Evaluation of cervical lymph nodes by ultrasound and its correlation with FNAC

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Abstract
Background: The cervical/neck region has a rich network of strategically placed lymph nodes. These nodes can be involved in various diseases. Ultrasound examination of these nodes can yield useful information about the underlying pathologic processes. **Aim of The Study:** Evaluation of cervical lymph nodes by ultrasound and its correlation with FNAC. **Materials and Methods:** This was a prospective study done in the department of Radiodiagnosis at Mamata Academy of Medical Sciences, Bachupally, Hyderabad, Telangana, over a period of eight months. A total of 110 cases were studied. First ultrasound examination of the neck nodes was done followed by fine needle aspiration study. The borders of the nodes, echotexture, capsular and hilar vascularity were noted. The findings of the two modalities were correlated. **Results**: A total of 110 cases were studied with age ranging from 10 years to 70 years. The male to female ratio was 0.2:1. Most (77.2%) cases were diagnosed as reactive lymph nodes on ultrasound. Most of the reactive lymph nodes (70/85) had homogenous echotexture. Most of the reactive lymph nodes (65/85) had hilar vascularity whereas most of the malignant nodes (8/10) showed absence of hilar vascularity. There was good correlation between the ultrasound and FNAC diagnosis of cervical lymph nodes. **Conclusion:** Cervical lymphadenopathy is more common in the third to fifth decades of life. Reactive enlargement is more common than other etiologies. USG of cervical lymph nodes is a simple, noninvasive diagnostic technique useful for initial evaluation of the nodes and gives clues towards the possible etiology of the lymphadenopathy. For suspicious cases, an FNAC can be done and if the results are equivocal then biopsy procedure can be done for definite diagnosis.
Key Words: Ultrasound of neck nodes, FNAC of cervical nodes, Malignant cervical nodes

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INTRODUCTION

Approximately one third of body lymph nodes are placed in cervical region. [1] Cervical lymphadenopathy can be seen in several pathologic processes such as lymphoma, tuberculosis and metastasis. [2-4] Therefore, an accurate differentiation between these conditions is of utmost importance to select an appropriate therapy and assess the prognosis.[5,6] Gray scale sonography is used for evaluation of number, size, shape and borders of lymph nodes.[7,8,9] Advantages of USG include wider accessibility, availability of high frequency probes with greater resolution, no radiation issues and real time examination in multiple planes with feasibility for USG guided aspiration cytology/histopathology whenever needed. [10] The addition of color Doppler has further sharpened the diagnostic accuracy. [10] Color/power Doppler sonography can further characterize lymph nodes as non-neoplastic (reactive, 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. [11] Ultrasonographic criteria for distinguishing neoplastic and non-neoplastic lymph nodes are commonly studied under site, shape, size, echogenicity, hilum, matting, nodal border, long/short axis ratio, intranodal necrosis, and angioarchitecture. [11]

AIM OF THE STUDY

Evaluation of cervical lymph nodes by ultrasound and its correlation with FNAC

MATERIALS AND METHODS

No ethical issues were involved in the study. Informed consent was taken from all patients who were posted for USG and FNAC. This was a prospective study done in the department of Radiodiagnosis at Mamata Academy of Medical Sciences, Bachupally, Hyderabad, Telangana. This study was done over a period of eight months from December 2018 to June 2019. A total of 110 cases were studied.

Technique: Ultrasound of neck was done in all cases using high-frequency linear array ultrasound transducer. Ultrasound machine used was SONOSCAPE S6. FNAC was done in the cases by concerned expert Pathologist working in our Institute.

Inclusion Criteria

1. Age group from 10 years to 70 years
2. Both genders
3. All the patients attending outpatient and inpatient department of general medicine and general surgery with cervical lymphadenopathy sent for ultrasound examination.
4. Patients in whom both ultrasound and FNAC was done with adequate FNAC material.

Exclusion Criteria

1. Age group less than10 years.
2. Patients with other neck masses and having no evidence of cervical lymphadenopathy on ultrasound.

