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Sutureless And Glue-Free Conjunctival Autograft In Pterygium Surgery: A Case Series

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I. Introduction

Pterygium is a sunlight-related, ocular-surface disease that can obscure vision [1,2]. It occurs most frequently in populations located near the equator and in labourers who work outdoors or in specific factory environments [3]. There is a higher prevalence of pterygium in farmers, watermen, postal workers, sawmill workers, and welders. Pterygium is a wing-shaped, epithelial-covered fibro vascular lesion that originates from the limbus, more often on the nasal than temporal side [1]. Visual impairment can result from astigmatism induced by the lesion even before involvement of the central cornea; progression of the lesion with migration centrally into the visual axis results in vision loss [4, 5]. The standard treatment for pterygium is surgical removal but this has a recurrence rate as high as 61-82% [5, 6]. If the excision is combined with adjunct treatments, such as conjunctival autograft, amniotic membrane grafts, beta-radiation, or mitomycin C, recurrence can be reduced to 231%, depending on factors such as age, geographic location, occupation, pterygium morphology, and surgeon experience [5, 7-9].

In 1985, Kenyon et al (10) proposed that a conjunctival autograft of the bare sclera could be used in treatment of recurrent and advanced pterygium. Recent reports favour the use of fibrin glue (11–14) above sutures with improved comfort, decreased surgical time, reduced complication and recurrence rates have been reported. Suture-related complications include infection, granuloma formation, and chronic inflammation (15, 16) whereas plasma-derived fibrin glue has the potential risk of prion disease transmission and anaphylaxis in susceptible individuals. Sutureless 'laissez-faire' grafting has been used successfully in gingival grafts (17) and represents a similar mucosal membrane tissue environment to the conjunctiva of the eye. During the past decade, the debate over the best approach to pterygium surgery has centred on whether surgeons should use sutures or fibrin glue to affix the conjunctival graft. Both approaches have their pros and cons in terms of such factors as surgical time, postoperative complications, cosmesis and recurrence. So I am presenting a novel approach in which the patient's own blood is used for fixation. Although it hasn't been tested in a randomized, controlled trial, early results suggest that it may end up reshaping the debate altogether.

II. Review of literature:

- Simple excision is associated with a high rate of recurrence (around 80%) that may be more aggressive than the initial lesion.(19)
- Irit Bahar et al conducted prospective randomized clinical trial on 65 eyes with primary nasal pterygium and average operative time was 16minutes(14-16) in fibrin glue group and 20minutes(20-29)in vicryl suture group($p<0.05$) and observed foreign body sensation in 20% and 60% of fibrin glue and vicryl suture group respectively ($p<0.001$). Significantly less pain, photophobia, irritation, itching, epiphora, local hyperemia, conjunctival chemosis, and dry eye were noted in fibrin glue group($p<0.05$).(20)
- Koranyi G et al reported transplant loss as 1% out of 362 from fibrin glue and 2% out of 156 from vicryl group.[11] Foreign materials(suture) used in ocular surface surgery may lead to local complications such as discomfort, scarring or infection and plasma derived products such as fibrin glue may produce hypersensitivity reactions, viral transmission and economic burden.(21)
- D de Wit et al conducted case series on total of 15 eyes of 12 patients. All patients underwent sutureless and glue-free autologous conjunctival graft post pterygium excision and concluded that cosmesis was excellent in all cases and visual acuity improved in 1 patient. The mean surgical time was 14minutes. There were no transplant dislocations or failures. Postoperative pain on day 1 after surgery was consistently rated as 2 out of 10 on a visual analogue score. Pain did not increase after the first postoperative day.(18)
- Malik KPS et al carried out a prospective interventional case series in 40 eyes with primary pterygium requiring surgical excision. Pterygium excision with LCAT without using glue or sutures was performed in

all patients followed by bandaging for 48hours.The patients were followed up postoperatively on 2nd day, 1 week, 6 weeks, 6 months, and 12 months. Total graft dehiscence occurred in 2 eyes (5%), graft retraction in 3 eyes

- (7.5%) and recurrence was seen in 1 eye (2.5%).At 6 weeks postoperatively, the gain in uncorrected visual acuity ranged from 0.18 to 0.5logMAR in 7 eyes. No other complication was noted.(22)

Aims

- Foreign materials used in ocular surface surgery may lead to local complications such as discomfort, scarring, or infection. Plasma-derived products such as fibrin glue may produce possible hypersensitivity reactions whereas the risk of viral transmission remains. We describe a simple method of achieving conjunctival autograft adherence during pterygium surgery avoiding potential complications associated with the use of fibrin glue or sutures.

