

ORIGINAL ARTICLE

Usefulness of Ultrasonography in Detection of Swellings of Head and Neck Region

Sushum Kumar Verma

Assistant Professor, Department of Radiology, ERA's Lucknow Medical College, Lucknow, India

ABSTRACT:

Background: Various disease processes may affect head and neck regions, which present clinically as swellings. The present study was conducted to assess the efficacy of ultrasonography (USG) in detection of swellings of head and neck regions. **Materials & Methods:** The present study was conducted on 68 cases of head and neck region of both genders. Ultrasonogram with a linear transducer probe with a frequency of 15 MHz and a depth of 3 cm was used in all cases. **Results:** Out of 68 patients, males were 40 and females were 28. In 34 cases, swellings were inflammatory, cystic in 16, benign in 10 and malignant in 8. Boundaries were clear in 66 and ill defined in 2 cases, shape was oval in 38, round in 12, lobular in 4 and irregular in 14 cases, echo intensity was anechoic in 46, isoechoic in 10 and hyperechoic in 12. Architecture was homogenous in 32 and heterogeneous in 36 cases. **Conclusion:** Ultrasonography with high frequency transducers can significantly improve the evaluation of patients with various types of head and neck swellings.

Key words: Head and neck, Swellings, Ultrasonography.

Corresponding Author: Dr. Sushum Kumar Verma, Department of Radiology, Era's Lucknow Medical College, Lucknow, Uttar Pradesh, India

This article may be cited as: Verma SK. Usefulness of Ultrasonography in Detection of Swellings of Head and Neck Region. J Adv Med Dent Scie Res 2016;4(3):145-147.

INTRODUCTION

Ultrasonography has played a major role as a diagnostic tool in various medical fields. Only recently has it been used for maxillofacial imaging. It has still not found its place as a routine diagnostic aid in this field. When one considers that the majority of structures and associated pathologies in the head and neck region lie only between 1 and 5 cm below the skin surface, it is not surprising that ultrasound is gaining in popularity in the field of head and neck imaging.¹ "Sonography" means imaging with ultrasound; "ultra" means beyond or in excess; "sound" means audible sound energy. The term ultrasound means the form of sound energy beyond audible range. Ultrasound used for diagnostic purposes has a frequency of 2 MHz–20 MHz while ultrasound used for ophthalmology has a range of 2 MHz–50 MHz.² Ultrasonography has several advantages over other modalities as it is harmless, uses no ionizing radiation, is widely available, easy-to-use, non-invasive, inexpensive and unaffected by metal artefacts such as dental restorations. It can be performed without heavy sedation. Ultrasound causes no health problems and may be repeated as often as necessary.³

Various disease processes may affect head and neck regions, which present clinically as swellings. The disease processes which lead to such types of swellings can be broadly classified as inflammatory, cystic, benign or malignant in nature. In evaluation of such swellings,

detailed case history and clinical examination are the most important and mandatory steps. But in some cases, such as chronic inflammation, abscess formation, deep-seated or infected cystic lesion and neoplasms, clinical examination and palpation do not provide complete assessment of the exact origin and nature of swellings; such cases require radiological imaging. Therefore, to get a final diagnosis, clinical examination must be joined with various investigative procedures.⁴ The present study was conducted to assess the efficacy of ultrasonography (USG) in detection of swellings of head and neck regions.

