# Non Phacoemulsification Small Incision Cataract Surgery

## Essay

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**By**

**Awney Karam Deif Yosif**

**MB;Bch, Diploma of ophthalmology,**

**Cairo university**

**Supervised by:**

**Prof. Dr. Mohammed Mahmoud El Sayed**

**Professor of ophthalmology**

**Cairo University**

**Prof .Dr. Hebatalla Abdel Rahman El Gendy**

**Assistant professor of ophthalmology**

**Cairo university**

**Dr. Eman Magdy Eissa**

**Lecturer of ophthalmology**

**Cairo University**

**Faculty of medicine**

**Cairo University**


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# *Abstract*

Recent trends in cataract surgery involve removal of the lens through a small scleral tunnel incision in order to reduce postoperative astigmatism and to promote rapid visual stabilization of the patient. This essay based on a new technique of cataract extraction which is now partly revitalized in developing countries as during the early 1980s , when a self – sealing tunnel incision was introduced , surgeons developed instruments and techniques to cut the nucleus into parts for easy removal through a smaller self sealing sclero-corneal tunnel incision .

The technique involves creating a frown-shaped 6-8 mm scleral tunnel incision when the nucleus is removed as a whole without fragmentation whereas , the incision size is decreased to 3.5-5.5 mm when the nucleus is extracted after fragmentation and about 2-3 mm posterior to the limbus centrally and the incision should involve 1/3-1/2 the scleral thickness.



**Key Words:**

**The dynamic of sutureless-sics, Scleral tunnel incision, Nuclear expression (Laxation), Techniques of nucleus management in MSICS.**

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# *Review of literature*

# The dynamics of sutureless small incision cataract surgery

## History

Prior to the advent of silk sutures, sutureless cataract incisions were the norm of necessity in ophthalmology but they were not self-sealing for the obvious reasons relating to technique and instrumentation. The earliest mentions of scleral tunnel incision of cataract sugery were made by Richard P. kratz et al in 1980 . ***(Kratz et al , 1980)*** .

In 1990, steven B Siepser described a radial transverse incision (fig.1) which admitted only foldable implants. This was a workable but technically difficult incision and was potentially dangerous in inexperienced hands . ***(Steven, 1990)*** .

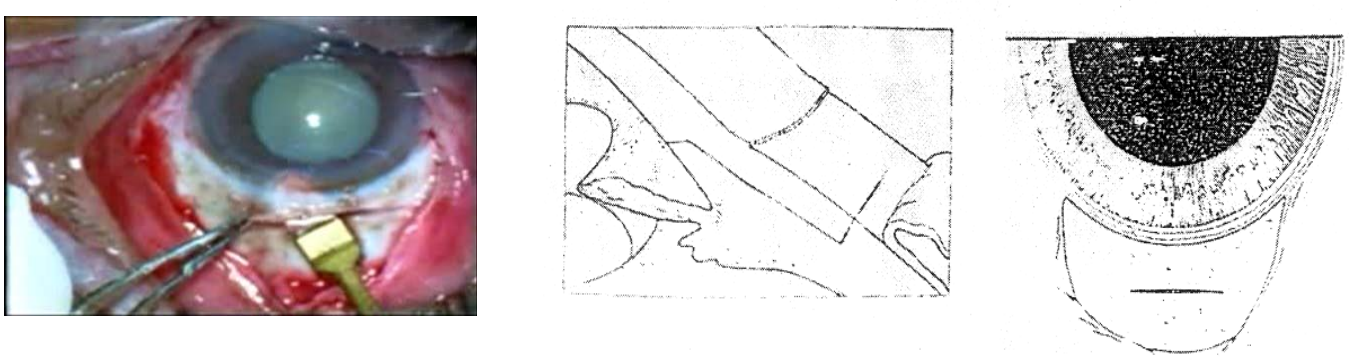


**Fig. (1)** : Radial transverse scleral incision ***(Steven, 1990)***

Whereas , in 1990, Michael Mcfarland reported sutureless incision for foldable implants (fig.2) which was based on a series of relaxing incisions in the bed of a scleral tunnel . ***(Michael Mcfarland, 1990)*** .

