

Assessment of Neck Masses Using Ultrasonography: An Institutional Based Study

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ABSTRACT

Background: Ultrasound is a relatively inexpensive, widely available noninvasive method of investigation. Although there is extensive documentation on the use of ultrasound in abdominal lesions, it appears to have been underutilized in the evaluation of neck masses. Hence; we planned the present study to assess the spectrum of neck masses using ultrasonography.

Materials & Methods: The present study included assessment of diagnostic accuracy of ultrasound in diagnosing neck masses. A total of 50 cases of neck swellings were randomly selected and were analyzed. Careful inspection and palpation of all the swellings was done. Division of all the swellings was done broadly into four categories; Inflammatory, Benign, Malignant and cystic. Separate experienced and certified Radiologists assessed the obtained sonographic images. Surgical therapy was carried out after obtaining the Ultrasonographic findings and biopsy specimen was obtained. By analyzing the histopathologic findings, final diagnosis was obtained. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: In the present study, a total of 50 patients with neck swellings were analyzed. After performing the ultrasonography and surgical intervention, all the patients were broadly divided into four study groups, depending upon the type of swelling- Inflammatory (54 percent patients), cystic (12 percent

patients), benign (14 percent patients) and malignant (20 percent patients). Sensitivity of ultrasonography in diagnosing cystic lesions, inflammatory lesions, benign lesions and malignant lesions was 100%, 97%, 100% and 100% respectively. Specificity of ultrasonography in diagnosing cystic lesions, inflammatory lesions, benign lesions and malignant lesions was 98%, 100%, 98% and 98% respectively.

Conclusion: Use of ultrasonography in the field of radiodiagnosis can significantly improve the assessment the neck masses.

Key words: Neck, Masses, Ultrasound.

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INTRODUCTION

Although clinical history and examination may suggest the diagnosis, imaging is required to confirm the clinical diagnosis and assess the anatomical extent of the lesion before treatment.^{1,2} High-resolution ultrasound (US) is an ideal initial imaging investigation for neck masses as it reveals the cystic nature in most cases and localizes the mass in relationship to the surrounding structures.^{3,4} In many clinical conditions, high-resolution sonography and color (power) Doppler sonography can be used as the first-line modality for evaluating cervical soft tissue masses. Cervical cysts, lipomas, paragangliomas, neurogenic tumors, hemangiomas, and lymphangiomas often exhibit characteristic sonographic appearances. Sonography can be used for lymph node assessment, and most salivary gland diseases can be diagnosed sonographically. Sonography can be used to guide needle biopsy of soft tissue neoplasms and lymph nodes.^{5,6}

Ultrasound is a relatively inexpensive, widely available noninvasive method of investigation. Although there is extensive documentation on the use of ultrasound in abdominal lesions, it appears to have been underutilized in the evaluation of neck masses.^{7,8}

Hence; we planned the present study to assess the spectrum of neck masses using ultrasonography.

MATERIALS & METHODS

The present study was conducted in the Department of Radiodiagnosis, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh (India) and it included assessment of diagnostic accuracy of ultrasound in diagnosing neck masses. Ethical approval was obtained from the ethical committee of the institution and written consent was obtained after explaining in detail the

entire research protocol. A total of 50 cases of neck swellings were randomly selected and were analyzed. Swellings arising due to any kind of trauma or fracture were excluded from the present study. Detailed clinical history was obtained from all the patients. Thorough clinical examination was carried out in all the patients according to criteria described previously in the literature.⁹ Careful inspection and palpation of all the swellings was done. Inspection was done with the purpose of obtaining all the details in relation to the shape, size and other morphologic parameters of the swellings. Division of all the swellings was done broadly into

four categories; Inflammatory, Benign, Malignant and cystic. Ultrasonographic evaluation was carried out in all the patients. Ultrasonography findings in all the patients were described based on the criteria previously mentioned in the literature.¹⁰ Separate experienced and certified Radiologists assessed the obtained sonographic images. Surgical therapy was carried out after obtaining the Ultrasonographic findings and biopsy specimen was obtained. By analyzing the histopathologic findings, final diagnosis was obtained. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Table 1: Distribution of patients of the present study according to the type of neck swelling