MATERIALS & METHODS

The present study was conducted in the department of Radiodiagnosis. It comprised of 68 cases of head and neck region of both genders. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

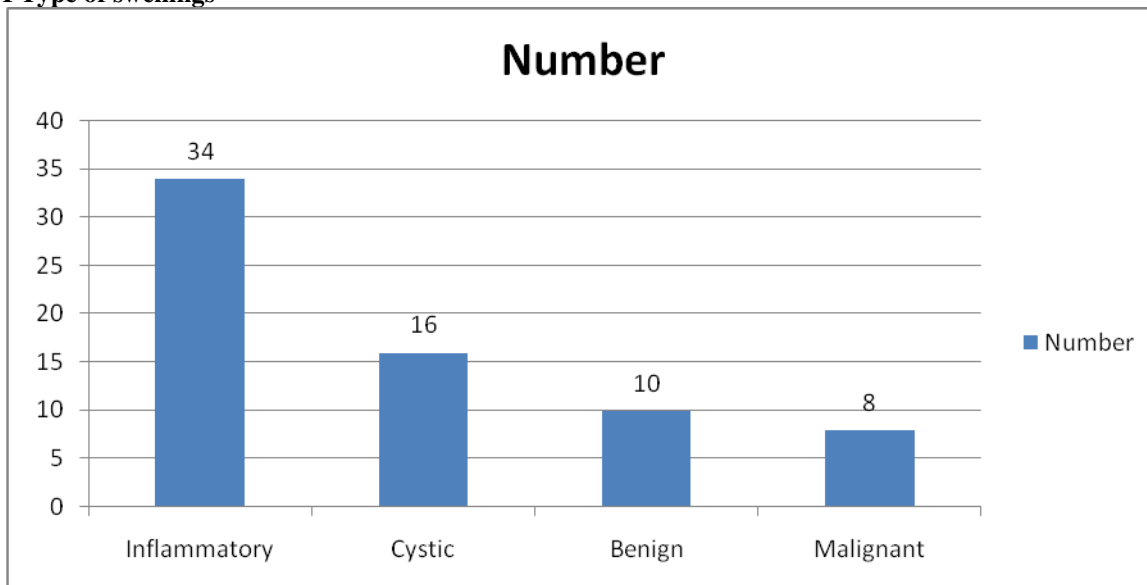
General information such as name, age, gender etc. was recorded. In all cases, location, colour, size, shape, border, surface, consistency, tenderness, temperature, fluctuancy, compressibility and overlying skin over the swelling were noted. Ultrasonogram with a linear transducer probe with a frequency of 15 MHz and a depth of 3 cm was used. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Gender	Total- 68	
	Males	Females
Number	40	28

Graph I Type of swellings



Graph I shows that in 34 cases, swellings were inflammatory, cystic in 16, benign in 10 and malignant in 8.

Table II Features of lesions

USG features		Number
Boundary	Clear	66
	Ill defined	2
Shape	Oval	38
	Round	12
	Lobular	4
	Irregular	14
Echo intensity	Anechoic	46
	Isoechoic	10
	Hyperechoic	12
USG architecture	Homogenous	32
	Heterogenous	36

Table II shows that boundaries were clear in 66 and ill defined in 2 cases, shape was oval in 38, round in 12, lobular in 4 and irregular in 14 cases, echo intensity was anechoic in 46, isoechoic in 10 and hyperechoic in 12. Architecture was homogenous in 32 and heterogeneous in 36 cases.

DISCUSSION

The technology for producing ultrasound imaging and the characteristics of sonic waves has been known for many years. The ultrasound signal transmitted into a patient is attenuated by a combination of absorption, reflection, refraction, and diffusion. The higher the frequency of the sound waves, the higher the image resolution but lesser penetration of the sound through soft tissue. The fraction of the beam that is reflected to the transducer depends on the acoustic impedance of the tissue, which is a product of its density and the beam’s angle of incidence. Because of its acoustic impedance, a tissue has a characteristic internal echo pattern.⁵ The present study was conducted to assess the efficacy of ultrasonography (USG) in detection of swellings of head and neck regions.

