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**CORNEAL SUTURES OR METHODS WHICH ARE MORE LIKELY TO REDUCE SUTURE-RELATED
COMPLICATION
(REVIEW)**

According to previous studies, we've described several advances in corneal surgery, that have brought enhanced results. They have also been associated with unwanted adverse events. Therefore, we conducted analysis to compare and estimate effectiveness of the treatments, diminishing post-surgical complications.

We searched PubMed, Lancet, for clinical trials, making an accent to the management or prevention of such complications as astigmatism and scarring.

According to our analysis of reviews, we highlighted such preventative measures like excimer laser keratoplasty method; collagen cross-linking which is beneficial for wound strengthening; AFG; X-pattern sutures and horizontal suture. Besides the last study shows more safe and efficient way to reduce the risk of egress of fluid from the eye after wound leakage during cataract surgery.

Introduction. "Corneas are the most commonly transplanted tissue worldwide, and the indications for transplantation cover a wide range of diseases (tables 1 and 2). In the USA, 42 642 corneal transplantations were done in 2010 [1] compared with 12 623 solid-organ transplantations in 2008, including kidney, liver, lung, pancreas, heart, and intestine.[2] In the UK in 2010 and 2011, there were 3565 corneal, 2671 kidney, and 689 liver transplantations"[3].

Corneal transplantation or keratoplasty has developed quickly within the previous 10 years. Penetrating keratoplasty, a technique comprising of full-thickness substitution of the cornea, has been the predominant methodology for more than 50 years, and effectively obliges most reasons for corneal visual impairment. The selection of fresher types of lamellar transplantation by specialist surgeons, which specifically substitute just affected layers of the cornea, has been a crucial change as of late. Deep anterior lamellar keratoplasty is substituting penetrating keratoplasty for disarranges affecting the corneal stromal layers, while eradication of the danger of endothelial rejection. Endothelial keratoplasty, which specifically replaces the corneal endothelium in patients with endothelial disease, has brought about more quick and unsurprising visual results. Other developing treatments are ocular surface reconstruction and artificial cornea (keratoprosthesis) surgery, which have turned out to be all the more broadly accessible as a result of fast advances in these systems [4].

On the whole, these advances have brought about enhanced results, and at the same time have extended the quantity of complications. This article was aimed to describe actual methods of avoidance of surgical-induced postoperative complications.

Methods. For this review, the authors searched PubMed, The Lancet using the keywords "keratoplasty; corneal sutures; Amniotic membrane, astigmatism". They also searched ophthalmology books about cornea and papers published in the last 5-10 years discussing the different steps of evolution of corneal surgeries and management of endothelial diseases. The authors used the statistics of the eye bank association of America. The abstract, the full article and references were obtained and references checked for additional material where appropriate.

Keywords: *keratoplasty; corneal sutures; Amniotic membrane, astigmatism*

Discussion.

The first relevant issue of nowadays to be discussed was estimation of excimer laser keratoplasty and motor trephination role in the post-surgery outcomes.

"Prospective clinical studies have shown that the technique of non-contact excimer laser PKP improves donor and recipient centration, reduces "vertical tilt" and "horizontal torsion" of the graft in the recipient bed, and thus results in significantly less "all-sutures-out" keratometric astigmatism (2.8 vs. 5.7 D), more regular topography (surface regularity index [SRI] 0.80 vs. 1.0) and better visual acuity (0.80 vs. 0.60), in comparison to the motor trephine. The stage of the disease does not influence functional outcome after excimer laser PKP" [18,19,20,21].

During this randomized, clinical study at the university eye hospital of Erlangen, Germany, 134 eyes of seventy six females and fifty eight males undergoing PK between 1992 and 1997 were haphazardly assigned to tissue layer surgical procedure. The inclusion criteria were physicist dystrophy (diameter seven.5 mm) or kHz (diameter eight.0 mm), graft large zero.1 mm, no previous intraocular surgery, and 16-bite double running diagonal suture in keeping with F. Hoffmann. Patients with any style of maculopathy (including high myopia), glaucoma, or visual defect were excluded. Surgical procedure was performed exploitation either a 193-nm excimer optical maser on metal masks with eight orientation teeth/ notches as delineate elsewhere [5,6] (excimer group: thirty seven kHz and twenty three or a Geuder motor trephine (control group: forty four kHz and thirty Fuchs dystrophy). In sixteen eyes within the excimer cluster and nineteen eyes within

the management cluster, "open-sky" extracapsular cataract extraction and posterior chamber lens implantation were performed at the same time (triple procedure)[7].

In conclusion, after double running suture removal, astigmatism decreases or remains unchanged in 79% of patients after excimer laser keratoplasty and increases in 80% of patients after conventional motor trephination.

Collagen cross-linking as an adjunct for repair of corneal lacerations: A cadaveric study

A penetrating globe injury is a disease which causes loss of structure of eye, especially prolapsed or damage to the structures of the eye. The standard of the treatment of such kind of the injuries is to riposte the and close the wound with the suture.[8] Earlier treatment reduces the risk of the appearance of the complications: endophthalmitis, supachoroidal hemorrhage, epithelial ingrowth, tissue necrosis and loss of the eye [9,10].