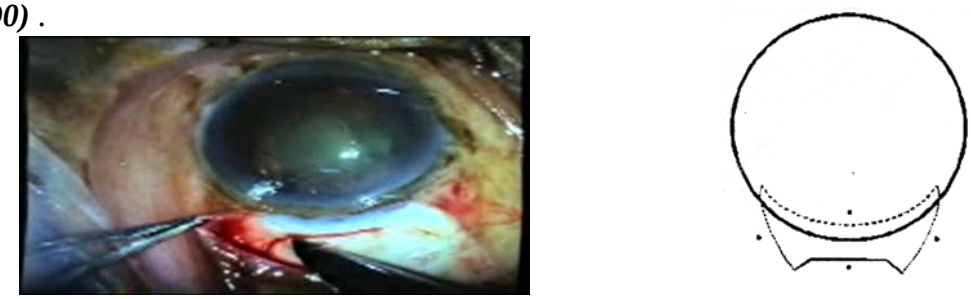


**Fig. (2)** : Horizontal scleral incision with backward relaxing incision ***(Michael Mcfarland , 1990)***

Furthermore , chevron v- shaped (Fig. 3) sutureless scleral tunnel incision was designed to admit not only foldable but rigid lenses as well, and was practical and easily adopted by cataract surgeons. ***(Pallin , 1991)*** .

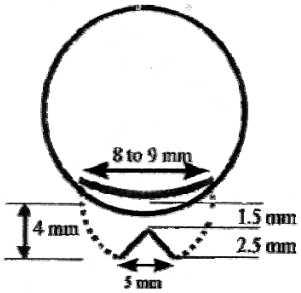



**Fig. (3)** : The inverted, V-shaped, chevron scleral incision is approximately half thickness. The apex of the V is 1.5 mm from the limbus and the angle between the arms of the V, 90 degree. The base of incision is 5.0 mm long (the distance between the tips of the V) and its distance from the limbus , approximately 4.0 mm. The internal opening of the tunnel is 8.0 to 9.0 mm long . ***(pallin, 1991)*** .

A similar incision, called the frown shaped scleral tunnel incision (Fig. 4)was widely popularized by Jack singer in 1991, that was firstly closed with one suture , then a sutureless frown incision was designed ***(Singer, 1991)*** .

**Fig. (4)** : Frown incision ***(Singer, 1991)***

The scleral tunnel incision was reported as an astigmatism – neutral method of entering the anterior chamber . However despite, the evolution in sutureless scleral incision , clear corneal incisions remain the most preferred incision for cataract surgeons , although it still required sutures because of the nature of corneal tissues which resist stretching and tendency of the incision to tear during implant insertion as, corneal incision measured pre and post insertion of foldable implants show a mean increase in internal width of 4.4 to 6.2 %, depending upon whether forceps or injector insertion technique was used. ( ***Girard,1995; Ernest, 1997; Radner et al 1997; Leaming, 1999 and Mamalis , 2000)*** .

The current popularity of clear- corneal incision (Fig. 5) is related to considerations i.e. no need to incise the conjunctiva with cauterization of blood vessels, located at the temporal aspect of AC which tends to counteract against the rule astigmatism (ATR) and also topical and intra cameral anaesthesia have been shown to be most effective in clear corneal incisions. ***(Fine, 1993; Gills, 1997and Koch, 1997)*** .

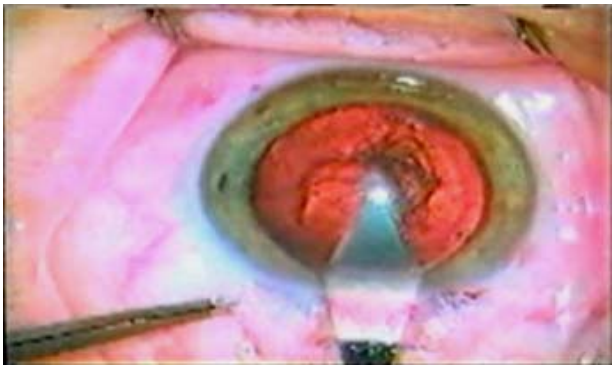


**Fig. (5)** : Clear corneal incision (***Fine, 1993; Gills, 1997 and Koch, 1997)***

However , corneal incisions have some disadvantages . It was reported to be difficult to obtain square incisional geometry i.e the length of the tunnel must be equal to or exceed the width of the incision. Since a long tunnel through the cornea presents a problem during manipulation in the anterior chamber, also short external corneal incision tends to tear when the implant is forced through it and the corneal incisions depend for their integrity upon swelling of the lips initially. But the swelling of incision lips is a transient phenomena so, the incision which appears to be self sealing at surgery may be easily induced to be leaky in the post operative period as the corneal tissue does not heal quickly, forming relatively weak adhesive bonds making the incision less secure. ***(Radner et al , 1997; Ernest et al , 1998 and Mamalis , 2000)*** .

