Original Research Paper

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COMPARISON OF ULTRASONOGRAPHY AND COLOUR DOPPLER DIAGNOSIS WITH FNAC & HISTOPATHOLOGY IN CERVICAL LYMPHADENOPATHY.

Radiology

KEYWORDS: FNAC, Lymphad enopathy, USG, Colour Doppler

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ABSTRACT

A total of 93 cervical lymphnodes of 78 patient sisevaluated by USG (both gray scale &colourdoppler).Cervical lymphnodes are characterized on grayscale by their distribution, size,shape,border,calcification, necrosis, matting, adjacent soft tissue edema and vascular pattern.From this, a provisional diagnosis was made and then FNAC was done, followed by Histopathology examination.Previously diagnosed and treated cases were excluded from the study.USG diagnosis with FNAC &HP study to determine benign,reactive,tubercular and malignant lesions of the lymph node.

Summary:

Of 93 lymphnodes, 33 were reactive on USG and 28 turned out to be reactive on FNAC/HP study.

22 are tubercular on USG and 20 on FNAC/HP.

24 malignant nodes on USG has18 metastatic and 5 lymphomas on FNAC/HP.14 benign nodes in both USG and FNAC/HP.This study revealed that high-resolution sonographic examination gives a valuable guideline which potentiates towards FNAC/HP diagnosis and management.

INTRODUCTION:

Lymphnodes are enlarged in various infections to life-threatening cancers.There is much anxiety and confusion to detect the cause of lymphadenopathy.FNAC and Biopsy are invasive &time-consuming .USG is a safe, easily available diagnostic approach before invasive procedures of investigation.The use of high frequency sonic waves results in an improvement in spatial and contrast resolution and also shows the internal architecture of lymphnodes.This identifies normal,inflammatory tubercular and malignant lymphnode.USG features that give clues towards malignant nodes are heterogeneous echogenicity,absent hilus,invasion and intranodal necrosis.By using color Doppler angioarchitecture can be assessed and has high diagnostic accuracy.

MATERIALS AND METHODS:

The study was conducted in the department of Pathology and department of Radio-diagnosis of SCB Medical college, Cuttack.The data source was patients coming to Radiodiagnosis department with cervical lymphadenopathy are subjected to USG and Color Doppler study.A provisional diagnosis was made basing on their distribution,size,shape,echogenicity,calcification,necrosis,matting, adjacent soft tissue edema along with vascular pattern on color Doppler.The sonographic technique was methodical from superior to the inferior aspect of the neck without missing any cervical node. Submandibular→ parotid → upper ,middle,lower cervical→supra clavicular fossa→superior mediastinal to the posterior triangle.The criteria that were followed to differentiate between benign,reactive, tubercular and malignant nodes are

1. Distribution – level and side
2. Size
3. Shape – L/S ratio
4. Echogenic hilus –wide/narrow/absent
5. Border – sharp/unsharp
6. Homogeneicity and heterogenicity
7. Central necrosis and cystic necrosis
8. Matting
9. Vascularity and angioarchitecture

After a provisional diagnosis made the patients were sent to the department of pathology for FNAC, and then for biopsy.

OBSERVATION:

93 cervical lymph nodes of 78 patients were examined using Grey scale ultrasound,Dopplersonography and the final diagnosis was confirmed by FNAC/histopathological examination.The age of the patients ranging from 5 to 75 years and majority of patients were in the age group of 40 -70 years with the average age 49years.Of 78 cases,57 were male (73%) and 21(27%) were females.

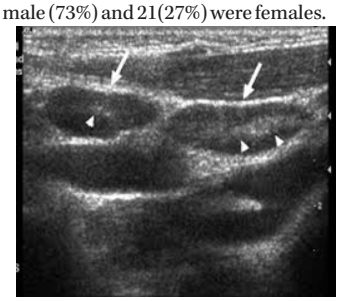


Image 1: Multiple upper cervical reactive nodes with oval shape and intact hilum

Lymphnodes of oval shape were more of reactive&inflammatory and with round shape being malignant andtubercular.In our study out of 24 malignant nodes 22(89.7%)wereround,out of 22 tubercular 18(85%) were round.85.7% of benign and were oval and 85% of reactive were oval.