In the experiment they conducted a cadaveric bench study to compare wound strength with and without CXL. For the corneal laceration they created a 5 mm wound in the center of the cornea. The placement of both 1 and 2 sutures in the wound resulted in a sealed wound that leaked without suture breakage when IOP was increased. Eyes were then randomized to receive 1 suture (n ¼ 8 eyes), 2 sutures (n ¼ 8 eyes), or 3 sutures (n ¼ 4 eyes). Their technique was similar to previous reports in the ophthalmologic literature [11].

Then BSS was slowly injected into the anterior chamber via a 3 mL syringe. This was continued until fluid was seen from the wound [11]. The burst pressure was later determined by 2 blinded observers (Y.W. and M.X.). The burst pressure was easily identifiable as the highest point of a slow rise immediately before a precipitous drop. The mean between the 2 observers was used.

As an outcome of this experiment we can consider that CXL could be performed in an operating room to provide benefits for wound strengthening. This could help to prevent future formation of suture related astigmatism and scarring.

Comparison of autologous fibrin glue versus nylon sutures for securing conjunctival autografting in pterygium surgery

Pterygium is a fibrovascular mass which is extending onto the corneal surface. Risk factors that can occur within usage are heredity, chronic ultraviolet radiation (UVR) exposure, chronic inflammation, vitamin A deficiency, tear film disturbances, micro trauma to the eyes and dusty, windy, dry, smoky environments [12].

Patients The study population consisted of 120 patients (120 eyes). People were randomly assigned to either the AFG (n = 60) or the NS (n = 60) group randomly. All patients who underwent surgery had a primary pterygium which had been injected the cornea more than 2 mm from limbus. Recurrence is defined as equal to or more than 1 mm fibrovascular growth over the peripheral cornea. All patients had a visiting to surgeon, and were then followed at 1 day, 1 week, 1, 3, and 6 months, and then every 6 months after surgery. Surgeon satisfaction was rated from 1 to 10, with 1 being least and 10 most satisfied with the surgery.

In conclusion, AFG is a safe and effective method for securing conjunctival wounds in pterygium surgery, and, in comparison to suturing, it can reduce the risk of the recurrence rate and the operating time of the surgery.

The Manual small incision cataract surgery (MSICS) is one of the effective techniques for cataract surgery.[14] The main incision of MSICS is the scleral tunnel, which can be sealed by two general sutures: horizontal and X-pattern sutures. This study compares the effectiveness of two suture types on surgically induced corneal astigmatism (SIA) in the scleral tunnel incisions for the MSICS.[13]

In a nonrandomized comparative trial, sixty four consecutive patients (64 eyes) diagnosed with a cataract within the Farabi Eye Hospital that needed surgery were enclosed. The patients with intra- and post-operative complications, pediatric cataracts, traumatic cataracts, and previous ocular surgeries (were excluded from the study. The amount of corneal astigmatism was calculated by subtracting Sim K values, using the plus cylinder notation. The patients were divided randomly to one of the groups: Horizontal or X-pattern suture group. [15,16,17]

In this study, the patients were followed till three months after surgery. The astigmatism looks to be constant at 1.5 months after surgery, due to the small dissimilarity between 1.5 and 3 months postoperative and surgically persuaded astigmatism in both groups. So, the other managements of the astigmatism (such as glasses or refractive surgery) in the patients that underwent MSICS might be done at 1.5 months after the surgery.

In conclusion, in the MSICS the horizontal sutures induced against-the-rule astigmatism and the X-pattern sutures induced mild with-the-rule astigmatism. So, the X-pattern sutures were more suitable than the horizontal sutures in the patients without significant preoperative abrupting in line with the central meridian of the incision. In the cases with significant preoperative abrupting, sutureless surgery or horizontal sutures were preferred.

Most surgeons in the United States now plainly conduct cataract surgery using clear corneal incisions (CCIs).[22] Studies have shown that even well-constructed incisions can leak without provocation[23] or after intraocular pressure (IOP) instability.[24,25] Sealing CCIs might reduce the probability of leak-related surgical complications.

This prospective randomized parallel-arm controlled multicenter subject-masked study evaluated the safety and efficacy of a hydrogel sealant in comparison with a 10-0 nylon suture (nonabsorbable, placed 90 degrees to the incision using a 3-1-1 buried-knot technique) for guarding incision leakage from CCIs in patients having uneventful clear corneal cataract surgery after which a wound leak occurred. The study was conducted at 24 sites in the U.S., with a maximum of 96 patients enrolled at any site. Of the 583 patients enrolled, eighty three

were excluded during screening or intraoperatively for reasons unrelated to wound leakage, leaving 500 healthy patients having uneventful clear corneal incision (CCI) cataract surgery were acceptable for the study. Spontaneous and induced fluid outlet from wounds was evaluated at the time of surgery using a calibrated force gauge.[25] Eyes with leakage were randomized to receive a hydrogel sealant (Resure) or a nylon suture at the main incision site. Incision leakage was reevaluated 1, 3, 7, and 28 days after surgery. Overall, of 500 eyes, 488 had leakage at the time of cataract surgery. The leak was extemporaneous in 244 cases (48.8%), and 488 (97.6%) of all incisions leaked with 1.0 ounce or less of applied force. After randomization, 12 (4.1%) of 295 eyes in the sealant group and 60 (34.1%) of 176 eyes in the suture group had wound leakage with provocation ($P < .0001$). The overall incidence of adverse ocular events was statistically significantly lower in the sealant group than in the suture group ($P < .05$).

