

The Gundersen Flap: A New Modification

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Abstract. To describe a new surgical technique as a modification of the Gundersen flap procedure. A retrospective evaluation of surgical outcomes of 10 patients with various ocular surface disorders which had two vertical bi-pedicel conjunctival flaps in order to cover the surface totally. 10 eyes of 10 patients' (4 females and 6 males) with age between 41-96 years old (mean 68.5 years) treated with modified conjunctival flap. Follow-up 8-38 months (mean 23 months). Only one patient developed flap retraction, no other complications reported during the follow-up period. Conjunctival flap is one of the surgical options to treat chronic corneal surface disorders. It can be partial or total, both techniques associated with several complications including flap retraction. This new modification may be a good alternative to minimize these complications.

Keywords: Gundersen flap, Conjunctival flap, Bi-pedicel vertical flap, Flap Retraction.

Introduction

The first introduction of the conjunctival flaps to treat corneal diseases was published in the German literature by Schoeler at the end of the nineteenth century^[1]. This technique involved dissecting both

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conjunctiva and Tenon's capsule plus suturing them to the corneal surface.

In 1958, Gundersen published a new technique using conjunctiva without Tenon's capsule in order to minimize the likelihood of post operative retraction of the flap^[2].

Over the last 50 years different types of conjunctival flaps were described in the medical journals which included advancement flap, Bi-pedicle flap, and single pedicle flap^[3-5].

Although the surgical procedure is simple and straightforward, it can be associated with several complications. One of these complications is retraction of the flap resulting from tension placed on the inferior portion of the flap and subsequent tearing away of the suture line. This complication is commonly seen with the total conjunctival flap.

This paper describes a new surgical technique as a modification of the Gundersen flap in order to minimize the post operative retraction of the flap.

Methods

A retrospective evaluation of medical records of 10 patients with ocular surface disorders who had modified total conjunctival flap between 1995 and 2002 at the University of Ottawa Eye Institute. All surgeries were done by Dr. George Mintsoulis and Dr. Ahmed Bawazeer.

Surgical Technique

This procedure can be performed with retrobulbar block or peribulbar anesthesia; general anesthesia can be used with children and uncooperative patients.

A lid speculum is placed and the corneal epithelium is removed mechanically with a blunt spatula, or a surgical blade (#64 Beaver blades). This will facilitate the adhesion of the flap to the corneal surface and reduce the risk of epithelial inclusion cysts formation under the flap. Any necrotic tissue is also removed (Fig. 1).

A complete 360 degree peritomy is made and hemostasis is obtained as needed by the cautery (Fig. 2).

Both temporal and nasal conjunctiva can be used to create a vertical bipedicle flap. The area to be dissected may be marked with a surgical marking pen.



Fig. 1. Preop. picture of eye.



Fig. 2. 360 degree peritomy.

A vertical conjunctival incision is made with a sharp-tipped Westcott scissors 8 mm from the limbus; both nasally and temporally; extended superiorly and inferiorly in both sides (Fig. 3). A serrated non-toothed forceps grasp the conjunctiva well, and the conjunctiva is dissected bluntly from Tenon's capsule to avoid buttonholing. A subconjunctival injection of balanced salt solution or 2% lidocaine with 1:100,000 of epinephrine can help the separation of conjunctiva from underlying Tenon's capsule.

The temporal and nasal flap is pulled medially and laterally respectively to cover the entire corneal surface.

The conjunctival flap is sutured to the limbus medially and laterally with 10-0 nylon interrupted, incorporating episclera into the bite (Fig. 4). The two free edges of the flap are sutured together centrally with 10-0 nylon interrupted; incorporating superficial cornea into the bite (Fig. 5). At the end, antibiotic ointment and a pressure patch are applied. The sutures may be removed in 3 to 4 weeks.



Fig. 3. Two 8 mm vertical incision on either side of the cornea.



Fig. 4. Two bipedicle flaps sutured over the cornea.



Fig. 5. Bare tenons area on either side of cornea at the end of procedure.

Results

Ten eyes of 10 patients presented with various ocular surface disorders (Table 1). Six males and 4 females with age ranges between 41 to 96 years old (mean 68.5 years). Follow-up period between 8 and 38 months (mean 23 months). Only one patient developed flap retraction (10%), but there were no other complications reported during the follow-up period.

Table 1. Summary of patients with modified conjunctival flap.