In present study, there were 68 patients with head and neck swellings. It comprised of 40 males and 28 females. Rosenfield et al⁶ in their study found that clinically lesions were 23(92%) diagnosed as buccal space abscess and 2 (8%) were cellulitis. Ultrasonographically and therapeutically 24 (96%) were buccal space abscess and 1 (4%) was cellulitis. The sensitivity of clinical criteria over ultrasonographic diagnosis was 96% with a specificity of 100%. The cheek thickness in males and females varied from 8.2 to 17.1mm with a mean of 11.6mm±2.1 (SD) and 8.2 mm to 14.2 mm with a mean of 11±1.8 (SD). The subcutaneous tissue appeared moderately echogenic, buccinator - highly echogenic, deep adipose tissue - less echogenic and parotid duct was appreciated as a thin hyperechogenic band crossing the buccinator muscle.

Buccal space, masticator space and parotid space were appreciated.

It was observed that in 34 cases, swellings were inflammatory, cystic in 16, benign in 10 and malignant in 8. Pandey et al⁷ found that in case of an inflammatory swelling, ultrasonography had a sensitivity of 100%, specificity of 89.5%, PPV of 84.6%, NPV of 100%, and accuracy of 93.3%. In cystic swellings, ultrasonography had a sensitivity of 85.7%, specificity of 100%, PPV of 100%, NPV of 95.8%, and accuracy of 96.67%. In non-odontogenic benign tumor, ultrasonography had a sensitivity of 100%, specificity of 100%, PPV of 100%, NPV of 100% and accuracy of 100%. In malignant swellings, ultrasonography had a sensitivity of 80%, specificity of 100%, PPV of 100%, NPV of 96.2% and accuracy of 96.67%.

Srinivas et al⁸ in their study did a comparison between benign and malignant neoplasms. The criteria of boundary, echo intensity and ultrasound architecture of lesions were statistically significant. The comparison of inflammatory swellings and malignant neoplasms shows that criteria of boundary and ultrasound architecture of lesions were 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 were statistically significant.

We found that boundaries were clear in 66 and ill defined in 2 cases, shape was oval in 38, round in 12, lobular in 4 and irregular in 14 cases, echo intensity was anechoic in 46, isoechoic in 10 and hyperechoic in 12. Architecture was homogenous in 32 and heterogeneous in 36 cases.

CONCLUSION

Ultrasonography with high frequency transducers can significantly improve the evaluation of patients with various types of head and neck swellings.

REFERENCES

1. Sanghar J, Ramasamy S, Sankar J, Austin R. Efficacy of Ultrasonography in the Diagnosis of Inflammatory Swellings of Odontogenic Origin. J Indian Acad Oral Med Radiol 2012; 24:98-101.
2. Shivanand B, Mahima VG, Karthikeya P. Ultrasonography of swellings in orofacial region. J Indian Acad Oral Med Radiol 2010; 22:18-26.
3. Dharti N, Neerjesh P, Wadhawan R, Luthra K, Reddy Y, Solanki G. Ultrasonography; A boon as a diagnostic & therapeutic aid in dentistry: A review. IJBAR 2014; 5:472-9.
4. Sumer AP, Danaci M, Sandikei EO, Sumer M, Celenk P. Ultrasonography and Doppler ultrasonography in the evaluation of intraosseous lesions of the jaws. Dentomaxillofac Radiol 2009; 38:23-7.
5. Struk DW, Munk PL, Lee MJ, Ho SG, Worsley DF. Imaging of soft tissue infections. Radiol Clin North Am 2001;39:277-303.
6. Rosenfield AT, Taylor KJ, Jaffe CC. Clinical applications of ultrasound tissue characterization. Radiol Clin North Am 1980; 18:31-58.
7. Pandey PK, Umarani M, Kotrashetti S, Baliga S. Evaluation of Ultrasonography as a Diagnostic Tool in Maxillofacial Space Infections. J Oral Maxillofac Res 2011; 2:4.
8. Srinivas K, Sumanth KN, Chopra SS. Ultrasonographic evaluation of inflammatory swellings of buccal space. Indian J Dent Res 2009;20:458-62.

Source of support: Nil

Conflict of interest: None declared

This work is licensed under CC BY: *Creative Commons Attribution 3.0 License*.