FNAC/histopathology diagnosis			

	Absent	Wide	Narrow	Total
Malignant	38 (83%)	2 (4%)	6 (13%)	46
Tubercular	17 (65%)	3 (12%)	6 (23%)	26
Reactive	7 (25%)	13 (46%)	8 (29%)	28
Total	**62 (62%)**	**18 (18%)**	**20 (20%)**	**100**
Chi square 29.58 p value <0.001				
Table 8: Absent lymphnode hilum on USG in comparison with FNAC/ histopathology diagnosis				

	Homogenous	Heterogeneous	Total
Malignant	16 (35%)	30 (65%)	**46**
Tubercular	16 (62%)	10 (38%)	**26**
Reactive	23 (82%)	5 (18%)	**28**
Total	**55 (55%)**	**45 (45%)**	**100**
Chi square 16.38 p value <0.001			
Table 9: Distribution of lymphnode echotexture according to USG in comparison with FNAC/ histopathology diagnosis:			

ORIGINAL ARTICLE

	Absent	**Coagulative**	**Cystic**	**Total**
Malignant	19 (41%)	9 (20%)	18 (39%)	46
Tubercular	16 (62%)	0	10 (38%)	26
Reactive	23 (82%)	0	5 (18%)	28
Total	**58 (58%)**	**9(9%)**	**33 (33%)**	**100**
P value = 0.001				
Table 10: Distribution of necrosis according to USG in comparison with FNAC/ histopathology diagnosis:				

	Present	**Absent**	**Total**
Malignant	4 (9%)	42 (91%)	**46**
Tubercular	3 (12%)	23 (88%)	**26**
Reactive	21 (75%)	7 (25%)	**28**
Total	**28 (28%)**	**72 (72%)**	**100**
Chi square = 42.68 p value <0.001			
Table 11: Hilar Vascularity on USG diagnosis with hilar vascularity on FNAC/ histopathology diagnosis			

	Present	**Absent**	**Total**
Malignant	2 (4%)	44 (96%)	**46**
Tubercular	5 (19%)	21 (81%)	**26**
Reactive	2 (7%)	26 (93%)	**28**
Total	**9 (9%)**	**91 (91%)**	**100**
P value = 0.04			
Table 12: Capsular vascularity on USG diagnosis with hilar vascularity on FNAC/ histopathology diagnosis			

	Present	**Absent**	**Total**
Malignant	37 (80%)	9 (20%)	46
Tubercular	16 (62%)	10 (38%)	26
Reactive	3 (10%)	25 (90%)	28
Total	**56(56%)**	**44 (44%)**	**100**
Chi square test = 34.77 p value <0.001			
Table 13: Mixed Vascularity on USG diagnosis with hilar vascularity on FNAC/ histopathology diagnosis			

ORIGINAL ARTICLE

	Present	**Absent**	**Total**
Malignant	1 (2%)	45 (98%)	46
Tubercular	2 (8%)	24 (92%)	26
Reactive	1 (4%)	27 (96%)	28
Total	**4**	**96**	**100**
Table 14: No perfusion on USG diagnosis with no perfusion on FNAC			

The above table shows most of benign, reactive, tubercular and malignant lymph nodes showing lymph node perfusion, which is not significant and non-specific criteria.

DISCUSSION: The present study is done to show the high resolution ultrasonography, colour and power dopplers efficacy and usefulness in differentiating tubercular, reactive and malignant cervical lymphadenopathy.

The diagnosis of metastatic lymphnodes helps in therapeutic planning,[4] as the presence or absence of metastasis helps in planning treatment, risk of recurrence and the survival.

Ultrasound is preferred over CT and MRI in evaluation cervical lymphadenpathy
1. In differentiating benign and malignant lymph nodes the size cannot be considered as sole criteria.
2. The presence of central nodal necrosis is thought to be one of the most specific sign of metastatic involvement with a specificity of 95% - 100%. In CT the nodal necrosis is observed as central low attenuation. Infection and other causes can also appear as a central nodal necrosis on CT.[5]
3. CT sometimes cannot detect cervical lymph nodes that are smaller than 0.5cms as most cervical nodes are aligned with their long axis parallel to the long axis of the body and because CT demonstrates only the transverse plane of the nodes in which plane all nodes appears to be round.[6]
4. Finally, CT and MRI are expensive and not readily accessible for repeated use during follow up of the patients.