Pathology	Number of patients	Percentage
Cystic	6	12
Inflammatory	27	54
Benign	7	14
Malignant	10	20
Total	50	100

Table 2: Ultrasonography findings of cystic lesions

Parameter	Number of lesions	
Ultrasonography architecture of pathology	Homogenous	5
	Heterogeneous	1
Ultrasonography characteristic of tissues	Cystic	6
	Solid	0
	Mixed	0

Table 3: Ultrasonography findings of inflammatory lesions

Parameter	Number of lesions	
Ultrasonography architecture of pathology	Homogenous	18
	Heterogeneous	9
Ultrasonography characteristic of tissues	Cystic	11
	Solid	14
	Mixed	2

Table 4: Ultrasonography findings of benign lesions

Parameter	Number of lesions	
Ultrasonography architecture of pathology	Homogenous	5
	Heterogeneous	2
Ultrasonography characteristic of tissues	Cystic	1
	Solid	5
	Mixed	1

Table 5: Ultrasonography findings of malignant lesions

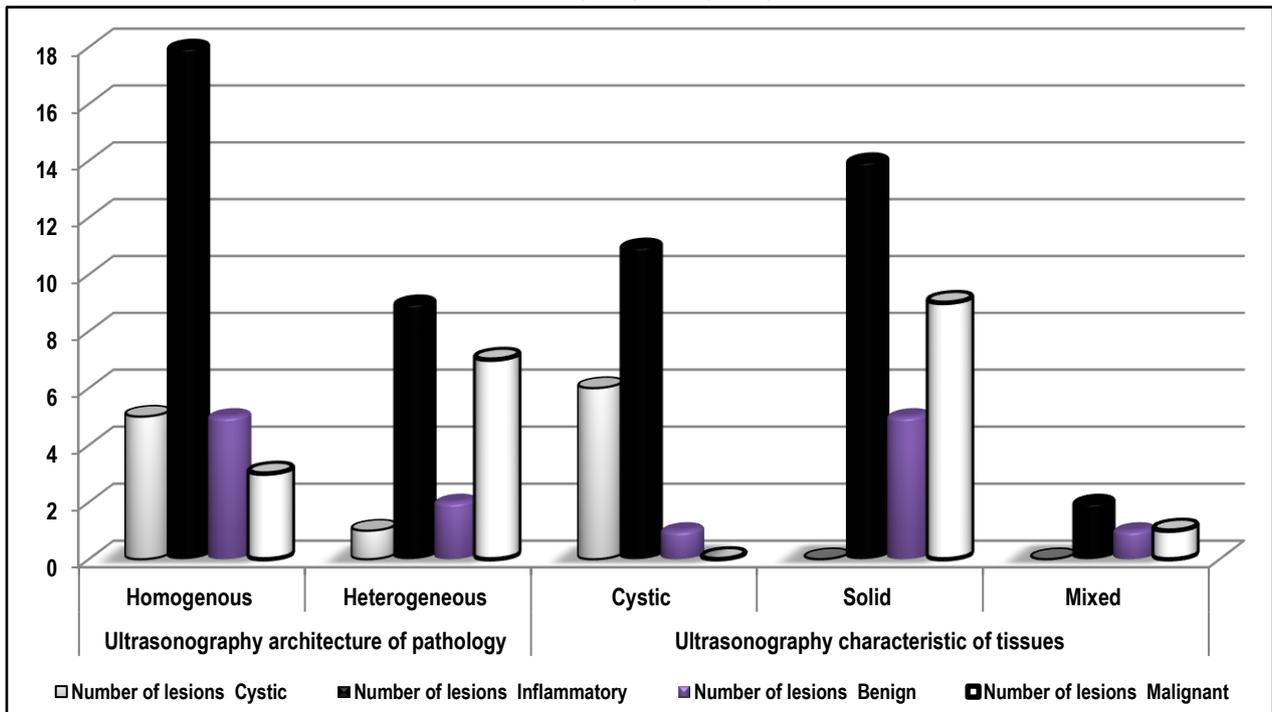
Parameter	Number of lesions	
Ultrasonography architecture of pathology	Homogenous	3
	Heterogeneous	7
Ultrasonography characteristic of tissues	Cystic	0
	Solid	9
	Mixed	1

