

The Pachymeter Guide: A New Device to Facilitate Accurate Corneal Thickness Measurement

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Abstract: A pachymeter guide has been developed to facilitate precise positioning of the ultrasonic pachymeter tip, making corneal thickness measurement much faster and more reproducible. This guide also makes pachymetry more accurate by preventing dehydration of the cornea, avoiding undue pressure on the cornea, and limiting tilting of the pachymeter tip. *Jpn J Ophthalmol* 1997;41:426-427 © 1997 Japanese Ophthalmological Society

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Accurate measurement of corneal thickness with ultrasonic pachymetry is essential to ensure both the safety and predictability of incisional astigmatic keratotomy.¹ Hand-guided pachymetry, however, is vulnerable to several sources of error, including inappropriate measurement location, tilting of the instrument, excess pressure, and undesirable drying or moistening of the cornea.² Moreover, if the pachymeter tip is not placed perpendicularly, ultrasound echo is poorly detected, resulting in repeated measurement attempts and dehydration of the cornea. This may lead to overestimation of the corneal thickness which increases the risk of corneal perforation and endothelial damage.^{3,4} The present authors have developed a guide to aid in precise placement/positioning of the pachymeter tip for accurate and rapid measurement of corneal thickness.

The guide consists of a corneal fixation ring and interchangeable silicone plates (Figure 1). The silicone plates are disposable and simply plug into the fixation ring. The inner surface of the silicone plates has a curvature radius of 9.0 mm to correspond to the corneal surface.

A small hole measuring 0.5 mm in diameter is located at the center of the silicone plate, enabling the surgeon to observe the mark created at the corneal

center (Figure 2). The pachymeter tip is placed into each of the six 1.5 mm-diameter holes located circumferentially along the periphery. The center of each hole is 3.0 (or 3.5) mm from the center of the plate (Figure 2). Since two sizes of silicone plates are available, to correspond to a 6- or 7-mm optical zone, the guide can be used in most astigmatic keratotomy procedures. The surgeon can select the appropriate plate for the size of optical zone planned for the surgery.

We have used this instrument for astigmatic keratotomy and found that it significantly increases the speed and reproducibility of pachymetry. With conventional hand-guided positioning of the pachymeter tip, re-positioning of the tip was often necessary to detect the ultrasonic echo. For 17 eyes, it took an average of 154.7 ± 21.6 seconds (mean \pm SD) to obtain five measurements at each of the six sites without the guide. On the other hand, measurement time with the pachymeter guide averaged 91.0 ± 13.2 seconds ($P < 0.001$, Student *t*-test), for five measurements at each of six points in the 20 eyes. Reproducibility of the measurements also improved significantly. The coefficient of variation in the five measurements taken at the same site was $1.44 \pm 1.05\%$ for the 17 eyes measured without the pachymeter guide, and $0.73 \pm 0.25\%$ for the 20 eyes, with the guide ($P < 0.001$).

The pachymeter guide prevents dehydration of the cornea by retaining a small amount of water between the plate and the corneal surface. Quicker

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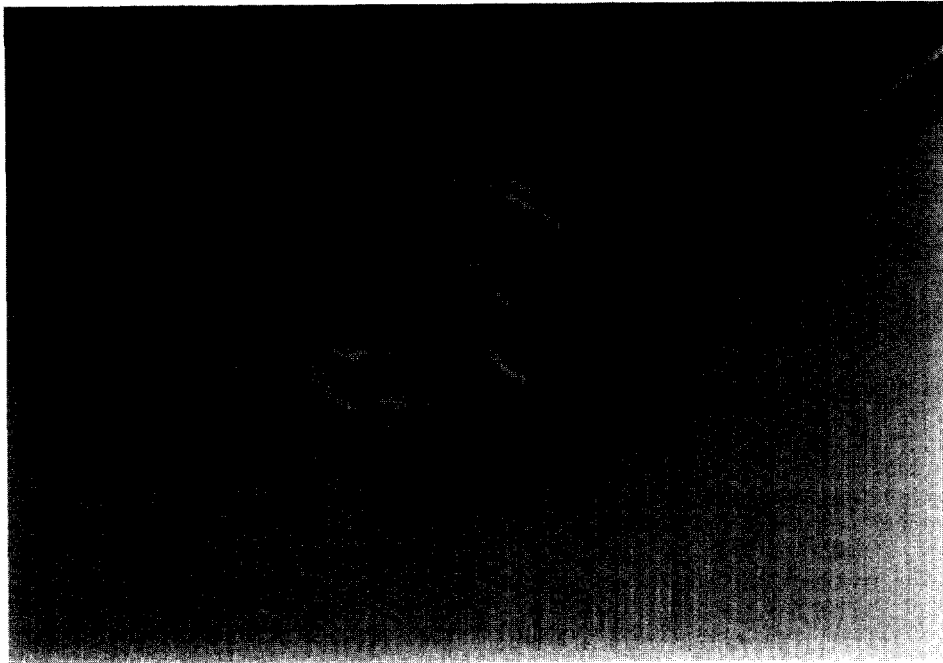


Figure 1. Pachymeter guide consists of corneal fixation ring and disposable silicone plates in two sizes.

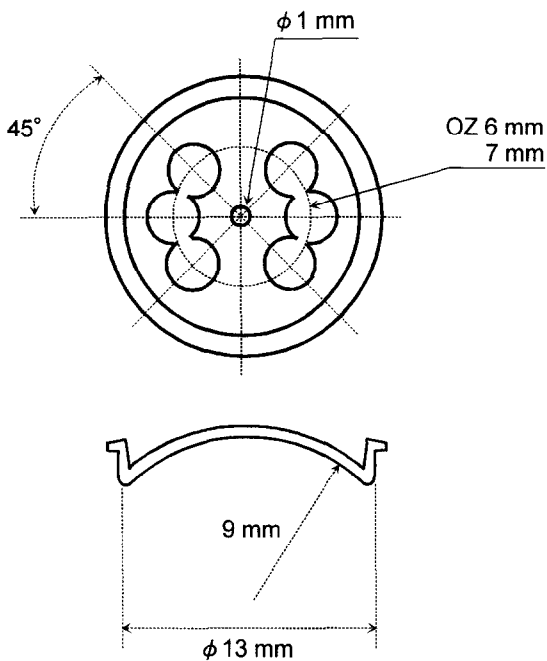


Figure 2. Dimensions of pachymeter guide. OZ: Optical zone.

measurement also contributes to the prevention of dehydration. Since the inner wall of the plate hole guides the pachymeter tip, tilting of the pachymeter tip and undue pressure on the cornea are less likely to occur. The pachymeter guide is manufactured by Tomey Japan (Tokyo).

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