

# Late onset of deep corneal vascularization: a rare complication of intrastromal corneal ring segments for keratoconus

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**PURPOSE.** *To report deep corneal vascularization noted 3 years after intrastromal corneal ring segments (Intacs) implantation for the treatment of keratoconus.*

**METHODS.** *A 33-year-old male keratoconus patient intolerant to rigid gas permeable contact lens in the right eye underwent Intacs implantation. At 2 years postoperatively, slit-lamp examination of the right eye revealed superficial corneal vascularization inferotemporally, extending 1.5 mm from the limbus. At 3 years postoperatively, the slit-lamp examination of the right eye revealed deep stromal vascularization extending to and arborizing along the temporal segment. Also, superficial vascularization was noted along the nasal segment inferiorly. The Intacs segments were then explanted.*

**RESULTS.** *On post-explantation day 10, the deep vessels regressed to ghost vessels with topical corticosteroid therapy.*

**CONCLUSIONS.** *The authors present a rare case where deep corneal vascularization was noticed 3 years following Intacs implantation for keratoconus. All patients having superficial vascularization away from the incision site need to be followed for this rare complication. (Eur J Ophthalmol 2009; 19: 298-300)*

**KEY WORDS.** *Corneal neovascularization, Deep vascularization, Explantation, Intacs, Intrastromal corneal ring segments*

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## INTRODUCTION

Corneal neovascularization has been infrequently reported after implantation of intrastromal rings. It has been found to be superficial and localized to the site of the surgical wound. Al-Torbak et al reported a case of deep vascularization noticed 7 months after surgery (1). We present a rare case where deep vascularization was seen 3 years after Intacs implantation.

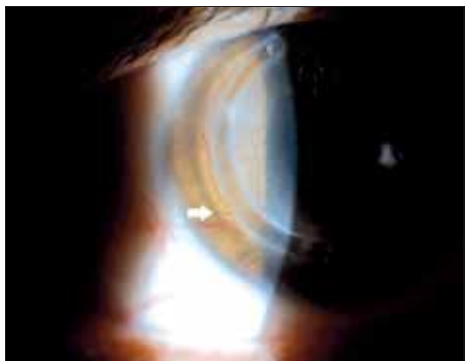
## Case report

A 33-year-old male keratoconus patient was intolerant to rigid gas permeable contact lens in the right eye. In this

eye, best spectacle-corrected visual acuity (BSCVA) was 20/100 with a manifest refraction of  $-10.00 -2.00 \times 90$  D, the central corneal thickness was  $467 \pm 1.9 \mu\text{m}$ , and the mean Sim K was 48.62 D.

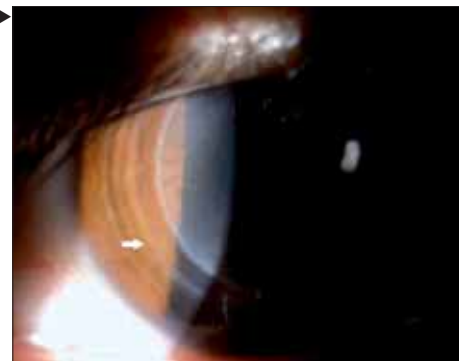
Under general anesthesia, two Intacs segments (Addition Technology Inc., USA), 0.35 mm each, were implanted using mechanical dissectors. The corneal thickness measured intraoperatively with ultrasonic pachymetry was  $601 \pm 1.4 \mu\text{m}$  at the incision site at 12 o'clock position. The incision site was not sutured.

On postoperative day 1, the BSCVA in the right eye was 20/30 with a manifest refraction of  $-4.00$  D. The mean Sim K in the right eye was 46.31 D. One and a half months after Intacs implantation, rigid gas permeable contact lens-



◀Fig. 1 - Deep corneal vascularization around the temporal Intacs segment.

▶Fig. 2 - On post-explantation day 10, deep vessels around the temporal segment regressed to ghost vessels. The Intacs segments left a scar on the cornea where they were placed previously.



es (Zeiss CFKE, Germany) were fitted in both eyes. The BCVA was 20/20-1 in the right eye. At 5 months postoperatively, the slit-lamp examination of the right eye revealed normal anterior segment findings with the Intacs segments in place. At 2 years postoperatively, slit-lamp examination of the right eye revealed superficial corneal vascularization inferotemporally, extending 1.5 mm from the limbus. At 3 years postoperatively, the slit-lamp examination of the right eye revealed deep stromal vascularization extending to and arborizing along the temporal segment. Also, superficial vascularization was noted along the nasal segment inferiorly (Fig. 1).

The Intacs segments were then explanted under topical anesthesia. On post-explantation day 1, the slit lamp examination revealed no epithelial defect and a quiet anterior chamber (Fig. 2). The patient was put on topical fluorometholone acetate 0.1% (Flarex, Alcon, USA) and ciprofloxacin 0.3% (Ciloxan, Alcon Laboratories Inc., USA) 5 times a day. On post-explantation day 10, the deep vessels were regressed to ghost vessels. The fluorometholone eye-drop was tapered in 12 days. The BSCVA was 20/40 with a manifest refraction of -11.00 D in the right eye.

## DISCUSSION

Long-term results of Intacs segments in the treatment of keratoconus have been reported lately: Colin et al reported 2-year results, Alio et al reported 3-year results, and Kymionis et al reported 5-year results. In none of these reports was deep neovascularization necessitating segment explantation reported. Alio et al reported superficial vascularization at the incision site and the peripheral part of the tunnel 6 months after implantation in 2 of 13 eyes which regressed between the first and the second year. Colin et al reported no evidence of vascularization in any

of the 100 eyes. Kymionis et al reported superficial wound site neovascularization in 12 of 17 eyes (2-4).

Al-Torbak et al reported deep stromal vascularization, which was noticed 7 months following Intacs implantation. It occurred at a site separate from the surgical wound. In this case, Intacs implantation was performed for post-LASIK ectasia. The authors stated that the localization of vessels deep in the stroma and along the curvature of the intrastromal ring in an eye with no history of Herpes simplex keratitis or other inflammatory disorders, as well as their disappearance after treatment with surgical removal and anti-inflammatory therapy, supported a hypothesis that the intrastromal corneal ring segment was the precipitating factor for neovascularization (1).

We present a rare case where deep corneal vascularization was noticed 3 years following Intacs implantation for keratoconus. To our knowledge, no such case has been reported beyond 1 year after surgery. All patients having superficial vascularization away from the incision site need to be followed for this rare complication. Hypoxia of cornea superficial to the Intacs may be the triggering factor as no inflammation was seen clinically.

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