

## MICROKERATOME HISTORY

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While LASIK (Laser Assisted In-Situ Keratomileusis) is a successful and relatively safe procedure, the microkeratome is the source of most reported complications.

Lamellar refractive surgery originated in Latin American during the 1950s with the development of the microkeratome and cryolathe devices by professor José I. Barraquer. Modeled after a carpenter's plane, the microkeratome was used to cut a corneal cap, which was then placed on a cryolathe for reshaping in an attempt to correct visual disorders. The procedure (keratomileusis, the predecessor to LASIK) failed to gain acceptance due to unpredictable results and a high incidence of complications.

Photorefractive keratotomy (PRK) was the refractive procedure of choice prior to LASIK. However, when the excimer laser was employed without first creating a corneal flap, patients experienced considerable discomfort and a delay in visual acuity. In the mid-1990s European surgeons began experimenting with the microkeratome in an attempt to improve upon the PRK procedure. The new technique, termed LASIK, utilized a microkeratome to create a flap of corneal tissue, which was then folded back to allow for vision treatment by the excimer laser. With LASIK, patients no longer experience considerable discomfort and typically have immediate improvement in visual acuity.

Today virtually all mechanical microkeratomers are based upon this original carpenter's plane design. All utilize metal razor blades and are subject to the inconsistencies of any hand-held device.

- Much like a dentist's drill, the microkeratome emits a whirring sound from the high-speed vibration of the blade at approximately 8,500 revolutions per minute.
- The microkeratome applies considerable vacuum pressure to the cornea, tightening the corneal surface so the blade can penetrate with minimal resistance.
- Outcomes are highly dependent upon the quality of the disposable blade, which may be further diminished with repeated use. (Gallitis)
- Even in very skilled hands, it can be difficult to achieve accurate depth and consistent flap thickness, factors that can have a significant impact on surgical outcomes. (Baviera)

Microkeratome complications occur in up to 10 percent of all LASIK procedures, including the most serious complications that may affect the visual outcome of a LASIK procedure (Ambrosio and Wilson, Osman):

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| <b>Invasive Corneal Incisions:</b>         | Unintentional deep cuts into the cornea, creating a flap that is unnecessarily thick.   |
| <b>Corneal Abrasions:</b>                  | Scratches across the surface of the cornea resulting in the loss of the epithelial layer. Symptoms can include blurry vision, grittiness, pain, red eyes and tearing for several days while the epithelial layer is regenerated.          |
| <b>Buttonhole Cuts:</b>                    | A tear through the center of the flap which requires the surgeon to abort the procedure. The patient must wait several months for the tear to heal before the procedure can be reattempted.   |
| <b>Partial or Improperly Formed Flaps:</b> | The dimensions and thickness of the corneal flap are critical to the overall success of the LASIK procedure. Irregularly shaped flaps, and those that are too small or too thin will also generally result in an aborted LASIK procedure. |
| <b>Free Caps:</b>                          | The unintentional severing of the flap hinge, resulting in a detached corneal disc; there is additional risk of flap displacement during the healing process.   |