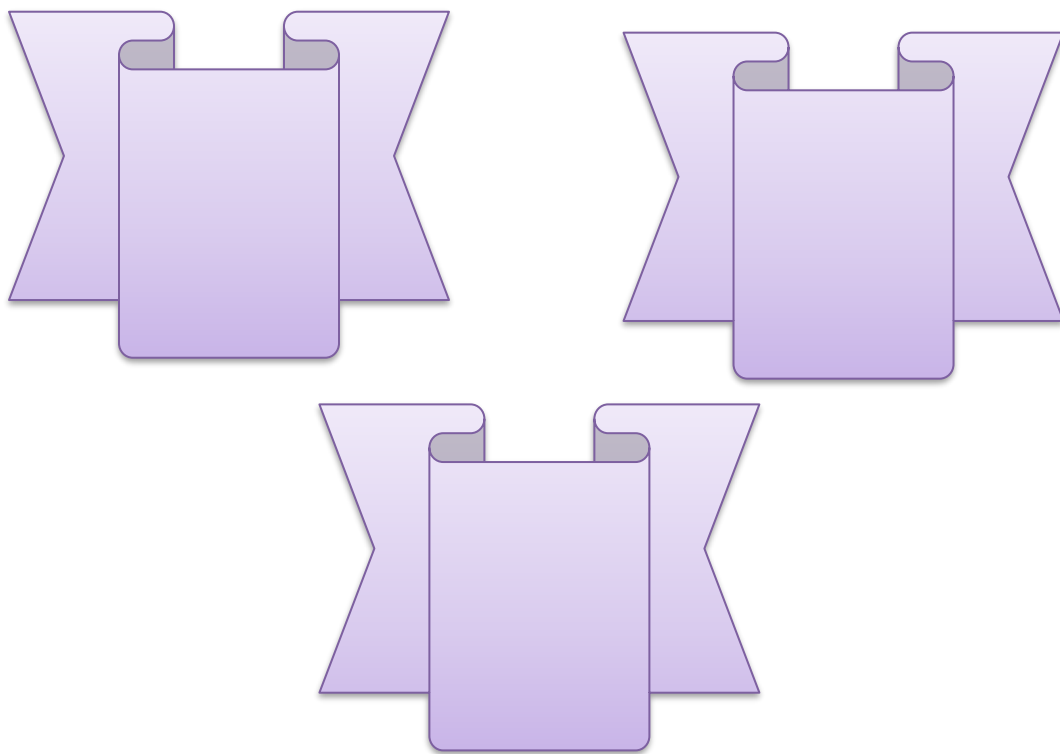


INTERNATIONAL JOURNAL OF MEDICAL ARTS



Volume 5, Issue 3, March 2023

<https://ijma.journals.ekb.eg/>



Print ISSN: 2636-4174

Online ISSN: 2682-3780



Available online at Journal Website
<https://ijma.journals.ekb.eg/>
 Main Subject [Ophthalmology]



Original Article

The Outcome of Surgical Treatment of Giant Papillary Conjunctivitis by Simple Excision Only, Excision with Conjunctival Autograft or Amniotic Membrane Transplantation

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ABSTRACT

Article information

Received: 09-04-2023

Accepted: 12-05-2023

DOI:
10.21608/IJMA.2023.204983.1667.

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Citation: Tawfik AMR. The Outcome of Surgical Treatment of Giant Papillary Conjunctivitis by Simple Excision Only, Excision with Conjunctival Autograft or Amniotic Membrane Transplantation. IJMA 2023 March; 5 [3]: 3126-3132. doi: 10.21608/IJMA.2023.204983.1667.

Background: Giant papillary conjunctivitis [GPC] is a type of inflammatory disease of the eye formed of "giant" papillae in the superior tarsal conjunctiva.

Aim of the work: We have compared the effect of refractory giant papillary conjunctivitis management surgically with excision with and without conjunctival autograft or amniotic membrane transplantation.

