Original Article

Concomitant use of conjunctival tissue graft from the pterygium itself without rotation in pterygium surgery: A full circle in conjunctival autografting

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Purpose: The aim of this study is to describe a modified technique of using conjunctival tissue from the pterygium itself without any rotation of graft for the primary pterygium in eyes with glaucoma filtering bleb, glaucoma suspects, and in primary double-head pterygium using fibrin glue. **Methods:** In this retrospective, noncomparative, interventional case series, 98 eyes of 98 patients with primary pterygium operated between July 2011 to July 2016 were included. They underwent this technique from the pterygium tissue itself. There was no rotation of this graft, and it was adhered to the bare scleral defect with fibrin glue. Histopathological analysis of pterygium tissue was done to look for morphology and thickness of this thin conjunctival tissue obtained from pterygium tissue itself. The primary outcome measure was recurrence rate. Other outcome measures studied was graft retraction and graft edema. **Results:** The mean age was 52 ± 10.04 years. Mean follow-up was 14 ± 8.24 months. The only significant complication was recurrence rate of 4.08% (4 eyes out of 98). The most come secondary outcome was graft edema, 52.04% (51 eyes out of 98) which resolved without any intervention. Other outcome such as graft retraction, 32.65% was also recorded. **Conclusion:** Conjunctival tissue from the pterygium tissue itself without actual rotation appears to be a successful technique with lower recurrence rate for treating primary pterygium in eyes with glaucoma filtering bleb, glaucoma suspects, and in primary double-head pterygium.

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Primary pterygium is believed to be a consequence of ultraviolet-induced damage with subsequent elastotic degeneration of conjunctival collagen.[1,2] In a tropical country like India, the prevalence of pterygium ranges from 9.5% to 13%.[3] Conjunctival autograft (CAG) is the gold standard in the management of primary pterygium.[4] However, in certain patients with primary pterygium having glaucoma filtering bleb superiorly, obtaining CAG is difficult. In glaucoma suspects where superior bulbar conjunctiva may be warranted for any future filtering surgery, CAG from superior site would not be advisable. Also in patients with large double-head pterygium, many a times' superior bulbar CAG is not sufficient enough to cover both the bare scleral defects. Jap *et al.* suggested the use of conjunctival tissue from the pterygium itself to cover the bare scleral defect without disturbing the superior or superotemporal bulbar conjunctiva, but with 180° rotation of the graft in such indications.[5]

We herein report a novel approach of using conjunctival tissue from the pterygium itself to cover the bare scleral defects, without actual rotation of the graft. We also documented long-term outcomes in these patients.

Methods

Case records of 98 eyes of 98 patients were included in this study and were divided into 3 groups. Data from July 2011 to July 2016 were analyzed retrospectively at a tertiary eye care hospital of South India. Data collected included patient's age, sex, ocular medical and surgical history, visual acuity before and after surgery, surgical technique and complications. Pterygium was graded according to corneal involvement (Grade 1: crossing limbus; Grade 2: midway between limbus and pupil; Grade 3: reaching up to pupillary margin; and Grade 4: crossing pupillary margin). Out of 98 eyes with primary pterygium, Group 1 included 25 eyes that had superior filtering bleb and underwent this technique for nasal pterygium; Group 2 included 20 eyes that were diagnosed to be glaucoma suspects and counseled about any future need for filtering surgery; and Group 3 included 53 eyes with primary double-head pterygium. All the eyes underwent same technique in all the three groups, performed by the same surgeon. Up to Grade 3 primary pterygium was included in this study. Grade 4 and recurrent pterygium were excluded from this study. The study protocol adhered to the tenets of the Declaration of Helsinki. The study was approved by institutional ethics committee.

