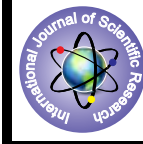


Non Invasive Differentiation of Benign from Malignant Parotid Lesions: Ultrasonography Proves a Boon



Medical Sciences

KEYWORDS : ultrasonography ,parotitis, parotid abscess ,pleomorphic adenoma

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ABSTRACT

Most parotid lesions are inflammatory in nature. Salivary neoplasms account for less than 3 % of all head and neck tumors and less than 0.1 % of all cancer deaths. A prospective study of 30 cases , comprising mainly of patients presenting with swelling in the parotid region ,where we have analyzed the ultrasonographic characteristics and have attempted to differentiate benign from malignant tumors. The commonest pathology being parotid abscess, followed by parotitis and pleomorphic adenoma. Ultrasound has been able to differentiate benign from malignant lesions with an accuracy of 100% .With ultrasound being very safe, economical and ready available modality for the diagnosis of parotid lesions.Ultrasound is better than CT or MR in differentiating benign from malignant lesions and in the assessment of vascularity with the help of doppler. Thus ultrasound is the primary imaging modality for parotid gland lesions with a high sensitivity.

AIM AND OBJECTIVES OF THE STUDY WERE:

To study and analyze the incidence of parotid lesions in various age groups, their ultrasonography appearances ,the accuracy of ultrasound in characterizing various parotid lesions and differentiating between benign and malignant tumors by developing useful criteria for differentiating the two.

MATERIALS AND METHODS:

A prospective study of 30 patients with parotid pathology was done by ultrasonography using a 10 MHz linear array transducer with Doppler facility between January 2012 and April 2012.

ULTRASONOGRAPHIC FEATURES OF PAROTID GLAND PATHOLOGY

I. SIALOSIS :

Refers to a nonneoplastic, non inflammatory, nontender chronic or recurrent enlargement of the parotid glands.[1]

Clinical Features :

Asymptomatic bilateral symmetrical enlargement of parotid glands

Ultrasound Features :

Enlarged glands with normal shapes and echotexture.

II. INFLAMMATION ACUTE

Bacterial Parotitis:

Clinical Features :

Painful, enlarged salivary gland, usually unilateral. Tender and may be associated with facial nerve paralysis.

Ultrasonographic Features :

- Enlarged gland, tender to transducer pressure ,diffusely hypoechoic with heterogenous echotexture.
- Later small microabscesses appear as echo poor foci, these may coalesce to form a large abscess.
- Abscesses are seen as hypoechoic area with good through transmission. There is overlying skin thickening. Borders are irregular and internal debris may be found.
- Preauricular and intraparotid lymphadenopathy.[1],[3]

VIRAL PAROTITIS

Clinical Features :

Acute painful swelling of one or both glands with malaise. Mumps is the commonest cause. Others include parainfluenza, influenza A, herpes, Echovirus.

Ultrasonographic Features :

- Unilateral or bilaterally enlarged parotid glands with a diffuse decrease in parenchymal echogenicity.
- Retroauricular and jugular chain lymphadenopathy.

- Associated submandibular gland enlargement with similar changes.[1],[3]

CHRONIC INFLAMMATION

AUTOIMMUNE : SJOGREN'S SYNDROME

Clinical Features :

- Can affect children aged 8 months – 15 years; M>F and adults between 40 years-60 years; F>M.
- Clinically two types are seen :Primary Sjogren's Syndrome ; Affects salivary and lacrimal glands and Secondary Sjogren's syndrome ;Involvement of salivary glands secondary to systemic autoimmune disorders.

Ultrasonographic Features :

- Early stage – Normal diagnosable by sialography.
- Slight decrease in parenchymal echogenicity.
- Multiple cystic areas scattered throughout the gland due to peripheral non obstructive sialectasia with cystic areas ranging from simple cysts to complex multiseptated cysts with irregular margins.
- Later fibrotic and infective changes cause a heterogenous echotexture.[2]

POST IRRADIATION

Clinical Features :

Following irradiation patients develop dryness of mouth, which usually occurs after 6-8 months.

Ultrasonographic Features :

- Reduced Volume with increased echogenicity of gland.

GRANULOMATOUS INFLAMMATION

SARCOIDOSIS

Clinical Features :

- The patient is usually a known case of sarcoidosis and presents with bilateral chronic painless enlargement of the parotids.

Ultrasonographic Features :

- Multiple hypoechoic rounded lesions in the gland which may be due to parenchymal lesions or lymph nodes or as solitary hypoechoic mass.
- Associated cervical lymphadenopathy.

TUBERCULOSIS :

Clinical features :

Usually a known case of tuberculosis presents with parotid enlargement, parotitis, a slow growing mass or a fistula on the face.

Ultrasonographic Features :

- Acute parotitis may be similar to viral parotitis – an en-

larged tender, hypoechoic gland with heterogenous echotexture.

- Chronic disease leads to a slowly growing mass with or without calcification.
- A fistulous track with thickening of skin may be seen in some cases.
- Associated lymphadenopathy is present.