Ultrasonography is cost effective, easily available, radiation free, non-invasive, safe and is primary investigation to differentiate malignant, tubercular, and reactive cervical lymphadenopathy.[5] Ultrasound examination of the lymph nodes can be done in all planes so that exact nodal size and shape can be evaluated.[7]

The criteria considered in this study to evaluate the differentiation between benign and malignant cervical lymphadenopathy are:
1. Level and site.
2. L/S ratio.
3. Nodal border: sharp/ unsharp.
4. Hilum: widened/narrow/ absent.
5. Echotexture: Homogenous/ heterogenous.
6. Necrosis: cystic/ central.
7. Matting.
8. Angioarchitecture: Hilar vessels, focal absence of perfusion, capsular vessels (Peripheral) displacement and mixed flow vascularity.

ORIGINAL ARTICLE

ULTRASOUND CORRELATION WITH FNAC/ HISTOPATHOLOGY: In a study done by Danniger et al[8] Ultrasonography sensitivity and specificity for detecting malignant nodes was 96% and 69% respectively.

Ahuja et al[10] concluded that ultrasound was 95% sensitive and 83 % specific for classifying metastatic/ non metastatic lymph nodes.

In our study on USG out of 100 lymphnodes, 55 were malignant, 18 were tubercular and 27 were reactive lymphnodes. On FNAC/ histopatholgy out of 100 lymphnodes, 46 lymphnodes were malignant, 26 were tubercular and 28 were reactive lymphnodes

In our study out of 100 nodes, 45 non neoplastic nodes (Reactive and tubercular) only 41 nodes were identified as on ultrasound prior to FNAC/histopathology. Out of 55 possible malignant nodes detected on ultrasonography only 46 lymph nodes turned out to be neoplastic (Malignant) on FNAC/ histopathology. There was a slight amount of over diagnosis by our study particularly with regard to neoplastic (Malignant) nodes due to inclusion of all grey scale and colour doppler parameters in diagnosis of neoplastic (Malignant) and non-neoplastic nodes (reactive and tubercular) cervical lymphadenopathy. Certain parameters like cystic/ central necrosis, borders and absent perfusion were considered as not significant parameters at end of study.

In our study the Ultrasonography sensitivity, specificity, positive and negative predictive values are 90%, 74%, 77% and 92% respectively for differentiating neoplastic from non-neoplastic cervical lymphadenopathy.

Thus our study confirmed the reliability of ultrasound sensitivity and specificity in evaluating cervical lymph nodes on ultrasound as reported in literature.

SHAPE AND L/S RATIO: In one study done by Vasallo et al[4], out of the 26 benign/ reactive nodes, 85% showed L/S ratio>2 and 15% showed L/S ratio <2. Of 68 malignant nodes 85% of nodal metastasis showed L/S ratio < 2 and 15% showed L/S ratio >2.

In another study done by Na DG et al[11], in 64 malignant lymph nodes, 85% of the nodes showed L/S ratio < 2 and 15% was L/S ratio >2.

Toriyabe et al[12] 68% of reactive/ benign lymph nodes are S/L <0.6 (oval) and in 81 % of malignant lymph nodes are more round in shape S/L >0.6

In our study 78% of malignant nodes showed L/S < 2, 79% of reactive nodes showed L/S > 2 and 61% of tubercular nodes showed L/S < 2, the p value for the L/S ratio was 0.001, which showed the association to be highly significant

LYMPH NODE BORDER– Sharp and Unsharp Border: Sharp borders in malignancy is due to the infiltrating tumour cells which replaces normal lymphoid tissues and it causes an increasing acoustic impedance difference between lymph nodes and surrounding tissues whereas unsharp borders in malignant nodes indicate invasion into adjacent structures. But in benign because of edema or active inflammation of the surrounding tissues, they will have unsharp borders.

In a study by Ahuja et al,[2] they concluded that border sharpness is not helpful in diagnosis.

In our study out of 46 malignant nodes 24 (52%) shows sharp border, out of 28 reactive 19 (68%) shows unsharp border, out of 26 tubercular 18 (69%) shows unsharp border. In this study the p value for the border was 0.09, which showed the association to be not significant.