III. MATERIALS & METHODS:

SOURCE OF DATA:
Patients having pterygium registered in Netrajyothi Eye Hospital,Gulbarga

STUDY DESIGN:
Prospective, non-comparative, interventional case series of 36 consecutive primary pterygium operated with conjunctival autografts.

DURATION:
1 year (Sept 2022 to Aug 2023)

SAMPLE SIZE: 36 patients

OBJECTIVE OF STUDY:
To reduce the recurrence by conjuctival autograft Minimize post-operative complications due to glue and suture Economical and cost effective Minimize duration of surgery Cosmetically excellent

INCLUSION CRITERIA:
Diminution of vision either because of astigmatism or encroachment on pupillary area.Progressive nasal pterygium Marked cosmetic deformity Patients of either sex Patients in age group of 30-70 years

EXCLUSION CRITERIA:
Temporal/ recurrent/ atrophic pterygium Patients on anticoagulants Patients with ocular surface diseases eg-blepharitis, Sjogren syndrome and dry eye. History of previous ocular surgery or trauma Pterygium with cystic degeneration Pseudopterygium

Methods:

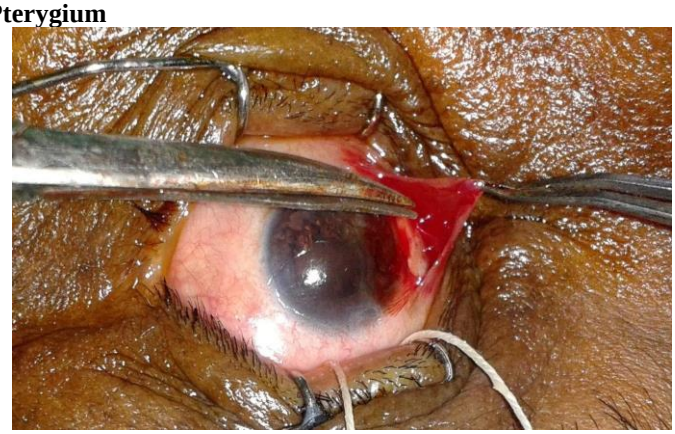
- Prospective, non-comparative, interventional case study for 36 cases of primary nasal pterygium excision with conjunctival autograft taken from superior bulbar conjunctiva. Graft was fixed using own blood clot as tissue adhesive which oozed in the bare sclera after pterygium excision. The eye was patched and the patch removed next day morning.

Materials and methods:

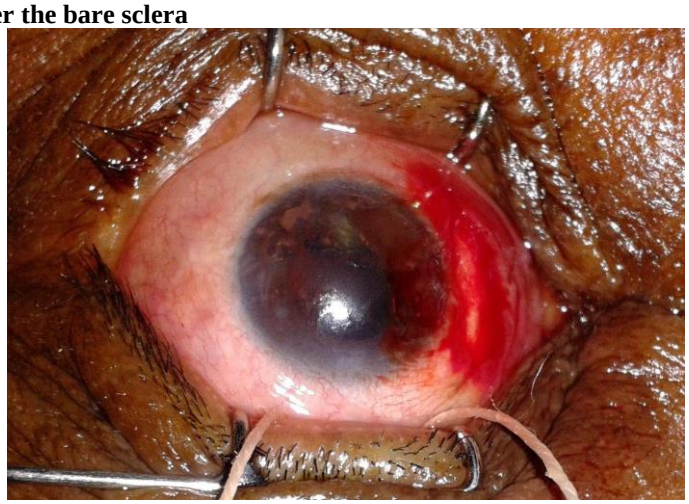
- **Surgical technique: Peribulbar block is given.**
- The body of the pterygium is dissected 4mm from the limbus, down to bare sclera, and reflected over the cornea. The pterygium head and cap is avulsed using tooth forceps followed by careful excision of corneal remnants by crescent or 15 no blade. Through excision of pterygium is done. Care is taken to avoid conjunctival plica excision and extensive dissection of tenons is avoided. Where possible, haemostasis is allowed to occur spontaneously without the use of cautery. If no blood is available to provide autologous fibrin, small perforating veins and capillaries are purposely fractured (though seldom required) to encourage a thin layer of fresh blood to cover the bare sclera. The size of the defect (mm2) is measured with Castroviejo callipers. Careful dissection between donor graft conjunctiva and Tenon's layer is used while fashioning the 1mm oversized conjunctivo-limbal graft from the superior bulbar conjunctiva.
- The limbal edge of the graft is carefully positioned at the host limbal tissue edge. The autograft edges are carefully undermined by lifting the conjunctival edges of the host area. The scleral bed is viewed through the transparent conjunctiva and to ensure residual bleeding does not re-lift the graft, small central

