Diagnostic Role of Ultrasonography in Neck Swellings

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Abstract

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The study of ultrasonographic features of various neck swellings in fifty patients was done. There were 22 thyroid and thyroid related swelling, 8 salivary gland lesions, 9 lymph nodes and 14 swellings of miscellaneous origin. Various ultrasonographic features like echogenicity, echotextures were noted. There were no specific echogenicity in benign and malignant thyroid neoplasms. Various ultrasonographic features of benign and malignant salivary neoplasms and lymph nodes are described. Specific sonographic features of various miscellaneous neck swellings are also described.

INTRODUCTION

Two new dimensions of medical practice pervade our environs; non-invasive diagnosis and cost control. Ultrasonography qualifies eminently in regards. While there have been many reports on its use in thyroid diseases, there are few reports on its general use in the diagnosis of head and neck diseases. Ultrasonography gives an accurate information as to the form and content of cervical masses. It enables us to distinguish solid from cystic lesions. It may alert us to the probabilities of malignant versus benign nature of neck swellings. The present study has been done with an aim to study the ultrasonographic features of various neck swellings.

Materials and Methods

This study included fifty three neck swellings in fifty patients who attended the ENT OPD in SSG hospital, Baroda between April 1994 and March 1996. After detail clinical examination,

ultrasonography of neck was done in supine position with neck hyperextended using 3.5 MHZ convex and 5 MHZ linear probes. Transverse, longitudinal, multiple angled and oblique projections were taken. Final diagnosis was made on the basis of fine needle aspiration cytology and histopathology of excised specimens.

Results

The maximum number of patients belonged to the age group 21-30 years. Male to female ratio was 1.4:1. The neck swellings were classified into 4 groups- Thyroid and thyroid related swellings (22), Salivary gland lesions (8), Lymph nodes (9) and Miscellaneous swellings (14).

Thyroid swellings (22) were subclassified into Benign thyroid lesions (14), Malignant thyroid lesions (3), and thyroglossal cyst (5). On ultrasonography all malignant lesions were hyperechoic. Of the benign thyroid lesions, 57% were hypoechoic and homogenous, 21.4%

were hyperechoic, 14.6% were anechoic and 7% were isoechoic. Calcification was seen in only one benign thyroid lesion. All thyroglossal cysts were anechoic and homogenous.

Ultrasonographic features of salivary neoplasms were variable, which those of parotid cyst and plunging ranula were classical as shown in Table No. 1. All salivary neoplasms were hypoechoic. All benign salivary lesions were homogenous and had regular margins. Calcification was seen in only one malignant neoplasm. Parotid cyst and plunging ranula were anechoic. Intra oral extension in case of plunging ranula was seen as anechoic mass separated from neck swelling by muscles of the floor of mouth (Figure 1).

All metastatic lymphnodes were hypoechoic and homogenous. Calcification was seen in only one lymph node. Long to short ratio (L/S) was calculated by dividing the longitudinal diameter by the axial diameter. L/S axis ratio of less than two was seen in 8 (88.8%) lymph nodes. Jugular vein infiltration was seen in four cases. The carotid artery infiltration by lymph node was seen in one case.

Out of fourteen miscellaneous neck swellings some swellings like cystic hygroma, hemangioma, Jugular vein ectasia had

characteristic anechoic appearances that led to an accurate diagnosis. The ultrasonographic features are as shown in Table No. II.

Discussion

Thyroid and Thyroid Related Swellings

The ultrasound appearances of benign thyroid lesions vary significantly with the sequence of events in their formation like colloid accumulation, necrosis, haemorrhage, fibrosis, scarring and calcification. In our study hypoechoogenicity was the most common feature of benign thyroid lesions while in Brkljacic et al (1994) study it was hyperechogenicity. All malignant thyroid lesions were hypoechoic. These findings are in conformity with Brikljacic et al who found hypoechoic in 78% of malignant thyroid lesions. This is because the probability of malignancy is substantially higher in solid lesions which are either hypoechoic or hyperechoic.

Most of the thyroglossal cysts were anechoic as seen by Kraus et al (1986) and also in our study. Hypoechoic is due to increased proteinaceous substance in thyroglossal cyst.

Salivary Gland Lesions

The fairly reliable parameter for assessing benign-

TABLE I
ULTRASONOGRAPHIC FEATURES OF SALIVARY GLAND LESIONS.