ORIGINAL ARTICLE

LYMPH NODE HILUM – Widened, Narrow and Absent: In malignancy/metastases infiltration of the malignant tissue result in early distortion of internal nodal architecture with invasion of hilum, resulting in narrowing or absence of hilum. In case of reactive nodes pathogen reaches nodal cortex in early stages induces lymphocyte proliferation and if inflammatory stimulus still persists, causes formation of new germinal centre resulting in widening of hilum.

In one study done by Vasallo et al,[4] 26 of benign nodes 58% showed a wide central hilum, 35% showed a narrow hilum and 8% no hilum. Of 68 Malignant nodes only 6% of nodal metastasis exhibited a wide central hilum, 48% exhibited no hilum and 46% showed narrow hilum.

In our study 83% of malignant nodes showed absent hilum, 13% of malignant nodes showed narrow hilum. 65% of tubercular nodes showed absent hilum and 23% with narrow hilum. 46% of reactive nodes showed wide hilum. The p value <0.01 shows significant association.

ECHOTEXTURE OF THE LYMPH NODES- Homogenous and Heterogeneous: In one study done by Toriyabe et al,[12] 17 of 19 nodes which showed heterogeneous echotexture were proved as malignant and 30 out of 33 lymphnodes which are homogenous echotexture were proved benign/reactive by histopathology study.

Our study shows 82% of reactive lymph nodes are homogenous and 65% of the malignant lymph nodes are heterogeneous correlating with previous study.

The p value for this criterion was 0.0015, which showed the association to be significant.

INTRANODAL NECROSIS (Cystic & Central/ Coagulation): Intranodal necrosis may be seen as a cystic (cystic or liquefaction necrosis) or echogenic (coagulation necrosis) area within the node. Cystic necrosis is the more common form of intranodal necrosis which appears as an echolucent area within the nodes. Coagulation necrosis is a less common sign, and appears as an echogenic focus within lymph nodes. Intranodal necrosis may be found in metastatic and tuberculosis nodes, and regardless of nodal size, the presence of intranodal necrosis should be considered pathologic.[2]

In a study by Lakshmi C et al[14] the intranodal necrosis was found in 26.67% of metastatic cervical lymph nodes and there was no intranodal necrosis in reactive cervical lymph node which was significant.

In our study, out of 100 nodes 42 showed necrosis. 33 nodes showed cystic necrosis of which 18 were malignant and 10 were tubercular. 9 nodes showed central (Coagulative) necrosis and all of them were malignant (100%). In our study 39% of malignant nodes showed cystic necrosis which were all malignant on FNAC correlation. Whereas 38% of tubercular nodes showed cystic necrosis. Benign/ reactive nodes showed 18% cystic necrosis. The p value for this criterion was 0.083, which showed the association to be not significant.

MATTING: Ying et al[2] stated that matting is the important criteria to diagnose tubercular lymph nodes. Because of the soft tissue edema surrounding the affected lymph nodes results in matting of the lymph nodes.

Ahuja et all[9] stated that matting and adjacent soft tissue oedema are common in tuberculous nodes, however they are rarely seen in malignancy.

In our study out of 100 nodes 18 showed matting all of which are tubercular (100%). Reactive and malignant lymphnodes show no matting.

ORIGINAL ARTICLE

VASCULAR PATTERN:
HILAR VASCULAR PATTERN: Benign/ Reactive nodes tend to have a prominent hilar vascularity due to increase in the vessel diameter and blood flow as the infection progresses.

In a study done by NaDG et al,[11] 97% of benign/ reactive and 18% of malignant lymph nodes showed hilar vessels.

In our study of 100 lymphnodes: Malignant 9%, tubercular 12% and reactive 75% showed hilar vessels. The p value for this criterion was less than 0.01, which showed the association to be very significant

CAPSULAR (PERIPHERAL) FLOW: In a study done by Na DG et al[11] there is peripheral vascularity with loss of central nodal vascularity is tubercular nodes (24%) and metastatic (6%).

Our study shows tubercular (19%) and malignant (4%) lymphnodes showed only capsular vascularity which was statistically not significant.

MIXED VASCULAR PATTERN: In our study of 100 lymph nodes: malignant 80%, reactive 10% and tubercular 62% showed mixed vascularity. The p value for this criterion was less than 0.001 showed the association to be statically significant.