haemorrhages are tamponaded with direct compression using non-toothed forceps until haemostasis is achieved, usually within 8–10 min. The stabilisation of the graft is tested by moving the eyeball temporally to ensure firm adherence to sclera. Postoperatively, steroid drops were initially given four times a day and tapered over 6 weeks while antibiotic drops were administered four times a day for 1–2 weeks.

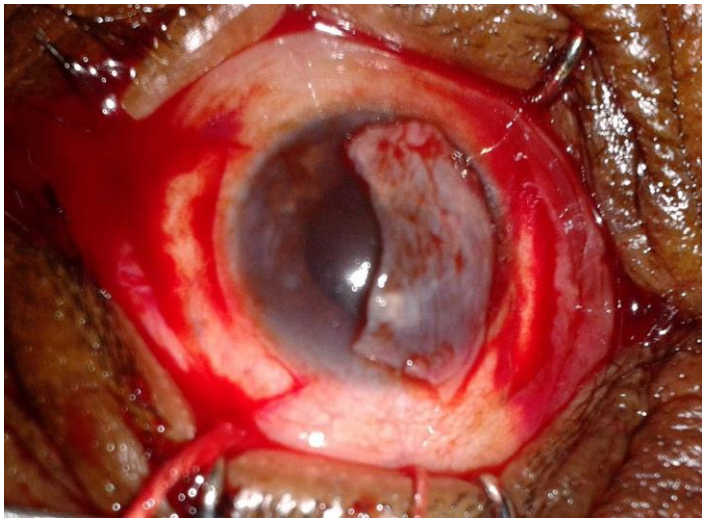
Thorough excision of Pterygium



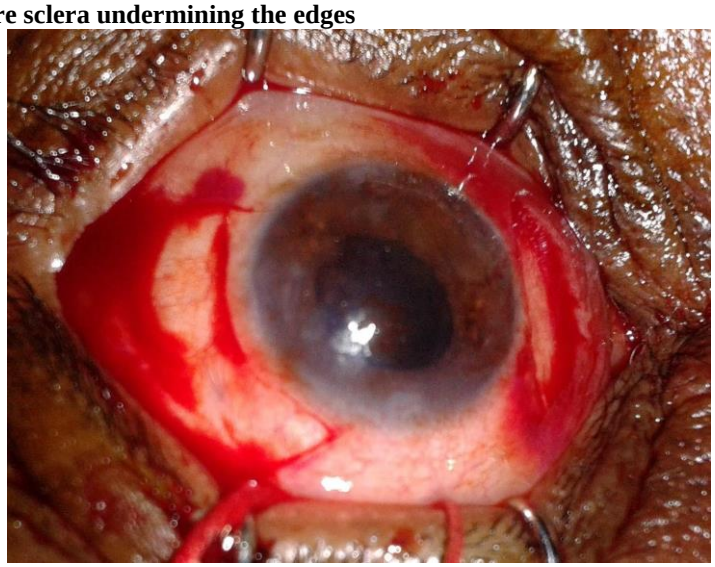
Allowing blood to cover the bare sclera



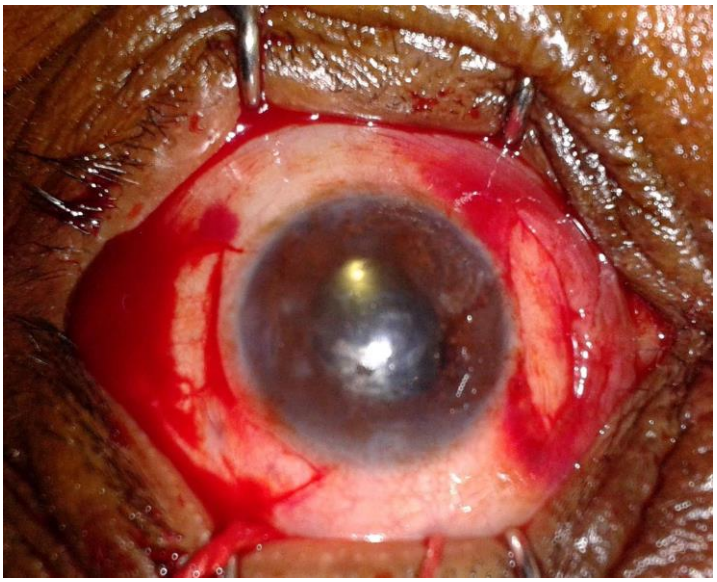
Over sized graft



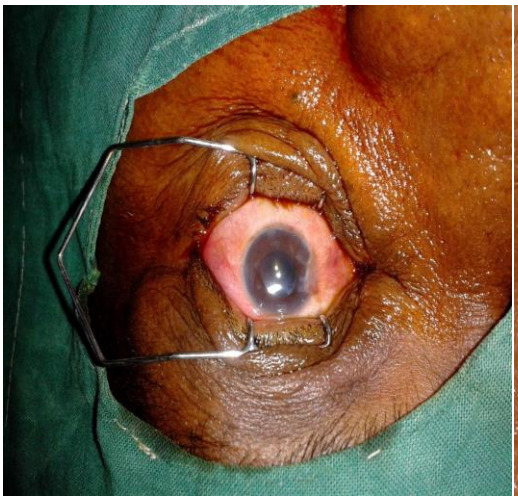
Graft placed over bare sclera undermining the edges

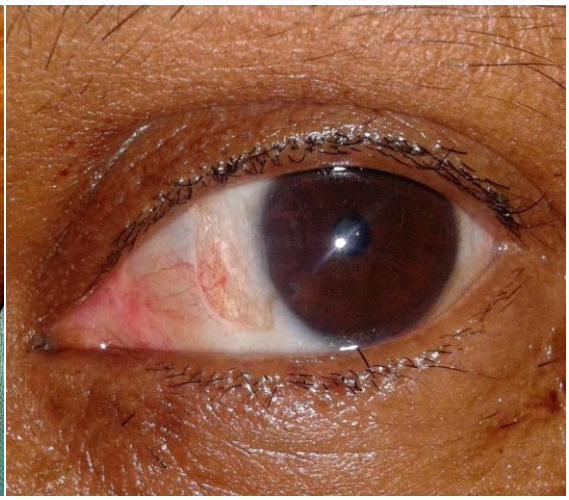


Allowing graft to adhere



Pre-operative Nasal **Post-operative pic after graft Progressive Pterygium fixation with autologous blood at 6 weeks.**





Cross sectional study:

- All records of patients undergoing pterygium surgery with conjunctival autografting at the Netrajyothi Eye Hospital,Gulbarga,between September 2022 and August 2023 were reviewed. All patients had primary nasal pterygia requiring surgical excision and signed informed consent. Primary outcome measures included graft dislocation and pterygium recurrence. Secondary outcome measures included size of graft used, patient comfort, and visual acuity. Slit lamp examination was done and after signed consent for photography, anterior segment camera photographs were taken to assess for pterygium recurrence, complications, and cosmetic result. Recurrence was defined as the presence of fibro vascular tissue regrowth extending beyond the surgical limbus onto clear cornea. Pre-operative and post-operative visual acuities together with complications were recorded from the patient's records. Cosmesis at the final visit was judged and the post-operative complaints of pain, irritation and discomfort within the first week were recorded retrospectively at the 1-week appointment. Subjective comments related to cosmesis were asked of each patient at the time of review.