All the patients were evaluated by taking detailed clinical history and thorough clinical examination was done. Routine investigations such as hemogram and urine analysis were done as per clinicians test request forms. Additional tests such as renal function tests, liver function tests and thyroid function tests were done in some cases as per clinicians' requirement. In our department, Ultrasound of neck was done in all cases using high-frequency linear array ultrasound transducer followed by FNAC procedure. The FNAC material was processed in the department of Pathology and air dried and wet fixed smears were stained and examined. Later the FNAC reports were collected and correlated with the ultrasound findings.

Equipment

In the present study, gray-scale real-time ultrasound examination was done using 7.5 MHz linear array transducer. Ultrasound machines used were SONOSCAPE S6.

The parameters that were followed in this study to differentiate between reactive, tubercular, and neoplastic (malignant) lymph nodes are given as below.

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 or unsharp
7. Homogeneity and heterogeneity
8. Central necrosis and cystic necrosis
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 nodes with oval shape, echogenic hilum, homogenous echotexture, matting, L/S ratio >2, and hilar vascularity were considered as reactive lymphadenopathy. Nodes that were hypoechoic, round without echogenic hilus, intranodal cystic necrosis, nodal matting, and having adjacent soft tissue edema were considered tubercular lymphadenitis.

RESULTS

In the present study a total of 110 patients were included who had presented with enlarged cervical lymph nodes.

Table 1: Age-wise distribution of the cases

Age (in years)	No. of cases	Percent (%)
10-20	05	4.5%
20-30	20	12.5%
31-40	22	20%
41-50	50	50.9%
51-60	08	7.2%
61-70	05	4.5%
Total	**110**	**100%**

.In the present study age group distribution ranged from 10 years to 70 years. Majority ie, 50.9 % (50/110) were among 41-50 years. Next common age group was 31-40 years (20%). Gender-wise distribution of cases: There were 20 (18.1%) males and 90 (81.8%) females in the study. The male to female ratio was 0.2:1.

Table 2: Diagnosis on ultrasound

Diagnosis on USG	No. of cases	Percent (%)
Reactive	85	77.2%
Tubercular	10	9.09%
Malignancy	10	9.09%
Metastases	05	4.5%
Total	**110**	**100%**

Most (77.2%) cases were diagnosed as reactive lymph nodes.

Table 3: Distribution of border of nodes according to ultrasound

Category	Sharp	Unsharp	Total
Reactive	40	45	85
Tubercular	3	7	10
Malignancy	7	3	10
Metastases	3	2	05

Table 4: Distribution of lymph node echotexture according to USG

Category	Homogenous	Heterogenous	Total
Reactive	70	15	85
Tubercular	7	3	10
Malignancy	2	8	10
Metastases	1	4	05

Most of the reactive lymph nodes (70/85) had homogenous echotexture.

Table: 5 Hilar vascularity on ultrasound diagnosis

Category	Present	Absent	Total
Reactive	65	20	85
Tubercular	3	7	10
Malignancy	2	8	10
Metastases	1	4	05

Most of the reactive lymph nodes (65/85) had hilar vascularity whereas most of the malignant nodes (8/10) showed absence of hilar vascularity.

Table 6: Capsular vascularity on ultrasound diagnosis

Category	Present	Absent	Total
Reactive	30	55	85
Tubercular	1	9	10
Malignancy	7	3	10
Metastases	2	3	05

Most of the reactive nodes (55/85) showed absent capsular vascularity whereas most of the malignant nodes (7/10) showed presence of capsular vascularity.

Table 7: Diagnosis on FNAC

Diagnosis on USG	No. of cases	Percent (%)
Acute suppurative lesion	20	18.1%
Reactive lymphadenitis	65	59.0%
Tubercular lymphadenitis	10	9.09%
Malignancy	10	9.09%
Metastases	05	4.5%
Total	**110**	**100%**

The most common diagnosis on FNAC was of reactive lymphadenitis seen in 59% cases.

DISCUSSION

Ultrasonography is a noninvasive tool for the initial study of cervical lymph nodes. The ultrasound morphology of normal nodes is different from those of reactive and neoplastic nodes. However, at the same time differentiating reactive, tubercular, lymphomatous and metastatic nodes can be difficult sometimes due to overlapping features on ultrasound. And hence, either FNAC or biopsy of the affected node has to be done in suspicious cases. [12]

Sample size: In the present study the sample size was of 110 subjects. Kumar et al [13] studied 80 similar cases, Singh AK et al [14] studied 100 cases and Malhotra AS et al [15] studied 238 cases. However, the latter study included other sites of lymphadenopathy like axillary and inguinal, mediastinal and abdominal, in addition to cervical lymphadenopathy. Komma et al [16] studied 83 similar cases and Khanna et al [12] studied 192 such cases of cervical lymphadenopathy.

