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Original Research Paper

Radiodiagnosis

ULTRASONOGRAPHY AND COLOR DOPPLER EVALUATION OF CERVICAL LYMPHADENOPATHY WITH PATHOLOGICAL CORRELATION

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ABSTRACT

Background: Enlarged cervical nodes are very common presentation in radiology department. The accurate diagnosis of the cervical lymphadenopathy is very crucial for further management. The aim of this study was to characterize cervical lymph nodes sonologically using their grey scale morphology and Color Doppler and to predict the cause based on above characterization and also to correlate Ultrasonography and Color Doppler findings with pathological diagnosis. **Methods:** A prospective study was conducted in department of radiology, N.S.C.B. Medical college Jabalpur from 2021 to 2022 among 70 patients with clinically palpable cervical nodes. The sonographic findings and FNAC correlation were done with calculation of p value, sensitivity and specificity. **Results:** Among 70 patients the most common diagnosis was reactive nodes followed by tubercular nodes, metastatic nodes and lymphomatous nodes. Reactive lymphadenitis common (57.1%), tuberculosis (18.6%), metastatic nodes (8.6%), lymphoma (2.9%). Ultrasound findings correlated with histopathology in 90% cases. **Conclusions:** Ultrasound and color Doppler aid cervical lymphadenopathy assessment, enhancing clinical examination. **Findings:** Common in 20-30 age group (mean 35.54±18.38). Reactive nodes: unsharp border, central echogenic hilum; tubercular cases: matting, necrosis. Metastatic nodes: irregular shape, heterogeneous echotexture. Hilar vascularity in reactive lymphadenitis. Correlate ultrasound diagnoses with histopathology for accurate characterization.

KEYWORDS : Cervical lymph node; Ultrasound; Color Doppler; FNAC;

INTRODUCTION

Lymphadenopathy, common in developing countries like India, necessitates evaluation of cervical lymph nodes. Ultrasonography is a cost-effective, accessible tool for assessment, providing high sensitivity and characterizing nodal morphology and vascularity. Compared to CT and MRI, ultrasound excels in assessing small nodes and allows for repeated follow-up examinations. Malignant lymphadenopathy diagnosis is crucial for treatment planning and prognosis. This study aims to differentiate lymphadenopathy using ultrasound and Color Doppler, correlating with FNAC/Histopathology. It aids in therapeutic decision-making by guiding further treatment course. Ultrasound proves valuable in quick diagnosis, treatment, and follow-up, offering non-invasiveness, safety, and cost-effectiveness, thereby enhancing patient care and outcomes.

AIMS AND OBJECTIVES

1. To characterize cervical lymph nodes sonologically using their grey scale morphology and Color Doppler.
2. To predict the etiology of the enlarged cervical lymph nodes based on above characterization.
3. To correlate Ultrasonography and Color Doppler findings with pathological diagnosis.

MATERIALS AND METHODS

This hospital-based prospective observational study was conducted at the Department of Radio-diagnosis and Department of Pathology, N.S.C.B. Medical College & Hospital in Jabalpur, Madhya Pradesh. The study spanned from March 2021 to August 2022. The objective was to evaluate cervical lymphadenopathy through ultrasound examination and correlate the findings with FNAC/Histopathology.

The inclusion criteria involved all patients referred for neck ultrasonography, irrespective of age and gender, with palpable cervical lymph nodes at NSCB Medical College Hospitals. These patients were also scheduled for FNAC or histopathology examination. Exclusion criteria comprised individuals who had undergone neck irradiation or had previously been diagnosed and treated for cervical lymphadenopathy. Ultrasound findings unrelated to cervical lymphadenopathy were also excluded.

A total of 70 patients were included in the study, and written informed consent was obtained from each participant after approval from the Institutional Ethics Committee. Thorough clinical examinations of the neck were conducted as part of the study protocol.

By undertaking this research, the aim was to enhance understanding of cervical lymphadenopathy and its diagnostic implications. The study design and methodology adhered to ethical standards, providing valuable insights that can contribute to improved patient care and treatment decisions.

OBSERVATIONS AND RESULTS

Table 1: Age Distribution

Age	Frequency	Percent
10-20	16	22.9
20-30	20	28.6
30-40	8	11.4
40-50	8	11.4
50-60	9	12.9
60-70	6	8.6
70-80	3	4.3
Total	70	100

Table 2: Sex Distribution

Sex	Frequency	Percent
Male	30	42.9
Female	40	57.1
Total	70	100

Table 3: Distribution of lymph nodes according to ultrasonography diagnosis.

	Frequency	Percent
TB	16	22.9
Mets	8	11.4
Lymp	2	2.9
React	39	55.7
Oth	5	7.1
Total	70	100

Tb: Tuberculosis; Mets: Metastasis; Lymp: Lymphoma; React: Reactive; Oth: Others

Table 4: Correlation of ultrasonography and histopathological diagnosis in different pathologies.

	Correlating		Total
	NO	YES	
Count	0	13	13
Tb%	0.0%	100%	100%
Count	1	5	6
Mets%	16.7%	83.3%	100%
Count	0	2	2
Lymp%	0.0%	100%	100%
Count	3	37	40
React%	7.5%	92.5%	100%
Count	3	6	9
Other%	33.3%	66.7%	100%
Count	7	63	70
Total%	10%	90%	100%

Tb: Tuberculosis; Mets: Metastasis; Lymp: Lymphoma; React: Reactive; Oth: Others

Table 5: Distribution of lymph nodes according to CLN-RADS in different diagnosis.