Patients and Methods: This was a randomized controlled trial conducted in the Ophthalmology Department, Al-Azhar University Hospitals, Egypt in the period from January 2022 to January 2023 included 45 patients presenting with giant papillary conjunctivitis who were treated surgically by one of the following techniques divided into 3 groups: group [1]; included 15 patients had undergone simple surgical excision of giant conjunctival papillae only, group [2]; included 15 patients had undergone surgical excision with conjunctival autograft and group [3]; included 15 patients had undergone surgical excision with amniotic membrane transplantation [AMT].

Results: Results of this study reported that recurrence occurred higher in simple excision [10.7%] with a significant difference between groups [p value=0.021], also dry eye was higher in the same group [17.9%] with no significant difference. Conjunctival inflammation was higher in excision with AMT [10%] with no significant difference. Scar had been formed in one eye of simple excision patients only while vascularization was in one eye of excision with autologous conjunctival graft only.

Conclusion: AMT or autologous conjunctival graft following excision of giant conjunctival papillae may reduce the chances of recurrence; also, surgical outcomes are better than that reported with the simple excision.

Keywords: Giant papillary conjunctivitis; Surgical excision; Excision with conjunctival autograft; AMT



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INTRODUCTION

Giant papillary conjunctivitis [GPC] is a type of inflammatory disease of the eye formed of "giant" papillae in the superior tarsal conjunctiva [1]. Initially, any papillae ≥ 1.0 mm was considered "giant papillae" but more recent research considers the GPC for any papillae ≥ 0.3 mm [2].

GPC typically occurred with contact lens wear, so the term contact lens-induced papillary conjunctivitis [CLPC] was described in cases induced by contact lens wear. Other causes also were reported such as eye prostheses, exposed sutures, exposed buckles, glaucoma filtering blebs, and elevated band keratopathy [3, 4].

The precise pathophysiology of GPC is not fully known and is potentially multifactorial with immunological reactions to any foreign body such as contact lenses and clinical presentation that resolve foreign body-induced physiological inflammation [5, 6].

Patients typically have symptoms of itching, blurring of vision, a feeling of a foreign body, increased mucus, and diminished tolerance of wear of contact lenses. GPC appears to be one of the most prevalent problems of both soft and rigid contact lens wear despite eye care programs that are being told by professionals about routine contact lens replacement and proper hygiene [7].

Treatment for GPC patients aims to enable them to use the most successful therapeutic program during contact lens wear. Contact lens users should use a proper cleaning method for lenses and remove them periodically, adjusting the design of lenses or trying rigid gas permeable lenses, which are smaller with less surface area, so lens deposits are not collected easily [8].

The contact lens can be replaced if the symptoms persist and topical drugs composed of corticosteroids, nonsteroidal anti-inflammatory eye drops, and mast cell stabilizers can be added which can simulate the immune system. For contact lens users with mild to moderate papillary conjunctivitis, olopatadine and fluorometholone are more effective as reported by *Khurana et al.* [9]. Moderate to severe GPC tends to have a good response to mast cell stabilizers with a success rate of 70% [10].

In refractory cases to conservative or medical treatment, surgical treatment is essential. Surgical excision for giant conjunctival papillae together with AMT or autologous conjunctival graft to treat the tarsal conjunctival defect has been conducted with reasonable performance [11].

In this article, we have compared the effect of refractory giant papillary conjunctivitis management surgically with excision with and without conjunctival autograft or amniotic membrane transplantation [AMT].

PATIENTS AND METHODS

This was a randomized controlled trial conducted in Ophthalmology Department, Al-Azhar University Hospitals, Egypt in the period from January 2022 to January 2023 included 45 patients presenting with giant papillary conjunctivitis, their ages ranged from 21 to 71 years, 19 patients were males and 26 patients were females. The patients are divided by simple randomization into three categories, each has 15 subjects, Group [1]: included 15 patients who had undergone a simple surgical excision of GPC only. Group [2]: included 15 patients who had undergone surgical excision of GPC with conjunctival autograft. Group [3]: included 15 patients who had undergone surgical excision of GPC with amniotic membrane graft. Our study followed the Helsinki Declaration principles and was approved by the ethical approval committee of our institution. Written consent was obtained from every patient before recruitment. We recruited the patients according to the following:

The inclusion criteria were: Patients with conjunctival papillae with a diameter ≥ 0.3 mm that are refractory to medical treatment.