The shape can be assessed objectivelyby taking the long and short axis ratio(L/S ratio) of the enlarged lymphnodes.The tendency of benign nodes to be oval(L/S > 2) and malignant nodes to be spherical(L/S <2) have been reported by many observers[1, 2].The p-value for the L/S ratio was 0.001 and is highly significant.

89% of malignant nodes showed L/S <2,77% of reactive nodes showed L/S > 2 and 55 % of tubercular nodes showed L/S <2.

That malignancy/metastatic nodes are having more sharp borders and benign have un sharp borders.In benign ,unsharp borders are due to edema and active inflammation of surrounding tissue.The sharp border in malignant nodes due to normal tissue replaced by tumor cells and unsharp border in malignant cases are due to the invasion of adjacent structures.In our series, 66% of malignant nodes showed sharp borders and 63% of tubercular nodes have unsharp borders.

The majority of malignant/metastatic nodes have absent hilum due

to infiltration causing distortion in nodal architecture.Widening of hilum in benign inflammatory cases due to the formation of germinal centers.Malignant/metastatic and tubercular nodes showing a heterogenous echotexture pattern. In benign reactive nodes it showed a homogenous pattern.

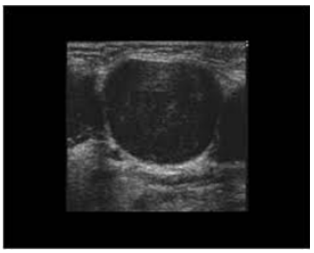
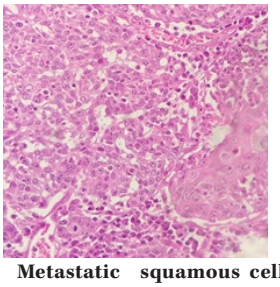


Figure 2: Round shape lymph node of malignant etiology with loss of echogenic hilum

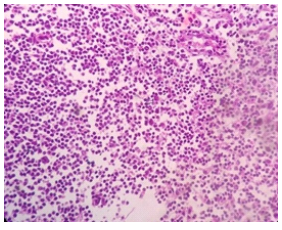
This is also one of the important criteria to distinguish between benign and malignant lesions.As regards necrosis,no necrosis in reactive nodes.Cystic central necrosis in metastatic lymphnode and coagulative necrosis in tubercular nodes.81% of tubercular lymphnodes showed matting and benign/reactive nodes did not show matting.

Highly significant hilar vascularity(86%) in benign,reactive and tubercular lymphnodes.In malignant lymphnodehilar vascularity was seen only in 8.2% of cases.Peripheral vascularity was seen in 97 % of malignant and 64% of tubercular cases.Displacement of hilar vessels in 87% of malignant and 64% cases of tubercular lymphnodes and is highly significant.No displacement in reactive and benign nodes. The aberrant course of vessels seen in 100% lymph nodes in both malignant andtubercular lesions.It was 70% in reactive nodes.

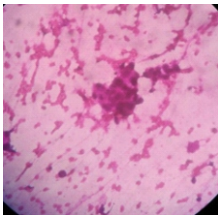
Out of 33 possible reactive nodes detected on USG,28 lymph nodes were reactive on FNAC/HP. Of 24 malignant nodes on USG 18 were metastatic and 5 were lymphoma on FNAC/HP and 1 as benign.Out of 14 possible benign nodes on USG 12 were benign onFNAC/HP study.Of 22 possible tubercular nodes on USG ,20 tutrned out to be tubercular on FNAC/HP study.



Histopathology: Metastatic squamous cell carcinoma in cervical lymph node



FNAC :Cervical node showing features of Non Hodgkin Lymphoma



Cytosmear showing Adenocarcinamotous deposits in cervical lymph node.

DISCUSSION:

The present study showed the efficacy and usefulness of high-resolution ultrasonography in thediagnosis of benign,reactive, tubercular and metastatic cervical lymphadenopathy33.Ultrasound has higher sensitivity than CT and MRI in the evaluation of cervical lymphadenopathy.CT shows necrosis as central low attenuation. Central nodal necrosis is also seen in fatty nodal metaplasia from various infection[3].Lymph node smaller than 0.5cm is not accurately detected by CT[4].CT & MRI are expensive and not readily accessible everywhere and for repeated use during follow-up.

