Table 8-1

List of Results of Using Intacs in the Treatment of Keratoconus

Author	Year	Eyes	Follow-Up Time (Months)	UCVA Change (Lines)	BSCVA Change (Lines)	SE Error Change (D)	Astigmatism Change (D)
Colin[5]	2001	10	12	+7	+2		
Siganos[6]	2003	33	11	+3	+7		
Boxer Wachler[7]	2003	74	9	+4	+2	+2.4	
Levinger[8]	2005	54	12	+6	0	+2.8	-1.4
Hellstedt[9]	2005	50	6				-2.9
Alio[10]	2006	13	36		+2		-1.8

depth.[37] Unlike ultrasound, OCT does not require fluid immersion or probe contact. In addition, the high speed allowed us to obtain a quick survey of ring segment depth over 360 degrees. The measurement was rapid, noncontact, and allowed us to detect the change in implant depth along the channel path.

Prospective Study of Optical Coherence Tomography Measurement of Intacs Depth

Our study was based on a prospective observational case series of eight eyes from four patients who received Intacs implants for the management of keratoconus. Intacs implants were imaged by OCT between 7 and 43 days postoperatively (average 24 days). Slit lamp photos were taken at the same visit.

A high-speed corneal and anterior segment OCT prototype developed by Carl Zeiss Meditec Inc (Dublin, Calif) was used. The OCT system operates at 1310-nm wavelength and delivered 5.0 mW of optical power at the corneal plane and acquired 2000 axial scans (A-scan) per second. The axial resolution was 17 µm, full-width-half-maximum in cornea. The transverse resolution was 45 µm based on the focused beam diameter. The prototype has an internal fixation target with accommodation control. The system provided a real-time display of both video camera and OCT images of the area under examination.

The OCT imaging was performed using the "pachymetry map" pattern, consisting of eight evenly spaced meridional lines 10 mm in length and 4 mm in depth. Each line consisted of 128 axial scans (Figure 8-3A) and generated a separate B-scan image (Figure 8-3B). Given the scanning speed of 2000 A-scans per second, this scan pattern is completed within in 0.5 second. The axial scans were 4 mm in depth. The depth of the Intacs implant was measured at seven positions along each implant (Figure 8-3C). The angular position was numbered as n = 1 to 7, where 1 was the closest to the incision site and 7 was the furthest. It represents the angular distance away from the incision site.

Optical Coherence Tomography Depth Measures

Intacs depth was measured at each angular position by two methods (Figure 8-4):

- A: Depth from the anterior corneal surface to the inner edge (the edge with the shorter radial distance from the corneal center) of the ring segment implant.
- A′: Depth from the anterior corneal surface to the anterior implant surface at the center of the implant width along the radial dimension (radially positioned midway between the inner and outer edge). The ratio between A′ and A is an indicator of the amount of compression which the stroma over the ring segments bears.

Total corneal thickness at the ring segment (T) is also measured. Total corneal thickness is measured at the inner edge of Intacs implants rather than in the middle (see Figure 8-4). This avoids the image