Table 6: Comparison of ultrasonography and clinical diagnosis

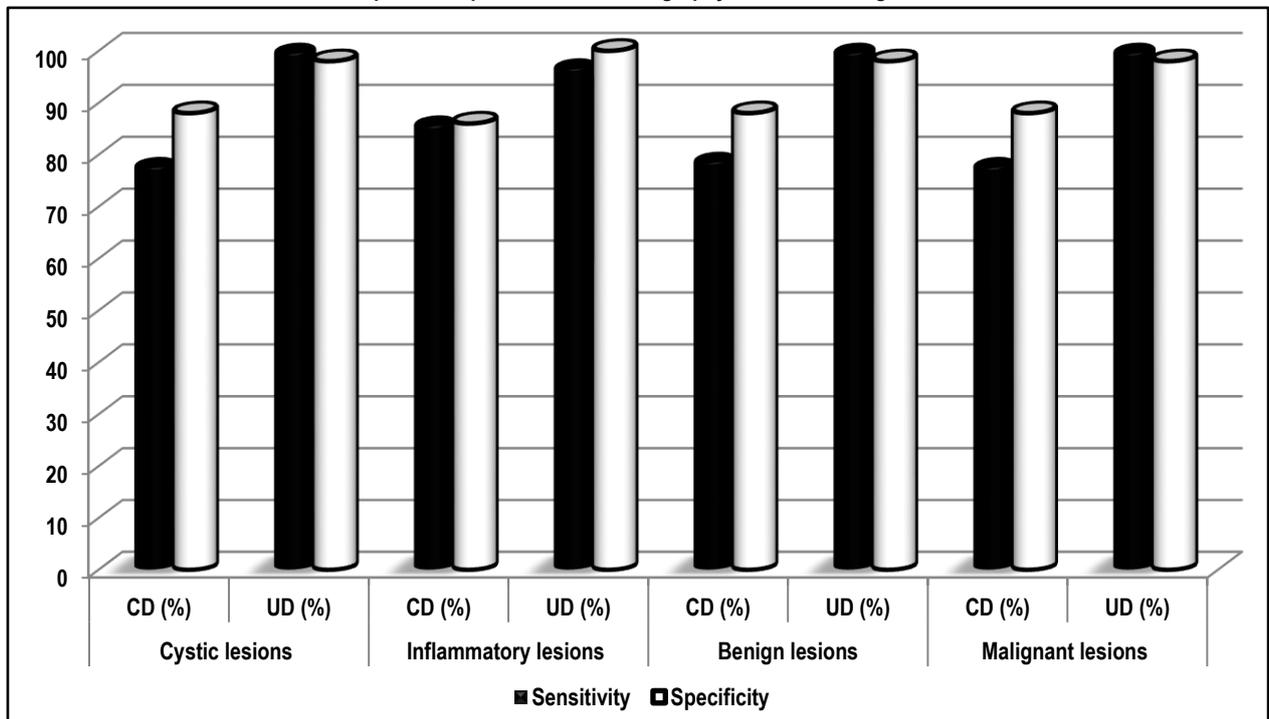
Sensitivity assessment	Cystic lesions		Inflammatory lesions		Benign lesions		Malignant lesions	
	CD (%)	UD (%)	CD (%)	UD (%)	CD (%)	UD (%)	CD (%)	UD (%)
Sensitivity	78	100	86	97	79	100	78	100
Specificity	88	98	86	100	88	98	88	98