In a study done Na DG et al[11] 85% of malignant and 76% of tubercular nodes showed mixed vascular pattern

This mixed vascularity flow is seen in tubercular, however more commonly in malignant nodes.

LIMITATIONS OF DOPPLER:
- According to Na et al,[11] it is very difficult to detect superficially located, slow flow signals,
- There is significant overlap in Doppler findings between inflammatory nodes, tubercular and neoplastic nodes.
- It is difficult to obtain Doppler spectral wave forms in non-cooperative patients.

CONCLUSION:
THIS STUDY CONCLUDES THAT:
1. High resolution sonographic and colour Doppler examination proved as a valuable primary investigation to identify lymph nodes and helps to differentiate neoplastic (Malignant) from non-neoplastic (Reactive and tubercular) lymphnodes.
2. Ultrasound proved as a radiation free, cost effective, non-invasive and safe method on evaluating cervical lymphadenopathy.
3. Ultrasound evaluation is very sensitive in differentiating between cystic/ necrotic foci and solid swellings.
4. Adjacent soft tissue edema and matting are particularly useful to identify tuberculosis, as malignant and tubercular lymph nodes almost have same characteristics expect matting.
5. Ultrasound helps in identifying abnormal nodes and useful for guided FNAC.
6. Finally all ultrasound diagnosis must be correlated with FNAC/histopathology study not only to determine whether the nodes are malignant, reactive, tubercular, nodes and also to determine the histology of the neoplasm.

ORIGINAL ARTICLE

AT THE END OF OUR STUDY WE PRESENT EVALUATION CRITERIA THAT HELP IN DIFFEREN-TIATING NON-NEOPLASTIC FROM NEOPLASTIC CERVICAL LYMPHNODES:
1. Grey scale findings of size, shape, long axis/ short axis ratio, nodal echogenic hilum, lymphnode echogenicity, matting and nodal necrosis.
2. Colour doppler findings of focal absence of perfusion, capsular vessels, hilar vascularity and mixed vascularity.

IMAGE 1: 15yrs old male presented with swelling in neck.

On USG at level I an oval lymph node with maintained Hilum and hilar vascularity suggestive of reactive lymphnode confirmed on FNAC.
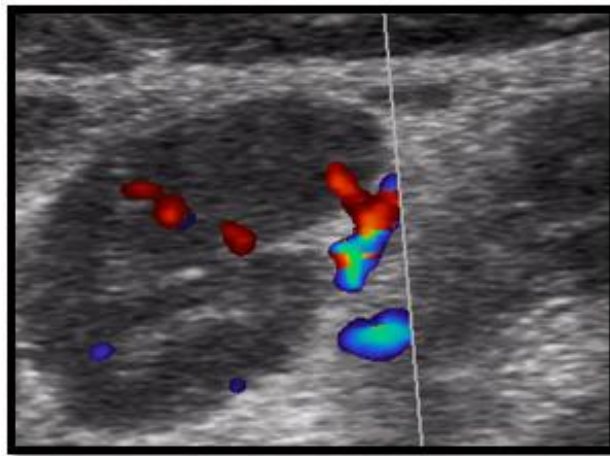
IMAGE 1

IMAGE 2: 65 yrs old male presented with swelling in neck

On USG oval lymph node with maintained Hilum and hilar vascularity suggestive of reactive lymph node but on FNAC it was proved to be malignant.
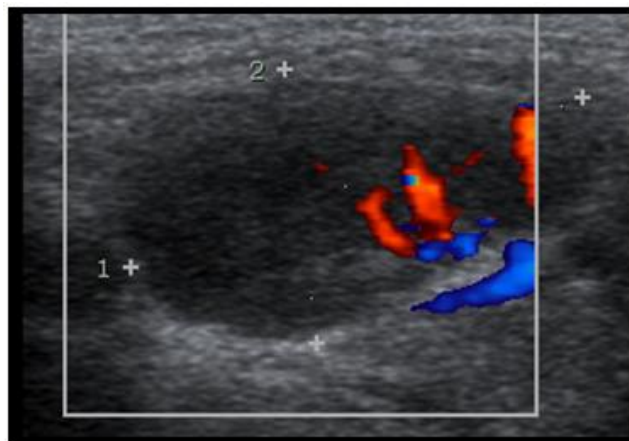
IMAGE 2

ORIGINAL ARTICLE

IMAGE 3: 18 yrs old male presented with swelling in neck.