USG is easily available,cost-effective,non-invasive,safe,radiation-free and is the primary investigation to evaluate the lesions in lymph nodes.It allows examination of lymph nodes in all planes so that exact nodal size and shape can be evaluated5.

The criteria considered in this study to evaluate the differentiation between benign and malignant cervical lymphadenopathy were

1. Level and site
2. Size
3. Shape
4. L/S ratio
5. Nodal border: sharp and unsharp
6. Hilum:widened,narrow and absent
7. Echotexture: Homogeneous,Heterogeneous
8. Necrosis
9. Matting
10. Angioarchitecture:hilar vessels,subcapsular vessels(peripheral) , displacement,aberrant course(mixed flow)

LEVEL AND SITE:

The distribution of cervical lymph nodes was made into ten regions in the neck by imaging-based classification which is an adjunct to clinically based nodal classification causing not much confusion to the clinician and surgeon regarding the level of lymphnodes.Supra clavicular(lower jugular) are more specific for metastasis from breast,lungs, esophagus,thyroid and intraabdominal organs. Tubercular lymphadenitis predominantly involved the posterior triangle and the supraclavicular nodes.A study done by Ahuja et al[6] showed that out of 78,24 were metastatic and 54 were tubercular. Ishiiet al found that the nodes involved in NHL were submandibular followed by the internal jugular nodes.In our study37% were tubercular and44% were metastatic in the supraclavicular region.Here the association is highly significant(p – 0.001)

SIZE:

VandenBrekel et al showed that a minimal axial diameter of 0.7cm for level II and 0.6cm for rest of neck nodes revealed the optimal compromise in malignant lymph nodes.Another study by Wang et al showed a minimal axial diameter of more than 0.8cm was highly specific for malignancy.The minimal axial diameter for malignant nodes in our study was 0.79cm and for benign was 0.63+/-0.19cm which showed the association is highly significant.The nodal size alone is an unreliable criterion for differentiating reactive from malignant lymph nodes.It is only to monitor the response to therapy.

SHAPE and L/S RATIO:

Benign nodes to be oval(L/S > 2) and malignant nodes to be spherical(L/S <2) have been reported by many observers[26,31].In our study 72% benign nodes showed L/S >2 and 88% malignant nodes showed L/S ratio <2.77% reactive nodes showed L/S ratio >2.55% tubercular nodes showed L/S ratio<2.This is highly significant.

NODAL BORDER:

Kaji et al34showed 84.2% malignant nodes have sharp and 15.8% of benign nodes have unsharp borders.In our study, 66% of malignant nodes showed sharp borders and 72% of benign nodes showed

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unsharp borders.62% of reactive and 64% of tubercular nodes showed unsharp borders.

HILUS (Widened,Narrow and Absent):
In one study by Vasallo etal[1]58%, benign nodes showed a wide central hilus,35% narrow and 8% no hilus.In malignant nodes 48% no hilus and 46% narrow hilus.

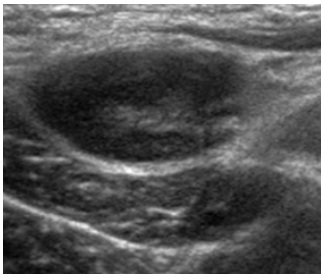

Figure 3 :Sonographically Normal appearing oval lymph node with maintained Hilum.

In our study 71%benign nodes showed wide hilus,54% tubercular showed absent hilus and 54% reactive nodes showed narrow hilus.The association is highly significant.

ECHOTEXTURE:
Homogeneous – In one study by Kaji et al 3,90.9% nodes were homogeneous echotexture in benign nodes. In our study, Benign and reactive nodes were 100% homogeneous. 37% of malignant and 63% of tubercular were homogenous.It correlates with the previous study.
Heterogenous: In a study by Toriyabe et al 7,17 of 19 showed heterogeneous echotexture and were proved as malignant by FNAC. In our study out of 23 heterogeneous 15 were malignant and also confirmed by FNAC and Biopsy.