CD (%): Clinical Diagnosis percentage, UD (%): Ultrasonographic Diagnosis percentage

Graph 1: Ultrasonography findings of cystic lesions



Graph 2: Comparison of ultrasonography and clinical diagnosis



CD (%): Clinical Diagnosis percentage, UD (%): Ultrasonographic Diagnosis percentage

RESULTS

In the present study, a total of 50 patients with neck swellings were analyzed. After performing the ultrasonography and surgical intervention, all the patients were broadly divided into four study groups, depending upon the type of swelling- Inflammatory (54 percent patients), cystic (12 percent patients), benign (14 percent patients) and malignant (20 percent patients).

Among the cystic lesions, Ultrasonographic architecture was obtained as homogenous in 5 lesions and was heterogeneous in 1 lesion. On ultrasound, cystic nature was seen in all the 6 lesions.

On obtaining Ultrasonographic findings in inflammatory lesions, it was seen that homogenous characteristic was present in 18 patients while heterogeneous characteristic was present in 9 lesions. Cystic nature on ultrasonography was seen in 11 lesions, whereas solid nature was seen in 14 lesions. In the remaining 2 lesions, mixed appearance was seen.

Among the malignant lesions, Ultrasonographic architecture was obtained as homogenous in 3 lesions and was heterogeneous in 7 lesions. On ultrasound, solid nature was seen in 9 lesions,

whereas, in the remaining 1 lesion, it was mixed in nature. On obtaining Ultrasonographic findings in benign lesions, it was seen that homogenous characteristic was present in 5 patients while heterogeneous characteristic was present in 2 lesions. Cystic nature on ultrasonography was seen in 1 lesion, whereas solid nature was seen in 5 lesions. In the remaining 1 lesion, mixed appearance was seen. Sensitivity of ultrasonography in diagnosing cystic lesions, inflammatory lesions, benign lesions and malignant lesions was 100%, 97%, 100% and 100% respectively. Specificity of ultrasonography in diagnosing cystic lesions, inflammatory lesions, benign lesions and malignant lesions was 98%, 100%, 98% and 98% respectively.

DISCUSSION

A total of 50 patients with neck swellings were analyzed in the present study. All the patients were broadly divided into four study groups, depending upon the type of swelling- Inflammatory (54 percent patients), cystic (12 percent patients), benign (14 percent patients) and malignant (20 percent patients). Moshtaghi O et al evaluated the efficacy of otolaryngologist-performed in-office ultrasound (US) in the clinical assessment of lateral neck masses. They performed a retrospective review of patients with lateral neck masses who had both a surgeon-performed US and US-guided fine-needle aspiration (USGFNA) at our tertiary academic center from 2012 to 2015. Fifty-nine patients were included. USGFNA results included 32 (54%) malignant lesions, 23 (39%) benign lesions, and 4 (6%) nondiagnostic lesions. USGFNA demonstrated 85% accuracy. In 22 (37%) patients, in-office US revealed additional findings that were not identified on physical examination, which either assisted in surgical planning or altered treatment. In-office US and USGFNA on initial evaluation by the otolaryngologist augment physical examination and have potential value as the primary imaging and diagnostic modality in the workup of lateral neck masses.¹¹