On USG at level I oval lymph node with maintained Hilum and increased hilar vascularity suggestive of reactive lymph node confirmed on FNAC.
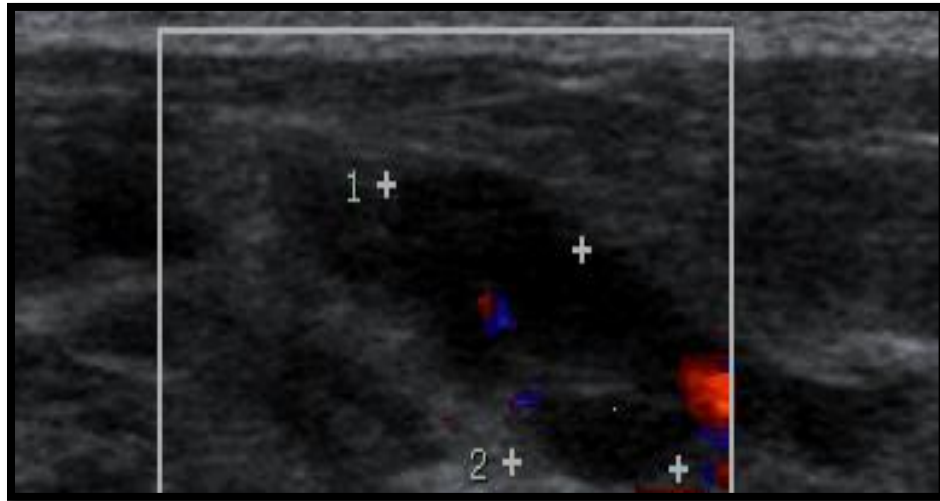
IMAGE 3

IMAGE 4: 57 yrs old male known case of ca of buccal mucosal mucosa.

On USG at level III an enlarged round lymphnode with absent hilum, sharp borders, heterogeneous echo texture and cystic necrosis (arrow) - suggestive of metastatic lymph node proved on FNAC.
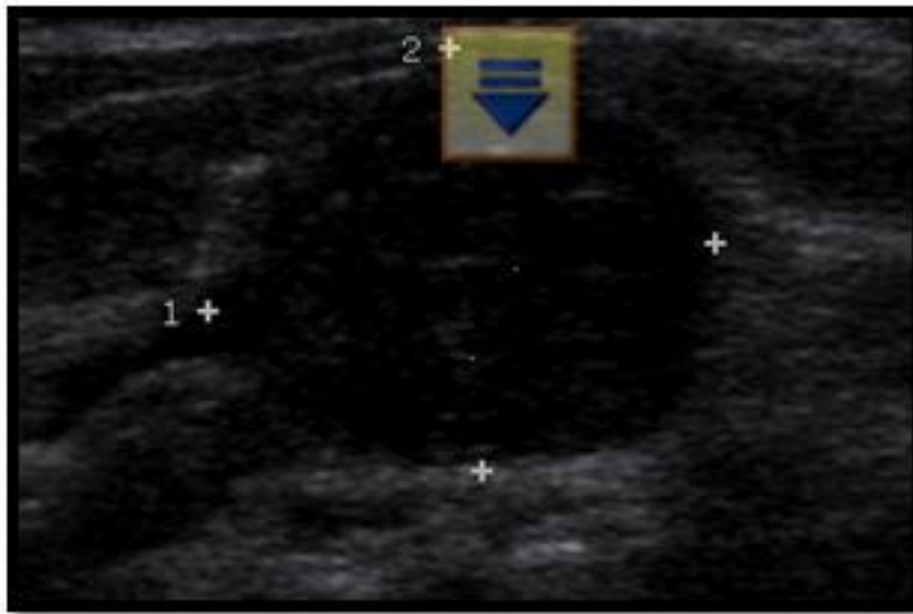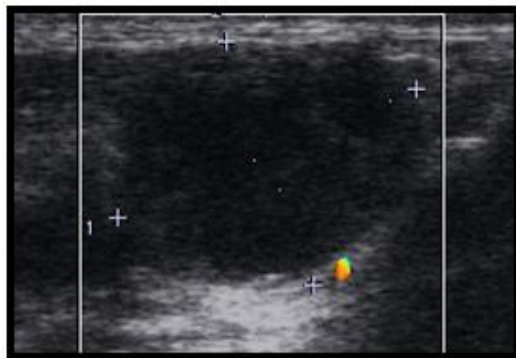