The exclusion criteria were: 1] Small conjunctival papillae < 0.3 mm. 2] Corneal involvement. 3] Suspected conjunctival tumor.

Data collection: Each patient had undergone a detailed history [such as atopy, asthma symptoms, allergic rhinitis, atopic dermatitis, and contact lens] and a complete ophthalmic examination.

Surgical techniques: Local anesthesia has been given and a 15 Bard-Parker knife was used to excise the giant papillae. There were 3 groups of patients: In group [1] simple excision

procedure was done [excising the giant papillae only], in group [2] conjunctival autograft procedure was done after excision of giant papillae, conjunctival tissue from another section of the subject's eye along with limbal tissue is resected in one piece and used to cover the part from which the papillae were excised while in group [3] an AMT was done after excision of giant papillae. The amniotic membrane with its epithelial side up had been placed over the tarsal conjunctiva after excision and placed in the site of the defect. The edges of

the amniotic membrane were sutured by 8-0 vicryl.

Preparation of amniotic membrane: The amniotic membrane was handled in the glycerin solution and kept in the Modified Eagle Medium [DMEM] Dulbecco in a 1:1 ratio containing antibiotics at -80°C , after receiving from donors who had undergone elective cesarean delivery. At the time of donation and after six months, donor serums were tested for microbiological safety.