In summary, a high percentage of the single-plane CCIs in this study showed some level of leakage after cataract surgery and before intervention. Results show that the hydrogel sealant is safe and efficient and is better than sutures in preventing egress of fluid from the eye after wound leakage during cataract surgery.

Conclusion.

Initially, we've described several advances in corneal surgery, that have brought enhanced results [4]. Current standards of care, such as stromal hydration and sutures, do not appear to provide sufficient wound integrity to guarantee a definitive seal. They have also been associated with unwanted adverse events. As we mentioned, the purpose of this review article was to estimate the methods of reduction of these complications. According to our analysis of reviews, in the case of removal of double running suture, it turned out that excimer laser keratoplasty method is less likely to cause astigmatism, in contrary to conventional motor trephination. Another recent studies showed the next method, reducing formation of suture-related astigmatism and scarring was collagen cross-linking which is beneficial for wound strengthening. Moreover, researchers made a comparison of AFG and suturing in pterygium surgery, which showed prevalence of AFG to the second one, due to its efficiency and ability to reduce recurrence rate and operating time of surgery. In MSICS its more appropriate to use X-pattern sutures only in patients with significant preoperative abrupting in line without the central meridian of the incision, while in the cases with significant preoperative abrupting, sutureless surgery or horizontal sutures were preferred. This issue needs further research. The last study shows more safe and efficient way to reduce the risk of egress of fluid from the eye after wound leakage during cataract surgery is hydrogel sealant in comparison to sutures.

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ТІГІСТЕРМЕН БАЙЛАНЫСТЫ АСҚЫНУ МҮМКІНДІКТЕРІН АЗАЙТАТЫН ҚАСАҢ ҚАБАҚ ТІГІСТЕРІ МЕН ОНЫҢ ӘДІСТЕРІ (ӘДЕБИ ШОЛУ)

Түйін: Біз бұдан бұрынғы зерттеулерге сүйеніп маңызды нәтиже берген қасаң қабақ хирургиясынды бірқатар жетістіктерін сипаттадық. Олар сондай-ақ жағымсыз салдармен байланысты екені анықталды. Сондықтан кейінгі хирургиялық асқынуларды емдеудің тиімділіктерін салыстырып және бағалау үшін, оларды азайту үшін талдау жүргізілді. Біз астигматизм және тыртық түзілу сияқты асқынуларды түзетуге немесе алдын алуына мән бере отырып, PubMed, Lancet дерек қорларындағы клиникалық мақалаларды зерттедік.

Біздің сараптамаларымыз бойынша экзимерлік лазерлік кератопластика әдісі, жараларды бекіту үшін пайдалы болып табылатын коллагенді тігу, аутологиялық фибрин желімін (АФЖ) пайдалану, X-пішінді және көлденең тігістер сияқты алдын алу шараларын атап кеттік. Сонымен қатар, соңғы зерттемеде шелді жою операциясында жараның ағып кетуінен кейін көзішілік сұйықтықтың ағып кету қаупін азайтатын аса қауіпсіз және тиімді әдіс көрсетілген.

Түйінді сөздер: Кератопластика, қасаң қабақ тігістері, амниотикалық мембрана, астигматизм.

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РОГОВИЧНЫЕ ШВЫ И МЕТОДЫ, КОТОРЫЕ С БОЛЬШЕЙ ВЕРОЯТНОСТЬЮ УМЕНЬШАЮТ ОСЛОЖНЕНИЯ, СВЯЗАННЫЕ С ШВАМИ (ОБЗОР ЛИТЕРАТУРЫ)

Резюме: Согласно предыдущим исследованиям, мы описали несколько достижений в хирургии роговицы, которые принесли расширенные результаты. Они также были связаны с нежелательными последствиями. Поэтому мы провели анализ для сравнения и оценки эффективности лечения, уменьшения постхирургических осложнений.

Мы изучали статьи в PubMed, Lancet, клинические статьи, делая акцент на исправлении или предотвращении таких осложнений, как астигматизм и рубцы.

Согласно нашему анализу обзоров, мы выделили такие профилактические меры, как метод эксимерной лазерной кератопластики; шивание коллагена, что выгодно для укрепления раны; использование аутологичного фибринового клея(АФК); X-образные швы и горизонтальные швы. Кроме того, в последнем исследовании показан более безопасный и эффективный способ снизить риск вытеканий внутриглазной жидкости после просачивании раны во время операции по удалению катаракты.

Ключевые слова: кератопластика, роговичные швы, амниотическая мембрана, астигматизм