IMAGE 4

ORIGINAL ARTICLE

IMAGE 5: 15yr old male, known case of lymphoma on USG there is enlarged level I lymph node with absent hilum, sharp borders and heterogeneous echo texture proved on histopathology.
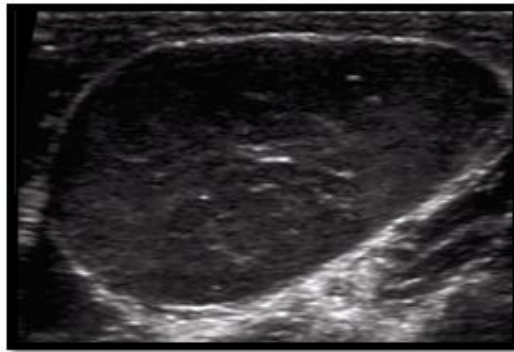
IMAGE 5

IMAGE 6: 19 yr old male, known case of lymphoma on USG there is enlarged level II round lymph node with absent hilum, sharp borders and heterogeneous echo texture proved on FNAC.

IMAGE 6

IMAGE 7: 42 yrs old male with swelling in neck on USG at level IV an enlarged round lymphnode with absent hilum, ill-defined border with extra capsular spread heterogeneous echo texture and cystic necrosis (arrow) - suggestive of metastatic lymph node proved on USG guided FNAC.

IMAGE 7

ORIGINAL ARTICLE

IMAGE 8: 52 yrs old male known case of papillary ca of thyroid on USG at level II an enlarged round hyper echoic lymphnode with absent hilum, sharp borders, heterogeneous echo texture and coagulative necrosis (arrow) - suggestive of metastatic lymph node proved on histopathology.
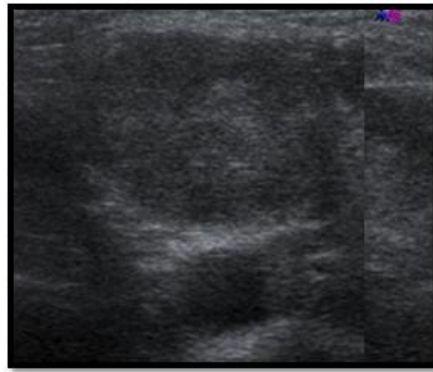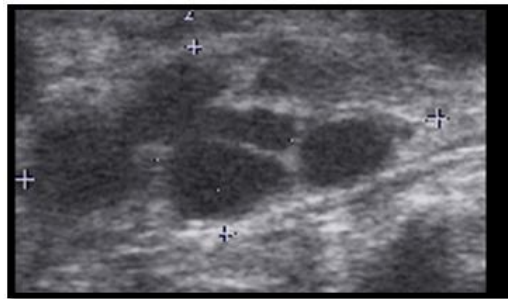

IMAGE 8

IMAGE 9: A 40 yrs old female with swelling in neck on USG at level V there are multiple enlarged lymph nodes with matting and adjacent soft tissue edema – suggestive of tubercular lymphadenopathy proved on FNAC.

IMAGE 9

IMAGE 10: A 35yrs old female with swelling in neck on USG at level II there are multiple enlarged lymph nodes with matting and adjacent soft tissue edema – suggestive of tubercular lymphadenopathy proved on USG guided FNAC.
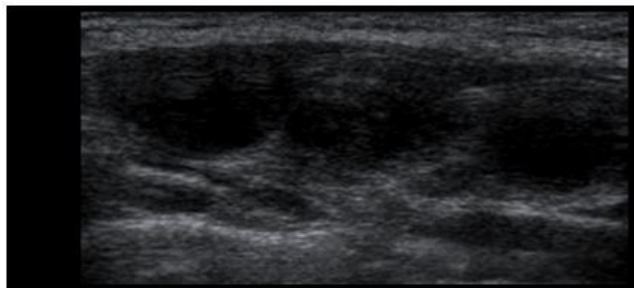

