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CASE REPORT

Ultrasonography and Color Doppler as a Diagnostic Aid in Differentiation of Periapical Lesions of Endodontic Origin: Report of Two Cases

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ABSTRACT

Ultrasound with color Doppler is a proven, useful and noninvasive diagnostic tool in endodontics. It can give an idea about the nature and dimension of periapical lesion, which helps in preoperative assessment and treatment planning. This report discusses two cases of periapical lesions of endodontic origin diagnosed with the help of ultrasound and color Doppler and treated surgically.

Keywords: Biopsy, Color doppler, Cyst, Granuloma, Ultrasound.

INTRODUCTION

Ultrasound real time imaging (also known as sonograph or echography) has wide application in numerous diagnostic fields of medicine.[1] Ultrasound with color Doppler is a proven, useful and noninvasive diagnostic tool in endodontics periapical lesions accompanying endodontic infection are usually diagnosed and treated based on the initial radiological findings.[2] Sometimes periapical surgery is necessary to eliminate and diagnose the cystic and noncystic nature of the lesion. Ultrasonography can give an idea about the nature and dimension of lesion, which helps in preoperative assessment and treatment planning.[3,4] This report discusses two cases of periapical lesions of endodontic origin diagnosed with the help of ultrasound and color Doppler and treated surgically in an Indian Dental school.

CASE REPORTS

Case 1 (Figs 1 to 6)

A 22-year-old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain and swelling in maxillary anterior region. Periapical radiograph showed a large radiolucent area in the region of 21, 22.

An ultrasound examination was performed using the diagnostic ultrasound machine, HL5 9ED SONOACE 8000LIVE*/EX PRIME (Medison America Inc USA) with color Doppler function, incorporating a high definition, multifrequency, ultrasonic probe (3D 3 5EK probe) operating at a frequency of 0.60 KHz (90 decibel). The probe position was changed in order to obtain transverse scans (axial plane) and longitudinal scans (sagittal plane).

Fig. 1: Case1—preoperative photograph

Fig. 2: Iopar of 21, 22 with periapical lesion

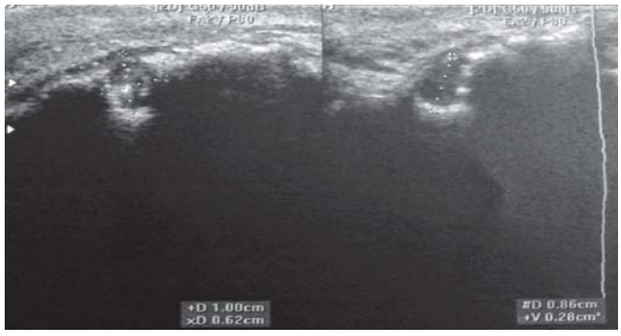

Fig. 3: Case 1—ultrasonogram in 21, 22 region

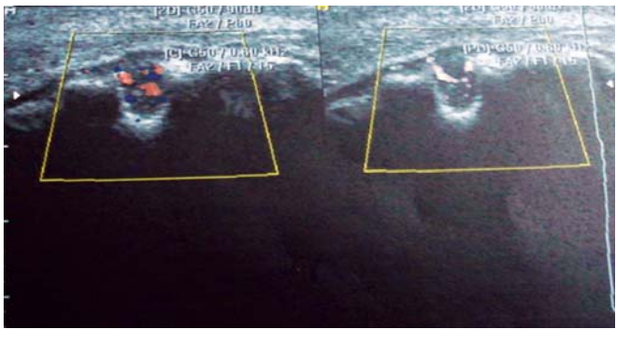

Fig. 4: Case 1—ultrasonogram with color doppler showing vascularization

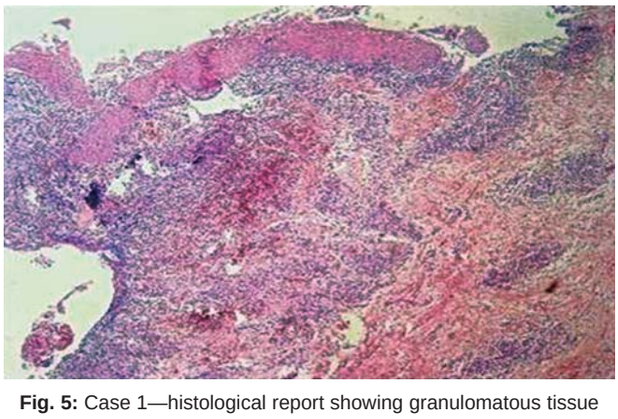

Fig. 5: Case 1—histological report showing granulomatous tissue

Color Doppler was applied to detect internal vascularization. The image was analyzed by an expert ultrasonographer. A tentative differential diagnosis of periapical granuloma was agreed upon based on the following principles:[2]

Granuloma: A poorly defined hypoechoic area showing rich vascular supply on color Doppler examination.