S.N.	Ultrasonographic features	Benign salivary neoplasm (n=3)	Malignant salivary neoplasm (n=2)	Parotid cyst (n=1) plunging ranula (n=2)
1	Echogenicity Hypoechoic Anechoic	3 —	2 —	— 3
2	Echotexture Homogenous Heterogenous	3 —	1 1	3 —
3	Calcification	—	1	—
4	Margins Regular Irregular	3 —	1 1	3 —

Fig1. Longitudinal and Transverse scan of plunging ranula showing separation of intraoral extension from external neck swelling by muscles of the floor of mouth.

nity of salivary gland neoplasms is the presence of regular margins, the other parameter being echotexture. Most neoplasms were homogenous in echotexture. Some neoplasms are heterogenous due to inflammation or reactive hyperplasia of intraglandular lymph node. Calcification is a neoplasm may be seen if neoplasm is of a very long duration. In one case of long standing malignant salivary neoplasm, calcifications were seen posterior acoustic shadows. Biopsy report of excised specimen was suggestive of spindle cell carcinoma. Cystic salivary lesions like parotid cysts and plunging ranula are anechoic.

Lymph Nodes

The echogenicity of metastatic nodes may vary from hypoechoic (in comparison to thyroid parenchyma) to isoechoic. In our study all lymph nodes were hypoechoic. Metastatic lymphnodes sometimes mimic the structural pattern of the primary neoplasm e.g. nodal deposits from papillary or medullary carcinoma of thyroid may have a cystic appearance or micro calcification or both. Ahuja et al (1995) who found that 87.5% of metastatic cervical lymph nodes in papillary carcinoma of the thyroid were hyperechoic. This is because of presence of calcification. Reactive nodes tend to

TABLE II
ULTRASONOGRAPHIC FEATURES OF MISCELLANEOUS NECK SWELLING

S.N.	Swellings Number		Echogenicity	Echotexture
	CYSTIC			
1	Sebaceous cyst	1	Anechoic	Homogenous
2	Dermoid cyst	1	Predominantly Hypoechoic	Heterogenous
3	Cystic Hygroma	4	Anechoic	Homogenous*
4	Hemangioma	1	Anechoic	Homogenous**
5	Jugular ectasia	2	Anechoic	Homogenous
	SOLID			
1	Lipoma	1	Hyperechoic	Homogenous
2	Rhabdomyosarcoma	3	Heterogenous	Heterogenous***
3	Neurofibroma	1	Hypoechoic	Homogenous

* Extension into chest is one swelling

** Compressible on putting probe.

*** Calcification in one.

Fig 2. Ultrasonography of neck showing multiseptated anechoic mass with no compression of major neck vessels is diagnostic of Cystic Hygroma.

have an oval shape, whereas metastatic nodes are roundish. "Roundness Index (RI)" is obtained by dividing the longitudinal diameter by the axial diameter. L/S axis ratio of less than 2 was seen in 95% of metastatic lymph nodes by Steinkamp et al (1995).

The ultrasonographic pattern of dynamic relationship of lymphnode metastasis to surrounding vascular structures in the neck is important for preoperative assessment. The patient may have to swallow or may have to do a Valsalva's manoeuvre to assess displacement or invasions of vessel by tumour. In the present study Jugular vein infiltration was seen in four cases on ultrasonography. The carotid artery infiltration was seen in one case on ultrasonography which was difficult to diagnose only on clinical examination.

Miscellaneous Neck Swellings

The echogenicity of some miscellaneous neck swellings does identify the internal characteristics of the swellings. Dermoid cyst was hypoechoic in Jafri et al study (1989) and also in the present study because of clusters of keratin in the cysts Lipomas hyperechoic as fat is more echogenic than surrounding structures. In Jafri et al (1989) and in the present study neurofibromas of neck were hypoechoic. Rhabdomyosarcomas were heterogenous because of presence of calcification, necrosis and haemorrhage.

Presence of anechoic mass with internal septations is diagnostic of cystic hygroma (Figure 2). The extension into chest was detected in one patient by us and by Jafri et al (1989) in size on coughing and Valsalva's manoeuvre. Ultrasonography was the investigation of choice to define the relationship with internal jugular vein in Genedh et al (1994) and in the present study.

Conclusions

Ultrasonography is very helpful in differentiating between solid and cystic neck swellings. It also differentiates between benign and malignant lesions of salivary glands and lymph nodes. There are no specific echographic features of benign and malignant thyroid neoplasms. Cystic hygroma, hemangioma and Internal jugular vein ectasia have characteristic ultrasonographic features. Ultrasonography is very useful in detecting the site, extent, consistency and relationship of neck swellings to adjacent structures.

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