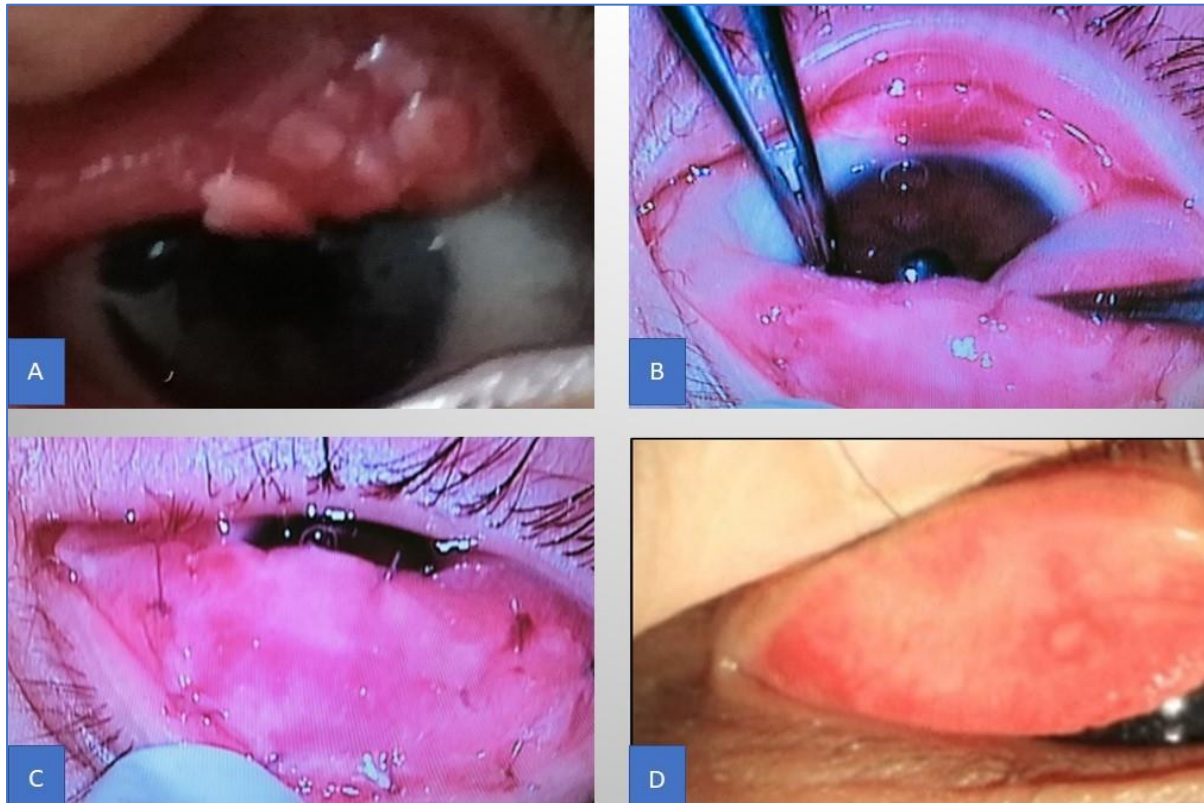


Figure [1]: The conjunctival autograft; [A]: Conjunctival giant papillae before the procedure [B, C]: During the procedure, [D]: After healing.



Figure [2]: Amniotic membrane graft; [A]: Before the procedure, [B]: After healing

Postoperative care: Topical prednisolone acetate [1%] and levofloxacin eye drops were taken four times daily for four weeks. Preservative-free lubricant eye drops were introduced also in both eyes.

Follow up: Patients received follow-ups for two years. The rate of recurrence and postoperative complications were reported during the long-term duration of follow-up.

Statistical Analysis

The collected data were coded, processed, and analyzed using the SPSS [Statistical Package for Social Sciences] version 21 for Windows® [SPSS Inc, Chicago, IL,USA]. Quantitative data were presented as mean \pm SD and range. Qualitative data were presented as numbers and percentages. Comparison between Qualitative data among the groups was done by Chi-Square test. ANOVA test was used to compare Quantitative data among the groups. $P < 0.05$ was considered to be statistically significant.

RESULTS

This study included 87 eyes of 45 subjects. The mean age in groups 1, 2, and 3 was 32.61, 42.84, and 39.27 years old respectively. Females were more prevalent [65%] in studied patients. Also, bilateral GPC was more common [93.3%] than single-eye [6.7%] in all groups [table 1].

Regarding risk factors and etiology of GPC, contact lens wearing was the most common

etiology 84.4% in all groups while atopy, exposed sutures, and exposed scleral buckles were 11.1%, 2.2%, and 2.2% respectively [table 2]. In group [1], 80% of cases were caused by contact lenses, and 20% were caused by atopy while in group [2], 93.3 % of cases were caused by contact lenses, and 6.7 % were caused by exposed scleral buckles. In group [3], 80% of cases were caused by contact lenses, 13.3% were caused by atopy and 6.7% were caused by exposed sutures.

Regarding the clinical presentation of studied groups 1, 2, and 3, itching was present in 8 [53.3%], 5 [33.3%] & 8 [53.3%] patients, blurred vision in 3 [20%], 7 [46.7%], and 5 [33.3%], foreign body sensation in 9 [60%], 4 [26.7%], and 7 [46.7%], decreased lens tolerance in 11 [73.3%], 9 [60%], and 7 [46.7%], excess mucus production in 6 [40%], 10 [66.7%] & 4 [26.7%], hyperemia in 12 [80%], 8 [53.3%], and 9 [60%] and conjunctival opacification in 8 [53.3%], 3 [20%] & 5 [33.3%] patients respectively with no significant difference between groups [table 3].

Considering postoperative complications, recurrence occurred higher in the simple excision group [21.4%] with a statistically significant difference between groups [p value=0.021], dry eye was higher in group 1 [17.9%] than group 2 [6.9%] and group 3 [10%] with no significant difference between groups. Conjunctival inflammation was higher in group 3 [10%] than in group 1 [7.4%] and group 2 [3.4%] with no significant difference between groups. Scar had been formed in one eye of group 1 only while vascularization was in one eye of group 2 only [table 4].