ATYPICAL MYCOBACTERIAL INFECTIONS

Clinical Features :

Usually occur in immunocompromised patients.

Etiology and Pathology :

Diffuse granulomatous inflammation.

Ultrasonographic Features :

Similar to Tuberculosis.

CYSTIC LESIONS

BRANCHIAL CYST

Clinical Features :

Young adult presenting with a unilateral painless parotid swelling, due to a persistent 1st or 2nd branchial cleft.

Ultrasonographic Features :

Anechoic lesion with through transmission. May contain internal echoes and debris. 1st cleft origin cysts occur as Type I – near the external auditory meatus or Type II – near the angle of the mandible. 2nd cleft cysts may occur near the lower pole.

DERMOID CYSTS :

Clinical Features :

Painless parotid mass in children due to proliferation of primitive epithelium trapped at junctional zones and along lines of skin closure.

Ultrasonographic Features :

Usually presents as a hypoechoic mass with homogenous echotexture and fine echoes. Well defined margins are seen.

SIALOLITHIASIS :

Clinical Features :

Recurrent swelling and pain of the gland, worsened by eating due to calcium phosphate or calcium carbonate stones form in the ductal system.

Ultrasonographic Features :

- Stones are seen as echogenic areas with posterior shadowing and may be intraglandular or within stenosed duct.
- Proximal ducts show ectasia which increases after administration of lime juice. Secondary parotitis may occur.

TUMOURS OF THE PAROTID GLAND

BENIGN TUMORS

PLEOMORPHIC ADENOMA :

Clinical Features :

Slowly growing painless mass usually at the angle of the mandible.

Ultrasonographic Features :

- Homogenous, solid, hypoechoic mass with sharp margins and no discrete posterior acoustic enhancement.
- May contain peripheral echo free areas representing hemorrhage or cystic degeneration.
- Doppler shows a peripheral basket like pattern with fine branches extending to the centre.
- Malignant transformation rarely occurs and is diagnosed by blurring of the margins, internal heterogeneity and rapid growth.[4],[5]

WARTHIN'S TUMOR (ADENOLYMPHOMA)

Clinical Features :

Unilateral or rarely (5%) bilateral slowly growing parotid masses.

Ultrasonographic Features :

- Hypoechoic mass with well defined margins but is less

homogenous than pleomorphic adenoma and shows good posterior enhancement.

- Often contains cystic areas which may be septated.
- Doppler shows a hilar disposition of vessels, consisting of single or multiple pedicles, which are uniformly distributed within.[4]

ONCOCYTOMA :

Clinical Features :

Showly growing painless mass, may be bilateral.

Ultrasonography :

No specific features exist One case has been described as being anechoic at all gain settings.

MALIGNANT TUMORS

Sonographically the different malignant tumors cannot be differentiated with certainty. However there are characteristics which clearly specify that a lesion is malignant.

Clinical Features :

Middle to old age patients (40-60 years) present with fixed hard masses with involvement of the facial nerve. There may be infiltration of the masseter and adjacent structures. Enlarged lymph nodes are also found.

Types:

Adenoid Cystic Carcinoma
Mucoepidermoid Carcinoma
Adenocarcinoma

Ultrasonographic Features :

- The general features common to malignant tumors are :
- Poorly defined margins, which are irregular.
- Solid and nonhomogenous echotexture with internal irregular medium to high echo production at normal and high gain settings.
- Echogenic mass at normal gain settings.
- Other features may include fluid filled cystic spaces due to necrosis or hemorrhage. There may be invasion of adjacent structures and invasion of the great vessels of the neck.

DOPPLER :

High degree of vascularization with peak systolic velocities of greater than 25 cm/sec. predicts malignancy with a sensitivity of 72% and specificity of 88 %.

SUMMARY AND CONCLUSION

- In this study of 30 cases of parotid gland pathology, the commonest pathology was parotid abscess, followed by parotitis and pleomorphic adenoma.
- Parotitis was common in the 0-10 age group, corresponding to the incidence of mumps. Abscess were found to be uniformly distributed through all age groups. Benign tumors were distributed over an age range of 11 years to 60 years and malignant tumors occurred in the age group of 30 years and above.
- In our study the commonest benign tumor was pleomorphic adenoma. There was an equal incidence of the different histological types of malignant tumor.
- ANALYSIS OF SONOGRAPHIC PATTERN OF PAROTID TUMORS
 1. Malignant tumors (except lymphoma) are irregular in margins, echogenic, non homogenous and showing posterior attenuation on ultrasound.[6],[7]
 2. Adenolymphoma (Warthin Tumor) are regular in margins, Hypoechoic to anechoic and showing Posterior enhancement on ultrasound.
 3. Pleomorphic adenoma are regular in margins, hypoechoic and showing little or no enhancement on ultrasound.[7]
 4. Lymphoma are regular in margins, hypoechoic and showing no enhancement on ultrasound.[7]
- In our study the use of the above criteria helped in accurate differentiation of benign and malignant tumors with sensitivity and specificity of 100%. Lymphoma could not be differentiated from benign tumors on the basis of its imag-

ing appearance but was diagnosed based on the presence of lymphnode and histopathology.