IMAGE 10

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IMAGE 11: 52 yrs old male a known case of ca of buccal mucosa on USG at level III an enlarged round hyper echoic lymphnode with absent hilum, sharp borders, heterogeneous echo texture and capsular vascularity (peripheral vascularity)- suggestive of metastatic lymph node proved on histopathology.
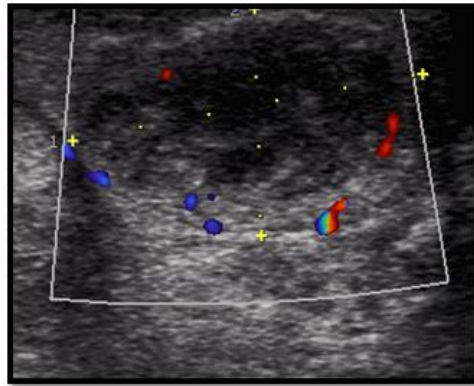

IMAGE 11

IMAGE 12: Tubercular lymph node with absent hilum showing capsular and hilar vascularity (mixed) on Doppler evaluation.
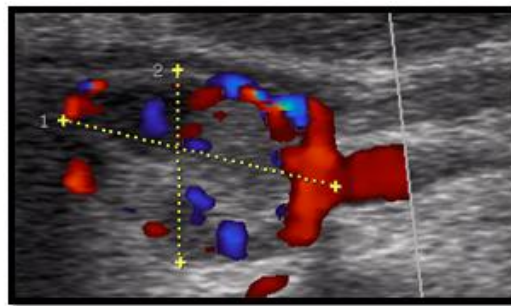

IMAGE 12

IMAGE 13: Tubercular lymph node with absent hilum and cystic necrosis showing. Mixed vascularity with focal absence of perfusion and displacement of hilar vessels on Doppler evaluation.
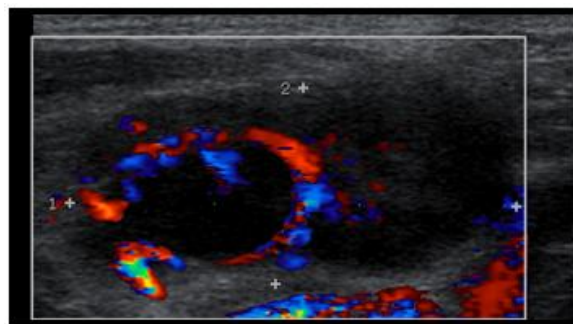

IMAGE 13

ORIGINAL ARTICLE

IMAGE 14: 24 yrs old male with swelling in neck on USG at level II an enlarged round hyper echoic lymphnode with absent hilum, sharp borders, heterogeneous echo texture and capsular vascularity (peripheral vascularity)- suggestive of metastatic lymph node on histopathology it was proved to be reactive.
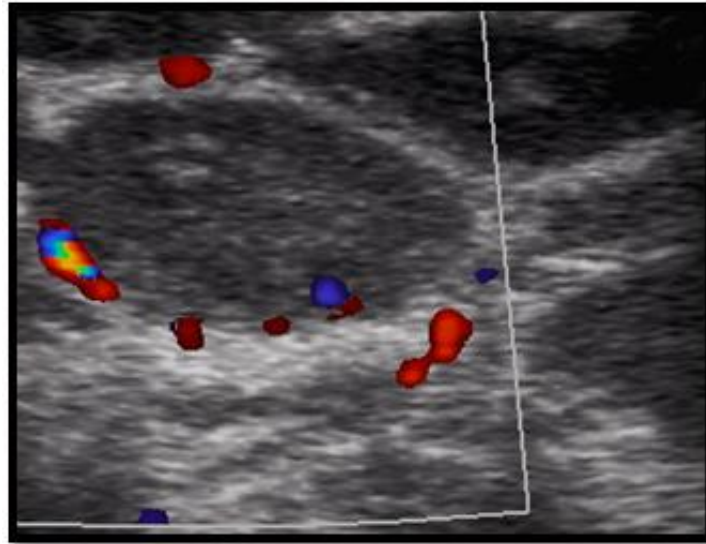

IMAGE 14

IMAGE 15: 65yrs old male with neck swelling on USG at level V there was an enlarged round lymphnode with hetrogenous echotexture and cystic necrosis with no matting on usg, thought to be malignant but proved as tubercular lympahadenitis on FNAC.

IMAGE 15

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