Table [1]: Demographic data of studied patients

		Group 1 [n=15]	Group 2 [n=15]	Group 3 [n=15]	F / χ^2 test	P value
Sex [No., %]	Male	10 [66.7%]	3 [20%]	6 [40%]	1.385	0.284
	Female	5 [33.3%]	12 [80%]	9 [60%]		
Age [years]	Mean \pm SD	32.61 \pm 5.15	42.84 \pm 9.33	39.27 \pm 7.11	1.228	0.302
	Range	21-65	28-61	24-71		
Number of eyes [No., %]	Right eyes	1 [6.7%]	-	-	2.164	0.257
	Left eyes	1 [6.7%]	1 [6.7%]	-		
	Bilateral eyes	13 [86.6%]	14 [93.3%]	15 [100%]		

Table [2]: Risk factors and etiology of GPC in studied groups

	Group 1 [n=15]	Group 2 [n=15]	Group 3 [n=15]	χ^2 test	P value
	No. [%]	No. [%]	No. [%]		
Contact lens	12 [80%]	14 [93.3%]	12 [80%]	1.764	0.461
Atopy	3 [20%]	-	2 [13.3%]	0.631	0.252
Exposed sutures	-	-	1 [6.7%]	-	-
Exposed scleral buckles	-	1 [6.7%]	-	-	-

Table [3]: Clinical presentation of GPC in studied groups

	Group [1] [n=15]	Group [2] [n=15]	Group [3] [n=15]	χ^2 test	P value
	No. [%]	No. [%]	No. [%]		
Itching	8 [53.3%]	5 [33.3%]	8 [53.3%]	2.761	0.311
Blurred vision	3 [20%]	7 [46.7%]	5 [33.3%]	1.292	0.192
Foreign body sensation	9 [60%]	4 [26.7%]	7 [46.7%]	1.814	0.541
Decreased lens tolerance	11 [73.3%]	9 [60%]	7 [46.7%]	0.942	0.273
Excess mucus production	6 [40%]	10 [66.7%]	4 [26.7%]	2.592	0.116
Hyperemia	12 [80%]	8 [53.3%]	9 [60%]	1.724	0.571
Conjunctival opacification	8 [53.3%]	3 [20%]	5 [33.3%]	5.219	0.153

Table [4]: Post-surgical complication in studied groups

	Group [1] [No. of eyes =28]	Group [2] [No. of eyes =29]	Group [3] [No. of eyes =30]	χ^2 test	P value	
	No. [%]	No. [%]	No. [%]			
Recurrence	6 [21.4%]	1 [3.4%]	1 [3.3%]	4.404	0.021*	P1=0.055 P2=0.035* P3=0.842
Dry eye	5 [17.9%]	2 [6.9%]	3 [10%]	2.742	0.152	
Conjunctival inflammation	2 [7.4%]	1 [3.4%]	3 [10%]	0.864	0.381	
Scar	1 [3.6%]	-	-			
Vascularization	-	1 [3.4%]	-			

P1=Comparison between group 1 and group 2, P2 = Comparison between group 1 and group 3, P3 = Comparison between group 2 and group 3. *: P value was significant.

DISCUSSION

Despite extensive daily use of contact lenses, GPC is considered a significant cause for the cessation of contact lenses worn by patients [12]. Different clinical studies evaluated therapies for different types of eye allergy disorders, several trials in the methods of treatment of GPC do not fulfill the requirements for randomized controlled trials, implementing evidence-based treatment approaches impossible for eye care professionals to conduct in their practice [13].

There is a shortage of knowledge on the surgical procedures but numerous techniques can be used, like cryotherapy of papillae, papillary excision accompanied by amniotic membrane transplantation, oral mucous membrane transplant, or autologous conjunctival graft to be placed over defects [14].

This analysis that evaluates the outcomes of surgical treatment of GPC involved surgical excision only, excision with AMT or conjunctival autologous graft. To our knowledge, there are no articles, that compare the postoperative outcomes for patients with the three procedures.