	CLN-RADS					Total
	1	2	3	4	5	
Count	1	0	3	2	7	13
Tb%	7.7%	0.0%	23.1%	15.4%	53.8%	100%
Count	0	1	0	0	5	6
Mets%	0.0%	16.7%	0.0%	0.0%	83.3%	100%
Count	0	0	0	0	2	2
Lymp%	0.0%	0.0%	0.0%	0.0%	100%	100%
Count	23	11	3	3	0	40
React%	57.5%	27.5%	7.5%	7.5%	0.0%	100%
Count	0	0	1	8	0	9
Other%	0.0%	0.0%	11.1%	88.9%	0.0%	100%
Count	24	12	7	13	14	70
Total%	34.3%	17.1%	10%	18.6%	20%	100%

Tb: Tuberculosis; Mets: Metastasis; Lymp: Lymphoma; React: Reactive; Oth: Others

In our study, tuberculosis accounted for 18.6% of cases, characterized by features such as fewer lymph nodes, an L:S ratio <2, oval shape, sharp borders, echogenic hilum, heterogeneity, hypoechoic echotexture, necrosis, matting, avascularity, and low RI and PI. These findings align with previous studies highlighting capsular vascularity, cystic necrosis, and matting as important criteria for diagnosing tubercular lymph nodes. Soft tissue edema and peripheral vascular flow patterns, including focal absence of perfusion, were also observed. Our study emphasizes the distinct characteristics associated with tubercular lymphadenopathy, aiding in its diagnosis and management.

In our study, 8.6% (n=6) of patients exhibited metastasis. We identified several ultrasound characteristics associated with metastatic lymph nodes, including multiple nodes, L:S ratio <2, oval shape, sharp borders, echogenic hilum, heterogeneity, hypoechoic echotexture, absence of necrosis and matting, mixed and displaced vascularity, and high RI and PI. These findings are consistent with previous studies by Ying et al. and Farzana Alam. Additionally, sharp margins were observed in 72.72% of malignant nodes in our study. Other studies have reported features such as absence of hilus, heterogenous echotexture, central necrosis, and focal absence of perfusion. Our study contributes to the characterization of metastatic lymph nodes using ultrasound criteria.

In our study, 2.9% (n=2) of patients were diagnosed with lymphoma, showing distinct ultrasound characteristics. These included the presence of more than 5 lymph nodes, L:S ratio <2, sharp borders, absence of an echogenic hilum, hypoechoic echogenicity, no necrosis or matting, mixed vascularity, RI<0.7, and PI<1.4. Similar findings have been reported by Ahuja, Ishii, Bruneton, and Ying. Lymphomatous nodes are typically round, well-defined, hypoechoic, and lack an echogenic hilum. Cystic necrosis is uncommon unless advanced disease or prior therapy is present. RI and PI values vary but are higher than reactive or tuberculous nodes, yet lower than metastatic nodes. Hilar presence and hypoechoic centers are also observed in lymphoma cases.

In our study, 57.1% (n=40) of patients had reactive lymph nodes, which displayed characteristic ultrasound features. These included the presence of more than 5 lymph nodes, L:S ratio <2, oval shape, lymph nodes without sharp borders, echogenic hilum, hypoechoic echogenicity, no necrosis or matting, avascularity, and low RI<0.7 and PI<1.4. Similar findings were reported by Vassallo, Kaji, NaDG, and Choi in their respective studies. Benign nodes often exhibit L:S ratio >2, hilar vessels, low RI, low PI, and may have unsharp borders or homogeneity. These ultrasound criteria provide valuable information for the characterization of reactive lymph nodes, aiding in their differentiation from other pathological conditions.

CONCLUSION

The study conducted on cervical lymphadenopathy underscored the value of ultrasound and color Doppler as adjunctive tools in evaluating this condition alongside clinical examination. The findings revealed a higher incidence of cervical lymphadenopathy in the age group of 20-30 years, with a mean age of 35.54±18.38 years.

Reactive lymphadenitis emerged as the predominant diagnosis, characterized by an indistinct border and a central echogenic hilum. Tubercular cases exhibited distinctive features such as matting and necrosis. Notably, no significant differences were observed in the L/S (length-to-width) ratio across different etiologies.

Metastatic lymph nodes exhibited irregular shape and heterogeneous echotexture on ultrasound imaging. Reactive lymphadenitis cases displayed hilar vascularity. Utilizing gray-scale morphology and Color Doppler, the researchers successfully characterized cervical lymph nodes sonographically. Conversely, there were no significant variations in the RI (resistive index) and PI (pulsatility index) among different etiologies.

However, it is important to emphasize the correlation between ultrasound findings and histopathology for an accurate diagnosis. This correlation not only assists in determining the neoplastic, reactive, or tubercular nature of the lymph nodes but also aids in identifying the specific histology of any present neoplasm. Histopathology remains the gold standard

for definitive diagnosis and characterization of lymph nodes in this context.

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