So , the properties of the reliable self sealing incision are square incisional geometry. This means that the length of the tunnel must be equal to or exceed the width of the incision , in other words, a short tunnel with long incision is less likely to be self sealing than a long tunnel with a short incision , also relatively short external incision with a tunnel that flares to a larger internal incision , a geometric external incision shape which tends to stretch. Thus the incision which does not meet these criteria is subject to tearing or causing problems when required to be self sealing . ***(Buzard and Febbraro, 2000)*** .

# Scleral Tunnel Incision

The term small incision generally refers to an incision 6 mm or less in length. Small incision cataract surgery could be performed either through a scleral or clear corneal approach . ***(Troutman et al , 1992)*** .

## Scleral tunnel (pocket) incision :

The term scleral tunnel incision refers to an incision initiated 2-4 mm posterior to the limbus and extending 1-2 mm anterior to the limbus into clear cornea, and involving 1/3 – 1/2 the thickness of the sclera. (Fig. 6)***(Fine, 1995)*** .

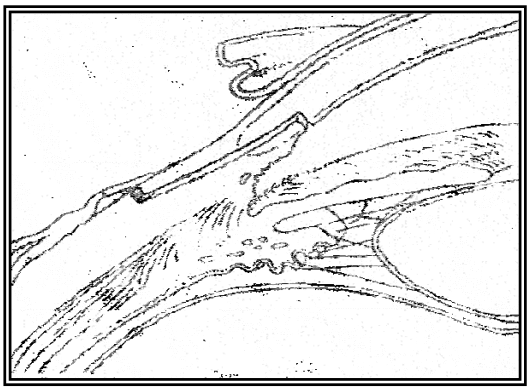


**Fig. (6)** : The triplaner sceral tunnel incision starting 2-3 mm posterior to the limbus and involving 1/3 – 1/2 scleral depth. The second part of the incision extends into clear cornea. The third part of the incision enters the AC perpendicular to the second plane . ***(Fine, 1995)***

Self-sealing sceral tunnel incision varies with respect to the configuration and the width of the groove i.e the external scleral incision. The incision may be circumlimbal (Fig. 7), straight (Fig.8), frown shaped (Fig. 9), inverted v-shaped chevron (Fig. 10) or trapezoid shaped scleral incision . (Fig. 11 & 12).( ***pallin, 1991; Maloney et al , 1991; Nikeghbali, 1994 and Fine,1995 ).***

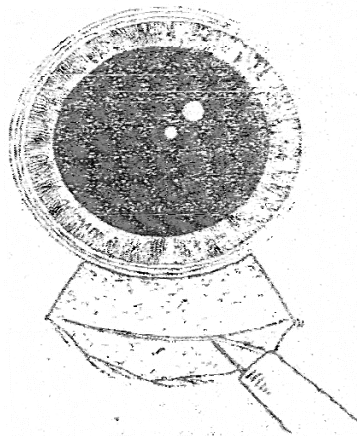
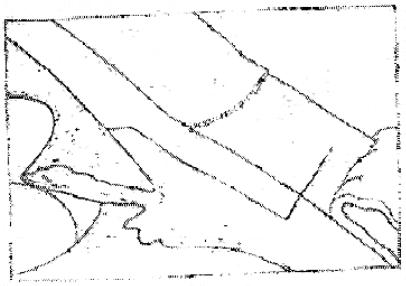


**Fig. (7)** : The circumlimbal scleral incision ***(Fine, 1995)***



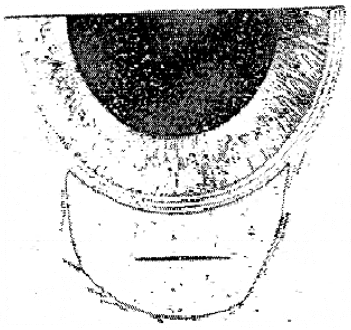


**Fig. (8)** : The straight scleral incision ***(Fine, 1995)***