The study in our hand included 87 eyes of 45 subjects and GPC was in both eyes in 93% of studied patients. Although clinical presentation is usually bilaterally, one study reported that 10% of GPC cases were unilateral [15].

Our research found that the most prevalent cause in all groups was the use of contact lenses [84.4%]. There is a broad variation in the recorded occurrence of GPC in contact lens wearers. **Allansmith et al.** [16] recorded that GPC's incidence rates were 1.5%-47.5%. The prevalence of GPC tends to be affected by repeated contact lens removal, type of contact lenses increased wearing times, bad contact lens hygiene, increased lens size, and poor lens fit [17].

Korb et al. [18], observed that conjunctival papillae exhibited above 0.3 mm in 0.6% of patients without wearing contact lenses or suffering from GPC. **Donshik et al.** [3], reported that the severity of the clinical presentation of GPC in atopic subjects is more than in non-atopic.

GPC is typically manifested by conjunctival redness, giant papillae on the tarsal conjunctiva,

and dense mucus deposits in both the medial canthus, and tear film^[19]. It is also worth noting that even asymptomatic patients with noncontact lens wear also have papillae. Research by **Allansmith *et al.***^[20], reported that in 69 percent of healthy individuals without contact lenses, small uniform papillae are detected.

The potency of AMTs was appropriate needed as an extension of the collagen layer and basement membrane. Epithelial cells are not supported by the AM. Therefore, AM graft can be differentiated from a conjunctival and mucosal graft epithelial graft. These grafts were used for ophthalmic reconstruction for over a century^[21].

For the last 2 decades, such approaches have been assessed in a manner that has widened the treatment possibilities by alternative technologies, such as AMTs. The recent procedures, which involve conjunctival and mucosal grafting remain updated and an effective alternative for conjunctiva reconstruction. Its benefits involve easy availability, quick and cost-effective graft, high graft stabilization, and tolerance^[22].

Considering outcomes of surgical procedures, recurrence occurred higher in simple excision [21.4%] with a significant difference between groups [p value=0.021], also dry eye was higher in the same group [17.9%] with no significant difference. Conjunctival inflammation was higher in excision with AMT [10%] with no significant difference. Scar had been formed in one eye of simple excision patients only while vascularization was in one eye of excision with autologous conjunctival graft only.

Tanaka *et al.*^[23], recorded that simple excision of the giant papilla has a recurrence rate of 82.4%, with repeated lesions through 6 months postoperative in seventeen eyes.

In a previous study by **Jiang *et al.***^[24], on 16 eyes, excision of giant papillae with AMT has enhanced clinical manifestations through 1 month; also, recurrence occurred in two eyes [12.5%].

Nevertheless, a retrospective analysis of thirteen eyes of subjects, who have refractory giant papillae after vernal keratoconjunctivitis [VKC] and AMT was done, and the smooth

tarsal conjunctival surface was observed in all patients, with no recurrence in any eye for one year after surgery^[25].

In addition, no recurrence of giant papillae was reported during the period from nine months to twenty-seven months in six eyes with severe vernal keratoconjunctivitis who had conjunctival autograft^[26].

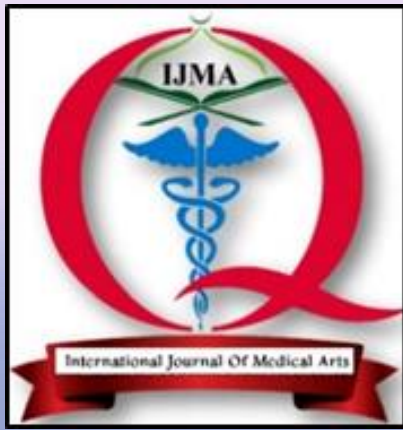
Conclusion: This research reveals that AMT or autologous conjunctival graft following GPC excision may reduce the chances of recurrence; also, their surgical outcomes are better than the simple excision outcomes.

Conflict of Interest and Financial Disclosure: None.

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Online ISSN: 2682-3780

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