Age distribution: Most of our cases were in the 31 to 50 years age groups. Kumar et al [13] and Singh AK et al [14] also observed increased prevalence of cervical lymphadenopathy in these age groups. Our patient age ranged from 10 to 70 years. In Kumar et al [13] study, and Singh AK et al [14] study, the age ranged from 12 to 60 years and 13 to above 70 years respectively.

Ultrasound diagnosis

Table 8: Comparison of diagnosis on ultrasound with other studies

Diagnosis on ultrasound	Malignant	Tubercular	Reactive	Metastatic
Singh AK et al [14]	55	18	27	-
Kumar et al [13]	35	21	24	-
Khanna et al [12]	14	62	98	11
Pattanayak et al [17]	22	28	25	25
Present study	10	10	85	05

Our observation of reactive lymphadenitis being the most common cause for cervical lymphadenopathy is similar to the observation of Khanna et al [12] Ultrasound is preferred over computed tomography (CT) and magnetic resonance imaging (MRI) in evaluation cervical lymphadenopathy as this modality is more readily available, also it can be repeated for follow up of patients and is less expensive than the other two methods. [13]

Table 9: Comparison of diagnosis on FNAC with other studies

Diagnosis on FNAC	Malignant	Tubercular	Reactive
Singh AK et al [14]	46	26	28
Kumar et al [13]	29	21	30
Present study	10	10	65

Various studies by Danninger et al[18] and Ahuja et al[19] have given the sensitivity and specificity of ultrasound in detecting malignant nodes as 96% and 69%, and 95% and 83% respectively. In our study there were fifteen cases of malignancy ie primary and metastatic malignancy in the lymph nodes. All fifteen were correctly detected on ultrasound examination giving a sensitivity ad specificity of 100% each. Such high rates of sensitivity and specificity could be due to the low sample size. However, when the individual factors of capsular and hilar vascularity are considered, the sensitivity and specificity for malignancy is variable. Sharp borders of lymph nodes on ultrasound are usually seen in metastatic malignancies and benign/reactive and tuberculous nodes show unsharp borders as observed by Shozushima M et al. [20] Our study also had similar finding of sharp borders of lymph nodes in 10/15 cases and more number of benign lesions had unsharp borders as compared to malignant nodes. In contrast Ahuja et al [11] in their study concluded that border sharpness on ultrasound is not helpful in diagnosis. In our study we noted most of reactive lymph nodes to have hilar vascularity and malignant nodes to have capsular

vascularity. In our study 70/85 cases of reactive nodes had homogenous echotexture. Homogenous echotexture of the enlarged nodes goes in favor of reactive etiology and heterogeneity goes in favor of malignancy as described by Kumar et al[13] and Toriyabe et al.[21] Komma S et al [16] also in their study observed that 84% of reactive nodes had homogenous echotecture and 73% of malignant nodes had heterogenous echotexture. Our findings are in concordance with the observations of above authors. FNAC is a simple, inexpensive, rapid, out-patient procedure and compliments the ultrasound examination findings and reduces the rate of surgery. [20] According to Pattanayak et al[17] ultrasound and color Doppler ultrasound in combination are helpful in the accurate detection of reactive lymph nodes. However, they also caution that it cannot be used as a diagnostic method for metastatic or tubercular nodes and cytopathology/histopathology remains the gold standard in such situations.

CONCLUSION

Cervical lymphadenopathy can affect any age but is more common in the third to fifth decades of life. Reactive enlargement is more common than tuberculous or malignant etiologies. Ultrasound examination of cervical lymph nodes is a simple, noninvasive diagnostic technique useful for initial evaluation of the nodes and gives clues towards the possible etiology of the lymphadenopathy. For suspicious cases, an FNAC can be done and if the results are equivocal then biopsy procedure can be done for definite diagnosis.

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