Cystic lesion: A hypoechoic well-contoured cavity surrounded by reinforced bone walls filled with fluid and with no evidence of internal vascularization on color Doppler examination.

Mixed lesion: Predominantly hypoechoic area with focal anechoic area showing vascularity in some areas on color Doppler examination.

Following conventional principles of periradicular surgery the case was operated and biopsies were obtained from the periapical areas.[5-9] Result of the biopsy was found to be a periapical granuloma as confirmed by ultrasound and color Doppler.

Case 2 (Figs 6 to 9)

A 35-year-old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain and swelling on palatal surface in the maxillary anterior region. Periapical radiograph showed a large radiolucent area with sclerotic border in the region of 21, 22 (root canal treated 6 months back in an general dental clinic). An ultrasound

Fig. 6: Case 2—preoperative photograph

Fig. 7: Case 2—IOPA X-ray of root treated 21, 22 with large periapical lesion

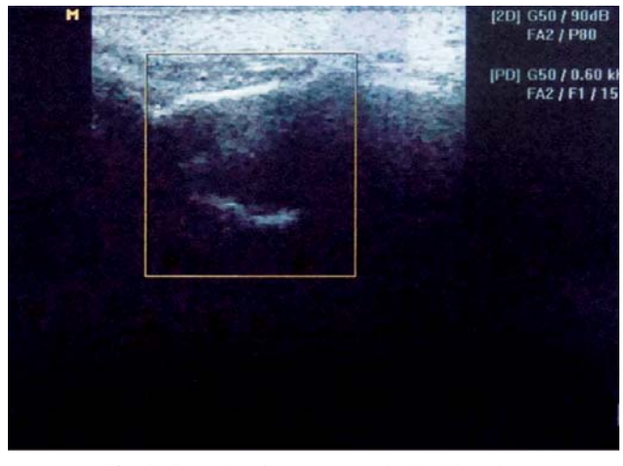

Fig. 8: Case 2—ultrasonogram in 21, 22 region

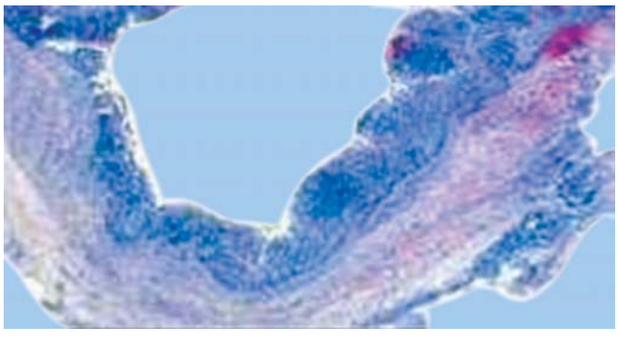

Fig. 9: Case 2—histological picture showing cystic lining

examination was performed as done in the first case. Measurements done in superior inferior, mesiodistal and anterior posterior direction.

It was found to be a hypoechoic well-contoured cavity surrounded by reinforced bone walls, filled with fluid and with no evidence of internal vascularization on color Doppler examination.

Following conventional principles of periradicular surgery case was operated on and biopsies were obtained from the periapical areas.[5-10] Result of the biopsy was found to be a periapical cyst as confirmed by ultrasound.

DISCUSSION

Ultrasound is based on the phenomenon of reflection of ultrasound waves (echoes) at the interface between two tissues that have different acoustic properties.[1-4] An interface or an area of tissue that causes a considerable reflection of ultrasound is described as hyperechoic whereas an area which shows lower echo intensity than surrounding tissues is described as hypoechoic or transonic. Anechoic is an area, where there is no reflection of echoes, typically within homogeneous liquids. Non-homogeneous areas that contain different types of tissues show a heterogeneous echo texture consisting of hyperechoic and hypoechoic signals. Bone surfaces demonstrate total reflection of ultrasound waves (hyperechoic/echogenic); thus structures in and beyond intact bone are not normally detectable by ultrasound.[3,4] However, where the bone cortex has become thinned or perforated, ultrasound imaging can still be performed through such bone "windows".[2] In addition, the application of color Doppler ultrasound can offer additional information regarding the presence, direction and velocity of blood flow within the examined tissue. The application of ultrasound and color power Doppler is a viable and nonhazardous tool for monitoring the healing of periapical lesions and inferences of bone healing.[1,3,4] CT and ultrasound with power Doppler provide an additional diagnostic tool without invasive surgery, in differential diagnosis of lesions like cyst and periapical granuloma.[3,4,11] Ultrasound imaging is a reliable diagnostic technique for differentiating periapical lesions based on the echotexture of their contents and the presence of vascularity using color Doppler in the anterior part of the mouth where the buccal cortical bone is thinned.[2] Ultrasound imaging is easy, reproducible , convenient and relatively cheap. Images are easy to read, simple to store and retrieve. No harmful effects have been observed in the tissues as a result of ultrasound examination.[12]

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