



B Scan Biometry in clear lens extraction in myopic eyes

Good PA, Burdon MA, Siddiqi R

Birmingham & Midland Eye Centre, City Hospital NHS Trust, United Kingdom



Introduction

- In high myopia clear lens extraction provides an attractive alternative to cornea laser surgery.
- In order to achieve accurate and predictable post operative refraction a very accurate biometry is required prior to surgery.¹
- A scan echographic and optical biometry methods may be inaccurate due to posterior staphylomata or tilted discs.
- This study investigates the use of B scan measurement of axial length in myopic patients using a high resolution scanner with unique time gain control characteristics.



Localised macular retinal detachment within a deep staphyloma (axial length 31.5 mm) illustrating the use of B scan where there is no clear view of the retina.

Methods

- 12 Patients (23 eyes) 8 females, 4 males (mean age 53.4 years). The high myopes (mean -18 D, range -11 D to -24 D) underwent A and B scan measurement of axial length.
- The equipment used was a BVI (Biovision instruments (Quanzel)) Axis II biometry machine and BVI B scanner.
- The latter has a specially modified time gain control which reduces the gain in the anterior segment (first 5 mm) to -30 dB. This allows clear imaging of the cornea through the closed eye lid.⁴
- Anterior chamber depth was confirmed using the A scanner (longest AC depth and shortest axial length, and compared to the B scan measurement of AC depth.
- Location of the macula was achieved by measuring 3.5 mm temporal to the optic disc.
- 10 measurements from each eye for A and B scan.
- All operations were performed by the same Surgeon (MAB) using Rayner 752U phaco lenses.
- SRK-T formula were used for all biometry calculations.^{2,3}

Results

- Group mean axial length was 27.4 mm (range 25.2 - 33.2 mm)
- 14/23 (61%) eyes had posterior staphylomata and 18/23 (78%) tilted discs.
- All 23 (100%) eyes achieved a post operative refraction within 1 D of the predicted refraction.
- 19/23 (83%) eyes achieved a post operative refraction within 0.5 D of predicted value.
- 10 eyes required no lens implant due to the very high myopia. All of these achieved a post operative acuity of 6/4-6/5
- If A scan measurements alone had been used only 16 eyes (69%) would have achieved a post operative refraction within 1 D of predicted, and three eyes would have been 2DS away from the predicted value, two of them were hypermetropic.

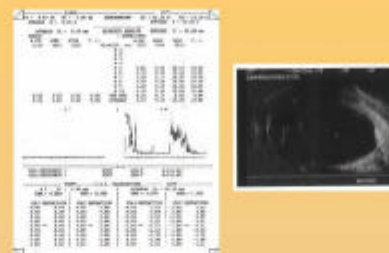


Fig. 1. Cross axial myopia whose refraction went from -24.00 to -0.75 post-operatively. Note the Similarity between A & B scan biometry.

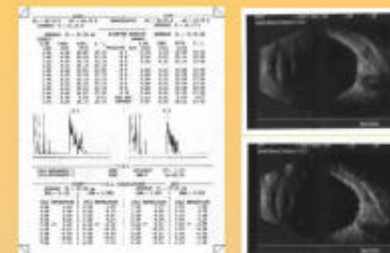


Fig. 2. A & B scan biometry of a patient with axial myopia of Refraction OD -18.00 OS -20.00. Note the similarity of A & B scan axial lengths. The post-operative refraction was OD -1.25 OS -0.75, the anisotropic value having been set at -1.

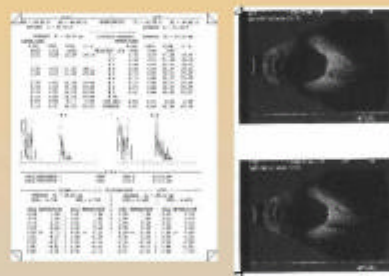


Fig. 3. Bilateral A & B scan in a patient with 15 DS of myopia. B scan showed a shorter axial length of R 28.7 mm L 28.8 mm. The resultant post-operative refraction was R -0.25 L 0.50. Using SD IOL R & L.

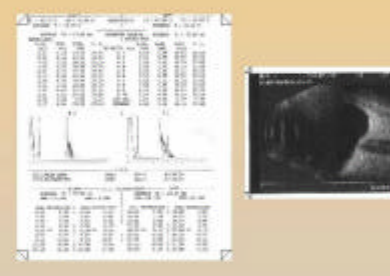


Fig. 4. A & B scan biometry of a patient with a deep staphyloma temporally causing the macula to appear on a slope & reducing the retinal echo on the A scan. The biometry machine had to be set at dove/long in order to obtain a measurement. This resulted in a discrepancy in axial lengths which would have resulted in two dioptres of hyperopia using B-scan final refraction was -0.25

Conclusions

- B scan Biometry provides a highly accurate means of measuring axial lengths in highly myopic eyes.
- This is essential in clear lens extraction surgery as a means of managing the highly myopic patient.
- The B Scan described in this study is more accurate than A scan as it takes into account staphylomata and tilted discs.
- If A scan alone is used poor posterior pole reflections due to the absence of a perpendicular reflective surface lead to the need to increase the gain of the instrument and lower its gain, which leads to inaccuracies.
- The B scan Biometry method can only be used in instruments which have a time gain control system which allows clear imaging of the anterior as well as the posterior segment.
- B scan Biometry has applications in all cases of highly myopic eyes requiring lens extraction.

References

- Ata HB. Ophthalmic Ultrasound, A practical Guide, Churchill Livingstone. First Edition. pp 64-74 1996.
- Retzlaff J, Sanders DR, Kruff MC. Development of the SRK-T intra-ocular lens implant power calculation formula. J Cat. Refract. Surg. 1990; 16:27-33.
- Olsen T. Prediction of intra-ocular lens position after cataract extraction. J. Cat. Refract. Surg. 1986; 12; 376-379