- Ultrasound was able to differentiate benign from malignant lesions with an accuracy of 100% Ultrasound also helped to detect clinically non palpable lesions and differentiate intraglandular lymphadenopathy from true tumors.
- Thus ultrasound is a very safe, economical and ready available modality for the diagnosis of parotid lesions. The parotid gland has a complex shape and is thus easier to assess by ultrasound which has multiplanar capability.
- Ultrasound is useful in the diagnosis and follow up of Sjogren Syndrome. It helps in guiding needle biopsies of clinically nonpalpable lesions. Ultrasound is better than CT or MR in differentiating benign from malignant lesions and in the assessment of vascularity with the help of doppler. CT and MR are mainly used for staging tumors and for assessment of deep lobe lesions.
- Thus ultrasound is the primary imaging modality for parotid gland lesions and helps to guide the radiologist as to the need for other expensive modalities such as CT scan and MRI or invasive procedures such as biopsy or drainage.

TABLE-1 : PAROTID LESIONS

Lesion	No. of Cases	Percentage
Parotitis	5	16.67
Abscess	7	23.33
Hemangioma	1	3.33
Arteriovenous Malformation	1	3.33
Cyst	1	3.33
Lymphoepithelial Cyst	1	3.33
Sjogren Syndrome	1	3.33
Sarcoidosis	1	3.33
Calculus	1	3.33
Tuberculosis	1	3.33
Pleomorphic adnoma	5	16.67
Warthin Tumor	1	3.33
Malignant parotid tumor	3	10
Lymphoma	1	3.33

TABLE - 2 : AGE DISTRIBUTION OF COMMON PATHOLOGIES

TABLE-3:TUMORS OF PAROTID GLAND

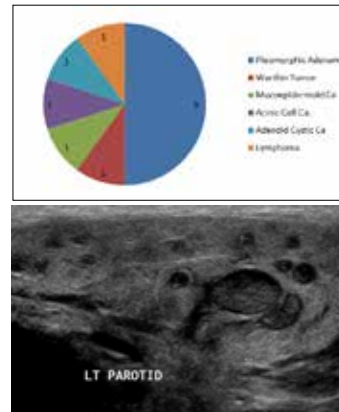


Figure 1. Sonography of the parotid glands in this patient reveal: a) Multiple microabscess formation with b) Swollen glands c) Hypoechoic lesions. These ultrasound images suggest inflammation s/o parotitis.

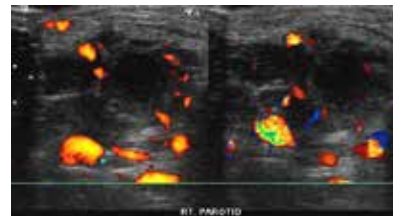


Figure 2. Parotid abscess: Ultrasound and Power Doppler / Color Doppler images reveal: a) Marked swelling of the right parotid gland b) multiple anechoic and hypoechoic cystic spaces within the right parotid gland c) marked augmentation of vascularity in the right parotid gland.

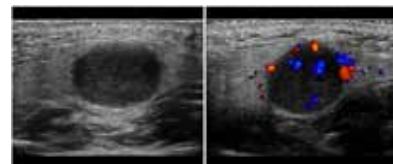


Figure 3. Ultrasound shows: Homogenous, solid, hypoechoic mass with sharp margins and no discrete posterior acoustic enhancement, Doppler shows a peripheral basket like pattern with fine branches extending to the centre suggestive of pleomorphic adenoma.

REFERENCE

1. Thomas P, Ear nose and throat. Head and neck Radiology, In Grainger RG (ed), Grainger and Allison's Diagnostic Radiology. 1997, 3rd (ed) Ch. 102, Churchill Livingstone. | 2. Mandel L et al, Using Ultrasonography to diagnose Sjogren's Syndrome. J.Am. Dent. Assoc. 1998, Aug. 129 (8) : 1129-33 | 3. Ahuja AT et al, Ultrasound of the Salivary Glands, IJRI 1998, 8 : 1 : 57-64. | 4. Solbiati L, Osti V, Cova L, Martinoli C, Derchi LE. The Neck. In: Meire H, Cosgrove D, Dewbury K, Farrant P, editors. Abdominal and General Ultrasound, 2nd Edn. London, UK: Churchill Livingstone, 2001:719-24. | 5. Chapman Ah, The Salivary Glands, Pharynx and Esophagus in Sutton D (ed) Textbook of Radiology and Imaging 1998, 6th Ed. Ch.28, Churchill Livingstone. | 6. Ballerini G et al 1984, Ultrasonic patterns of Parotid masses. JCU, 1984, 12 : 273-277. | 7. Gooding GAW, Gray Scale Ultrasound of the Parotid Gland. AJR 1980, 134 : 469-472. |