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CONTACT B-SCAN ULTRASONOGRAPHY

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Contact B-scan ultrasonography is a technique for viewing the interior of an eye when the normal view is blocked by corneal scar, cataract, or hemorrhage. It can also be used for evaluating the orbit; the contact technique uses a simple approach with relatively inexpensive equipment.

Ultrasound is a derivative of sonar. A pulse of sound is sent into the eye, and any change in the density of structure of the medium reflects an echo. These echoes are displayed on the screen of a television-like instrument as bright spots. The scanning element moves rapidly back and forth at approximately 12 times per second, building up a cross-sectional picture of the eye. This relatively rapid scan also permits dynamic evaluation of the eye.

In use, the scan head is placed against the closed eyelid, using methylcellulose to conduct the sound into and out of the eyelid. The power level is very low, making this a completely safe technique which may be repeated as many times as necessary. The scan head should be moved so that it is aimed at different parts of the eye and orbit, just as the lens of the indirect ophthalmoscope is changed constantly during an examination.

In the picture of a normal eye, we see the posterior wall, the orbital fat, and the optic nerve passing through the orbital echoes. The vitreous is clear, and in this view one can see the posterior lens capsule. In the contact technique, the anterior segment is not well visualized, although we have not found this to be a problem clinically. If it is desired to view the anterior segment it is possible to use a water bath as suggested by Purnell and Coleman.

Axial length of the eye can be measured by ultrasound, and examples are shown of high myopia, 30 mm. axial length as well as hyperopia, 17 mm.

axial length. Any form of contact ultrasound, either A or B scan, is not accurate enough to plan the power of an intraocular lens. Highly accurate axial length can be obtained by ultrasound if some form of a water bath or hanging drop suspension is used, but with any contact technique, the eye is always somewhat indented, distorting the axial length.

The ultrasonic picture of a vitreous hemorrhage varies widely. At times the echoes are very weak, while at other times the echoes from a dense hemorrhage show as strong echoes. It is very important when examining a vitreous hemorrhage to have the patient move the eye in order to evaluate the mobility of this hemorrhage ultrasonically. We feel this has a prognostic significance, and it is also important if vitreous surgery is contemplated. Obviously, a fixed solid vitreous has a much poorer outlook than that seen with a highly mobile hemorrhage.

Retinal detachments are very easily shown by ultrasound. A strong, sheet-like echo appears and is seen inserting into the optic nerve. We have seen unsuspected retinal detachments many times behind a vitreous hemorrhage. Also with the contact technique, the mobility of a retinal detachment can be seen and vitreous traction bands are apparent. A cyclitic membrane can also be shown by ultrasound.

Choroidal detachments have a typical balloon-like picture arising from the ora serrata and do not insert into the optic nerve. A sheet of vitreous hemorrhage deposited on the posterior face of a detached vitreous does not insert into the optic nerve, and generally the echo of the vitreous hemorrhage sheet is much weaker than that from a retinal detachment.

The evaluation of diabetes can frequently be aided by ultrasound, particularly in the case of retinitis proliferans and the presence of a vitreous hemorrhage when vitreous surgery is contemplated. However, some sheets of proliferans are so dense that they appear very similar to a retinal detachment and it can be difficult to distinguish between the two.

Intraocular tumors can be well seen by ultrasound. Some melanomas have a rather characteristic picture, but care must be taken to be sure this does not arise from some other solid tissue. The presence of a small lesion such as one 1/2 mm. high, can be seen, but it is only possible to determine that this is solid, rather than attempting to diagnose the character of the solid lesion. It is important to use the sensitivity control to evaluate the acoustic density of these lesions.

Some types of optic nerve pathology such as a colaboma of the optic nerve, can be seen by ultrosound, and, as reported by Coleman, retrobulbar neuritis can show a doubling of the optic nerve. The elevated nerve head with papilledema has been seen several times by ultrasound.

In the orbit, many changes can be seen. With a patient loocking in extreme gaze and the scan head at the opposite side of the eye, the recti muscles can be visualized and the thickening of them in thyroid disease can be shown, such as an enlarged medial rectus. Other orbital masses are shown, such as a mucocoele. No echoes are seen from the interior of this fluid-filled mass, and good sound transmission is carried through. A hemangioma also has good sound transmission and frequently can be compressed by placing pressure on the scan head during the examination. Orbital tumors show a displacement of the orbital fat pattern, and it is possible to tell whether these are infiltrating or cystic, or to gauge some idea of their pathology by the acoustic transmission.

Ultrasound is a very valuable technique for evaluating an eye. However, with any diagnostic technique, the pitfalls must be understood, and experience in its use is necessary. For example, we have found it very helpful to examine an eye preoperatively before keratoplasty or certain cataract surgery, but the use of the instrument must be understood and the examiner must have experience in its use to appreciate the findings. Contact B scan ultrasound is a simple technique which enlarges the ophthalmologist's armamentarium.

SUMMARY

The author reports the usefulness of Scanning-B ultrasonography for clinical diagnosis.

He uses the sensitive head, placing it on the skin of the closed lid under study, having moistened it previously with methyl cellulose.

He emphasizes the prognosis diagnosis of vitreous hemorrhages as well as the echographic visualization of intraocular and orbital tumors and their difference between difuse or encapsulated tumors.

He ends by stating that echography is only additional diagnosis technique of great help for the ophthalmologist.

C. B.