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بالرسالة صفحات
لم ترد بالأصل

ULTRASONOGRAPHIC FINDINGS IN EYES WITH TRAUMATIC AND COMPLICATED CATARACTS

Thesis

Submitted for partial fulfillment of th . n
in Ophthalmology

By

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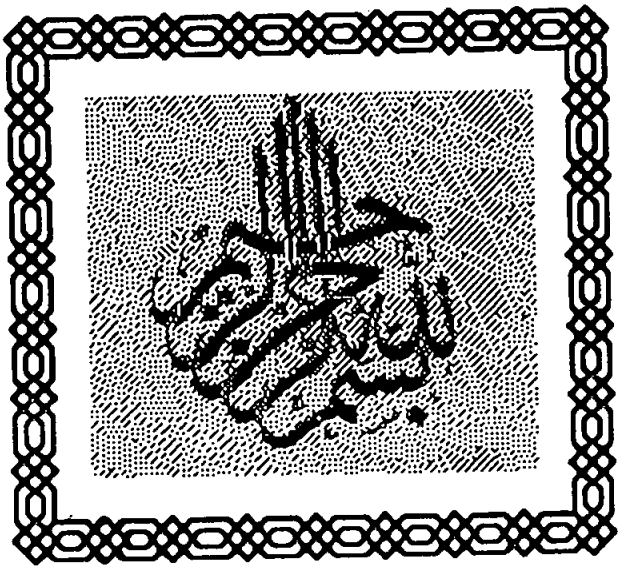

قَالوُا سُبحانكَ

لاَ عِلمَ لنا إلاّ مَا علّمتنا إنكَ أنتَ العَليمُ الحَكيمْ

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Alaa

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INTRODUCTION

Ophthalmic ultrasound has become an indispensable diagnostic tool that has increased our ability to detect and differentiate many ocular and orbital disorders.

It provides the ophthalmologist with an instantaneous "look" into an eye with opaque ocular media, where it considers a tool for accurate evaluation and identification of changes in the posterior segment hidden by the cataract as well as localization of foreign bodies (Coleman, 1972).

The term complicated cataract is used to describe cataracts that arise in the course of other ocular diseases or lesions. It may be subsequent to diseases of the retina, choroid, ciliary body, or iris; it may follow retinal detachment, intraocular tumours, or glaucoma (Bellows, 1975).

Various causes of traumatic cataract include blunt or perforating injury with retained intraocular foreign bodies that may be held within or pass through the lens, chemical burns, and remote forces such as electrical current and radiation injuries (Roper-Hall, 1979).

This painless, non-invasive dynamic examination can be performed in the outpatient clinic, or in the operating room.

The possibility of management of the previously inoperable eyes with the availability of the microsurgical instrumentations and techniques has increased the role of ultrasonographic evaluation of traumatic and complicated cataracts (Byrne and Green, 1992).

REVIEW OF LITERATURE

Diagnostic ophthalmic ultrasound

Ultrasound was first applied in 1938 with a study of the possible effects of high intensity ultrasound on eyes (Thijssen, 1993).

The ophthalmic application of ultrasonography was first described by Mundt and Hughes in 1956 who described the A-mode (Time Amplitude Ultrasonography, TAU). Oksala, Bronson and Ossoinig have developed this technique to a high degree of sophistication (Coleman and Dallow, 1983).

B-scan ultrasonography (Scanned Intensity Modulation Ultrasonography, SIMU) was first applied in ophthalmology by Baum and Greenwood in 1958 using the immersion technique. Further pioneering work using the immersion B-scan method was performed by Edward Purnell and Jackson Coleman.

Indications

Echography is indicated whenever complete or partial opacification of the media prevents an adequate clinical examination of either the anterior or posterior segments. It has

also proven to be very useful in clear media for the differentiation and measurement of intraocular tumours and inflammatory lesions. Biometry is another important contribution of ultrasound in ophthalmology. Reliable intraocular lens (IOL) calculations depend on accurate and precise axial length measurement. Measurements of the globe have also become important in evaluating conditions such as congenital glaucoma, micro-phthalmia and nanophthalmos, persistent hyperplasia of primary vitreous (PHPV), phthisis bulbi, and myopia (Green and Byrne, 1989).

Indications for ocular ultrasonic Examination:

•Opaque Ocular Media:-

* *Anterior segment:*

- Dense corneal opacification.
- Hyphaema or hypopyon.
- Miosis or pupillary membrane.
- Dense cataract.

* *Posterior segment:*

- Massive vitreous haemorrhage or inflammation.

- **Clear ocular media:-**

* *Anterior segment:*

- Iris lesions e.g., tumours.

- Ciliary body lesions e.g., detachment, swelling, and tumour.

* *Posterior segment:*

- Intraocular tumours and masses detection and differentiation e.g., melanomas, metastatic carcinoma, choroidal haemangioma and melanocytoma.

- Choroidal detachment: serous versus haemorrhagic.

- Retinal detachment: rhegmatogenous versus exudative.

- Intraocular foreign bodies: detection and localization.

- Optic disc abnormalities e.g., cupping, elevation (papilloedema, tumour) and drusen.

- **Follow-up studies:-**

- Biometry : Axial length of the eye .

Anterior chamber depth .

Lens thickness.

- Tumour measurement.

Physics & Instrumentation

Ultrasound refers to high frequency acoustic energy above the limits of human audibility (approximately 20,000 cycles per second) (Daune, 1985). For routine diagnostic ophthalmic ultrasound, frequencies used are generally in the range 8 to 10 MHz (1 megahertz = 1000,000 cycles per second) (Fig. 1) and examinations can be performed at frequencies of up to 100 MHz, permitting the visualization of structures of the anterior segment in near microscopic detail.

The very high frequencies used in ophthalmology produce short wavelengths. These very short wavelengths allow sufficient resolution of the minute structures in the eye and orbit.The speed at which ultrasound travels depends on the medium through which it passes. For example aqueous and vitreous conduct sound at a velocity of 1532 meter (M) per second, intraocular and orbital soft tissue at a velocity of 1550 M per second, and the normal lens at 1641 M per second (Coleman et al.,1992).

As the ultrasound passes through tissues, part of the wave may be reflected back towards the probe. This reflected wave is referred to as an echo. Echoes are produced by acoustic interfaces that are created at the junction of media with different sound velocities.