IV. Results:

- Of our 36 patients, 15 were female and 21 were male with a mean age of 51.97years. The mean size of conjunctival autograft was 28mm2. Mean follow-up time was 2.6months. Cosmesis was excellent in all cases. There were no intra- or post-operative complications requiring further treatment. There were no transplant dislocations or failures. Patients rated their cosmesis as excellent in all cases and photographic comparison of nasal to temporal conjunctiva at last review revealed no obvious cosmetic defects or recurrences. Post-operative pain on day 1 was not amongst the major complaints. Pain did not increase after the first postoperative day. Not a single graft was dislodged or got puckered in the immediate postoperative period. Follow up ranged from1-4months and no recurrence was seen in that period. Patients had faster rehabilitation without much discomfort as in suture fixation.

V. Discussion:

- Current surgical methods to prevent pterygium recurrence include conjunctival autograft, limbal and limbal–conjunctival transplant, conjunctival flap and conjunctival rotation autograft surgery, amniotic membrane transplant, cultivated conjunctival transplant, lamellar keratoplasty, and the use of fibrin glue.(25) All of these techniques involve the use of sutures or fibrin glue and are therefore vulnerable to associated complications. The presence of sutures may lead to prolonged wound healing and fibrosis.(23),(24) Subsequent complications such as pyogenic granuloma formation are easily treated; others such as symblepharon formation, forniceal contracture, ocular motility restriction, diplopia, scleral necrosis, and infection are much more difficult to manage and may be sight threatening.(26),(27) Although generally considered safe, fibrin glues are currently manufactured from human plasma and therefore carry the theoretical risk of transmissible disease.(25) Virus removal and inactivation procedures are included in the manufacturing process although may be of limited value against nonenveloped viruses such as hepatitis A virus and parvovirus B19.(28)
- New devices, such as the CryoSeal FS System, that generate fibrin sealant from autologous blood may eliminate the current risks associated with pooled plasma. They are not currently in widespread use however and the time taken to procure the fibrin may be prohibitive in day care pterygium surgery.(29) Fibrinogen compounds may also be susceptible to inactivation by iodine preparations such as those used for conjunctival disinfection before pterygium surgery(30) Conjunctival graft fixation with fibrin glue, a tissue adhesive derived from two human blood clotting factors, fibrinogen and thrombin, is superior over sutures in respect to better cosmesis, faster surgical and more comfortable patient rehabilitation time, better haemostasis and reduced post operative inflammation causing a reduction in recurrence rate. The two components of the glue when mixed simulate the later stages of human coagulation process, precipitating fibrin monomers, which acts as tissue adhesive within 30 seconds to 1 minute. But the glue is costly, less readily available and bio-degradable within 3 hours of preparation, carries the potential risk of viral disease transmission and anaphylactic reaction.
- The glue also acts very fast and that demands a certain amount of quick positioning in the graft alignment. The natural fibrin clot derived from the blood oozing over the operative field can be used as a tissue adhesive with all the benefits of synthetic glue minus its drawbacks. Shortage is no longer a problem, in rare cases where not much per operative bleeding occurs, the surgeon can puncture a minute vessel in the scleral bed to produce the necessary bleeding and clotting. Graft should be slightly oversized and as thin as possible to prevent the risk of graft retraction as described by Tan et. al.(31) Edge to edge conjunctival apposition with graft positioning requires only 3 to 5 minutes.

Study Limitations:

- It is a non-randomised study with small study population and a relatively short follow up period of 4 months.
- In conclusion autologous blood may be a viable alternate tissue adhesive for conjunctival graft fixation in pterygium surgery. It demands no extra cost but provides all the benefits of fibrin glue without its drawbacks. A prospective randomized controlled trial to investigate the long term efficacy of this unique grafting technique is required.

VI. CONCLUSIONS:

- This study suggests that autologous fibrin in blood is a useful alternative method for graft fixation in pterygium surgery. Autologous blood used for graft fixation in pterygium surgery is having excellent outcome and is less time consuming and avoids suture related problems and cost of fibrin glue**. Thus, autologous in-situ blood coagulum is a useful method for graft fixation in pterygium surgery with shorter operating time and less postoperative discomfort.**

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