INTRANODAL NECROSIS:
Cystic necrosis is a variant of coagulative necrosis encountered by the certain microorganism,mycobacterium tuberculosis.Central type of necrosis was seen in malignancy either primary or metastatic.

In our study, 31% of malignant nodes showed cystic necrosis and also confirmed by FNAC and 37% of tubercular nodes with cystic necrosis.Benign and reactive nodes did not show necrosis. 3 nodes had central necrosis and all were malignant.

MATTING:
Matting is an important criterion for the diagnosis of tubercular lymph nodes due to soft tissue edema surrounding the lymphnodes.In our study, 81% showed matting and proved to be tubercular on FNAC and Biopsy.

VASCULAR PATTERN:
Hilar vascular pattern:
In our study of 93 lymphnodes,Benign86%,malignant 8%,reactive 79% and tubercular 64% showed hilar vessels.

Subcapsular(peripheral)flow:
Malignant and Tubercular nodes have prominent sub-capsular vascularity due to thedestruction of hilar vascularity and also due to peripheral infiltration.

In our study Benign 0%,malignant 97%,tubercular 64% and reactive 16% nodes showed subcapsular vessels and are highly significant.

Limitations of Doppler:
According to Na et al[31]value of Doppler index may depend on the biologic nature of tumor neovascularization which is influenced by many factors such as histologic type of tumor cells,degree of nodal invasion and the arteriovenous system ofneovascularity or could it be due to inter observer variations in recording Doppler findings.It is very difficult to detect in superficially located,slow flow signals.There is significant overlap in Doppler findings between inflammatory ,tubercular and metastatic nodes.Also it is difficult to obtain Doppler spectral wave forms in non co operative patients.

Ultrasound correlation with FNAC and Histopathology:
In a study byDanniger et al [74]Ultrasonography sensitivity and specificity for detecting malignant nodes was 96% and 69% respectively. In another study done by Ahujaet al[53]sonographic sensitivity and specificity was 95% and 83% for classifying metastatic and non metastatic lymph nodes.

The comparative study of USG diagnosis with FNAC/HP diagnosis showed 85% of benign and 85% of reactive lymph nodes,91% of tubercular nodes correlates with the FNAC/HP study. In malignant nodes 78% are metastatic and 21% are lymphoma.

Our study has a high sensitivity of 96% ,specificity of 72%, positive predictive value of 83% and also a negative predictive value of 83%.

This showed a p value of 0.001,which is considered as very highly significant.

CONCLUSION:
This study concludes that ultrasonographic examination is very sensitive in differentiating between cystic,necrotic and solid swellings.Adjacent soft tissue edema and matting are useful to identify tuberculosis.Lymphnodes as small as 5mm to7 mm in size is visualized by this sensitive technique.Finally, all USG diagnosis must be correlated with FNAC/Histopathological features towards afinal diagnosis.

REFERENCES:

1. Pierre Vassallo, Kari Wernecke, Nikolus roos; Differentiation of benign from malignant superficial lymphadenopathy: the role of high resolution US; Radiology; 1992:183:215-220.
2. Na DG, Lim HK, al. Differential diagnosis of cervical lymphadenopathy: Usefulness of color Doppler Sonography. AJR1997; 168; 1311-1316.
3. Arjun Vikram Kaji, Tamara Mohuchy & Joel D.Swartz. Imaging of cervical lymphadenopathy. Seminars in ultrasound, CT and MRI June 1997;18:220-249.
4. Michel Ying, Anil Ahuja, Fiona Brook and Constantine Metreweli. Vascularity and Grey Scale Sonographic features of normal cervical lymph nodes; Clinical Radiology (2001);56:416-419.
5. Stein Kamp HJ, Cornehi M, at al. Cervical lymphadenopathy: Ratio of long to short-axis diameter as a predictor of malignancy; British Journal Radiology: 1995 March 68(80):266-270.
6. Ahuja A, and ying M; Grey Scale Sonography in assessment of cervical lymph Adenopathy; British J Oral Surgery;2000 Oct;38(5):451-459.
7. Y. Toriyabe, T. Nishimura, et al. Feb Differentiation between benign and metastic cervical lymph nodes with US; Clinical Radiology (1997):52:927-932.