Sr. No.	Age	Sex	Diagnosis	Complication	Period of Follow - Up
1.	72 Yrs	Female	PBK	Nil	11 mths
2.	78 Yrs	Male	HSV + PED	Nil	9 mths
3.	96 Yrs	Female	Neurotrophic	Nil	18 mths
4.	45 Yrs	Male	Corneal ulcer	Nil	35 mths
5.	50 Yrs	Male	Neurotrophic ulcer	Nil	8 mths
6.	41 Yrs	Male	PBK	Flap retraction	6 mths
7.	62 Yrs	Male		Nil	24 mths
8.	55 Yrs	Female	PBK	Nil	38 mths
9.	60 Yrs	Male	PBK	Nil	10 mths
10.	50 Yrs	Female	Corneal ulcer	Nil	14 mths

PBK: Pseudophakic Bullous Keratopathy

HSV: Herpes Simplex Virus

PED: Persistent epithelial defect

Discussion

In modern ophthalmology practice most of ocular surface disorders are effectively managed with different and less invasive treatment modalities. These include better and more potent topical antibiotics, topical lubrications, bandage contact lenses, tissue adhesives,

amniotic membrane transplantation, and advanced corneal, conjunctival, and oculoplastic surgical procedures.

In spite the advancement in the medical and surgical treatment of ocular surface disorders, conjunctival flap is one of the surgical options and is still indicated in some situation. These indications include non-healing sterile corneal ulcer, bullous keratopathy, herpetic ulceration, neuroparalytic keratitis, fungal keratitis, severe unresponsive keratitis sicca, chronic ulceration from exposure, and peripheral marginal ulceration^[4,6-8].

This surgical procedure contraindicates in patients with corneal perforation. There are many drawbacks associated with this procedure which include necrosis of the flap, hemorrhage under flap, buttonholes, epithelial cysts, ptosis, and retraction of the flap^[4,6-8].

Paton and Milauskas in a review of 122 consecutive cases reported 13 cases of postoperative flap retraction^[8].

Inslar and Pechous reported an incidence of 14% postoperative complication associated with conjunctival flaps and half of these complications were related to flap retractions^[9]. With these modifications only one patient developed flap retraction and the incidence was 10%, which was similar to the incidence reported previously. However, in our case series the patient who developed flap retraction had loose suture post operatively and the flap retracted ten days after surgery.

Gundersen^[2] was the first to report the importance of dissecting Tenon's capsule from the posterior surface of the conjunctiva before it is secured over the cornea in order to reduce the incidence of postoperative flap retractions. Even with this modification by Gundersen, a thin flap still has a tendency to retract. The main reason for this retraction is the tension created on the flap by the upper eyelid pulling the flap away from the corneal surface. With this new technique the tension created by the upper eyelids will not pull on the flap as it is placed and sutured vertically away from the tension line.

In conclusion, it's believed that Gundersen flap is still one of the surgical options in treating many corneal surface disorders; especially in institutions with limited surgical facilities. Moreover, with this new modification, by placing the flap vertically it can reduce the incidence of retraction, although 10% of our patients developed this complication in a small series, a larger number of cases might confirm our hypothesis.

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شريحة قاندرسن - التعديل الجديد

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المستخلص. هدف البحث، وصف تقنية جراحية جديدة كتعديل لشريحة قاندرسن. طرق البحث : مراجعة وتقييم النتائج الجراحية لعشرة مرضى، لديهم أمراض مختلفة لسطح العين الخارجي، والذين أجري لهم عمل جراحي بعمل شريحتين عموديتين ثنائية الارتكاز في الملتحمة، من أجل تغطية كل سطح العين. نتائج البحث: عشرة عيون لعشرة مرضى (أربعة إناث وستة ذكور) بعمر يتراوح بين ٤١-٩٦ سنة متوسط ٦٥.٥ سنة)، تم علاجهم بطريقة الشريحة المعدلة في الملتحمة. تم متابعة المرضى ٨-٣٨ شهراً (متوسط ٢٣ شهراً). مريض واحد فقط حصل لديه انسحاب شريحة الملتحمة، ولم يحدث أي اختلاطات أخرى خلال فترة المتابعة. إن شريحة الملتحمة هي إحدى الخيارات الجراحية لعلاج أمراض سطح القرنية المزمنة. قد تكون شريحة الملتحمة جزئية أو كاملة، وفي كلتا الطريقتين قد يحصل عدة اختلاطات، تشمل انسحاب الشريحة عن سطح القرنية. إن الطريقة الجديدة المعدلة عن شريحة قاندرسن قد تكون بديلاً جيداً لتقليل هذه الاختلاطات.