In the present study, among the cystic lesions, Ultrasonographic architecture was obtained as homogenous in 5 lesions and was heterogeneous in 1 lesion. On ultrasound, cystic nature was seen in all the 6 lesions. On obtaining Ultrasonographic findings in inflammatory lesions, it was seen that homogenous characteristic was present in 18 patients while heterogeneous characteristic was present in 9 lesions. Cystic nature on ultrasonography was seen in 11 lesions, whereas solid nature was seen in 14 lesions. In the remaining 2 lesions, mixed appearance was seen. Chandak R et al evaluated the efficacy of ultrasonography in the diagnosis of swellings in the head and neck regions. For this study, 70 cases with clinically obvious swellings in head and neck regions were selected randomly. The ultrasonographic features considered were shape, boundary, echo intensity, ultrasound architecture of lesion, posterior echoes and ultrasound characteristic of tissues. Intergroup comparisons were made between four different types of swellings: inflammatory; cystic; benign; and malignant. A comparison was made between benign and malignant neoplasms, and the criteria of boundary, echo intensity and ultrasound architecture of lesions are statistically significant as the P-value is <0.05. The comparison of inflammatory swellings and malignant neoplasms shows that criteria of boundary and ultrasound architecture of lesions are statistically significant. The comparison of cystic swellings and benign neoplasms concluded that only the criterion of ultrasound characteristics of tissues is statistically

significant. The comparison of inflammatory swellings and benign neoplasms shows that the criteria of boundary and echo intensity are statistically significant. The comparison of inflammatory swellings and cystic swellings concluded that the criteria of boundary, shape, echo intensity, posterior echoes and ultrasound characteristics of tissues are statistically significant. The comparison of cystic swellings and malignant neoplasms concluded that the criteria of ultrasonography, boundary, shape, echo intensity, ultrasound architecture of lesion, posterior echoes and ultrasound characteristics of tissues are statistically significant as the P-value is <0.05. It can be concluded that clinical diagnosis had sensitivity and accuracy of 85.7% and ultrasonographic diagnosis had a sensitivity and accuracy of 98.5%.¹²

In the present study, among the malignant lesions, Ultrasonographic architecture was obtained as homogenous in 3 lesions and was heterogeneous in 7 lesions. On ultrasound, solid nature was seen in 9 lesions, whereas, in the remaining 1 lesion, it was mixed in nature. On obtaining Ultrasonographic findings in benign lesions, it was seen that homogenous characteristic was present in 5 patients while heterogeneous characteristic was present in 2 lesions. Cystic nature on ultrasonography was seen in 1 lesion, whereas solid nature was seen in 5 lesions. In the remaining 1 lesion, mixed appearance was seen. Sensitivity of ultrasonography in diagnosing cystic lesions, inflammatory lesions, benign lesions and malignant lesions was 100%, 97%, 100% and 100% respectively. Specificity of ultrasonography in diagnosing cystic lesions, inflammatory lesions, benign lesions and malignant lesions was 98%, 100%, 98% and 98% respectively. Akinbami BO et al determined the accuracy, sensitivity, specificity and prediction values of ultrasound as a means of diagnosis of cervico-facial soft tissue swellings. They carried out ultrasonographic evaluation of 76 consecutive cases of cervico-facial soft tissue swellings that presented at the Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria from August 2002 to November 2003. The patients' demographics and relevant clinical information were obtained. Ultrasonographic evaluation was done using the B-mode transcutaneous ultrasonic imaging device with a transducer frequency of 5MHz. All the lesions were subjected to histopathological examination. There were 43(56.6%) males and 33(43.4%) females whose ages ranged from 2 weeks to 70 years (mean +/- SD; 22 +/- 19.7 years). Histologically, tumours constituted the highest percentage of swellings (35.5%), followed by cysts (26.3%). Males were more predominant in all classes of swellings except benign tumours. The accuracy of ultrasound in the diagnosis of pleomorphic adenoma was 80% and 100% for both adenocarcinoma and hemangioma. It was also 100% for majority of the cysts and HIV associated salivary gland swellings. The sensitivity of ultrasound in the diagnosis of pleomorphic adenoma was 80% and 100% for adenocarcinoma, hemangioma, all the cysts and HIV associated swellings. Ultrasound was also 100% specific in the diagnosis of monomorphic adenoma and hemangioma. Ultrasound was a useful diagnostic tool for cervicofacial soft tissue swellings.¹³

CONCLUSION

Under the light of above obtained data, the authors conclude that use of ultrasonography in the field of radio-diagnosis can significantly improve the assessment the neck masses. However; further studies are recommended.

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