Surgical procedure

Glaucoma suspects/with filtering bleb

A standard surgical technique similar to Jap *et al.*[5] was followed with fewer modifications. 0.5% proparacaine HCl (Aurocaine,

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Aurolab, Tamil Nadu, India) was used as topical anesthesia. About 1 cc of 2% xylocaine (AstraZeneca, UK) was injected subconjunctivally into the pterygium tissue [Fig. 1a] and a thin layer of conjunctival graft was fashioned from the pterygium tissue [Fig. 1b]. This conjunctival layer from the pterygium itself was then separated completely from the underlying fibrovascular tissue and kept aside onto the corneal surface. The fibrovascular tissue of the pterygium was excised [Fig. 1c]. Adequate cauterization was done to achieve hemostasis. Thin conjunctival layer was then transferred to the bare scleral bed with epithelial side up and without any rotation [Fig. 1d] and adhered to the bare scleral bed using fibrin glue Tisseel VH (Baxter AG, Vienna, Austria).

Double-head pterygium

0.5% proparacaine HCl (Aurocaine, Aurolab, Tamil Nadu, India) was used as topical anesthesia. Preoperative image of double head pterygium is shown in Fig. 2a. Smaller temporal pterygium was first excised [Fig. 2b] to form a bare scleral defect. About 1 cc of 2% Xylocaine (AstraZeneca, UK) was injected subconjunctivally into the nasal head of pterygium tissue and a thin conjunctival layer is separated from the underlying fibrovascular tissue of pterygium [Fig. 2c]. Fibrin glue was then used to adhere this thin layer tissue obtained from nasal pterygium to temporal bare scleral bed without any rotation of graft [Fig. 2d]. The underlying fibrovascular tissue of nasal side was then excised using conjunctival forceps [Fig. 2e]. The corneal and limbal area on nasal side was scraped clean of residual tissue with crescent blade. Gentle wet-field cautery was used to achieve hemostasis. The superior bulbar conjunctiva was selected as the donor site for nasal bare scleral defect. 2% xylocaine (AstraZeneca, UK) was injected subconjunctivally with 26G needle, which was useful in good dissection of conjunctiva from Tenon's capsule. A small nick incision was made at the forniceal end using Vannas scissors. A thin CAG of adequate size was fashioned [Fig. 2f]. For successful graft take up, thin graft with meticulous dissection of Tenon's is required.[6] Superior CAG was then transferred to nasal bed and adhered with fibrin glue Tisseel VH (Baxter AG, Vienna, Austria) [Fig. 2g and h].

The eyes were patched overnight. Postoperatively, topical 0.5% loteprednol etabonate, topical 0.5% moxifloxacin HCl, and tear substitute 0.5% carboxymethylcellulose was started six times daily for 1st week and then tapered gradually over four more weeks. Fig. 3a shows preoperative image of double head pterygium. Patients were examined on postoperative day 1 and later asked for follow-up after 1 week [Fig. 3b], 6 weeks, 6 months, 1 year [Fig. 3c], and every year thereafter. The data of each visit was analyzed and documented. Recurrence was defined as fibrovascular tissue in growth of 1.5 mm or more beyond the limbus onto the clear cornea with conjunctival dragging as described by Singh *et al*.[7]

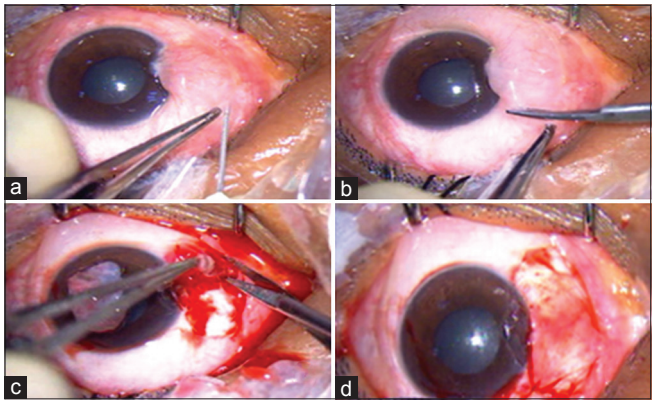

Figure 1: (a) Subconjunctival injection of xylocaine in nasal pterygium of glaucoma suspect. (b) Fashioning of thin conjunctival layer. (c) Excision of fibrovascular tissue of pterygium. (d) Conjunctival sheet graft *in situ* over nasal bare scleral defect without any rotation

Statistical analysis

Recurrence of pterygium was the primary outcome, whereas other outcomes such as graft retraction and graft edema were considered as other secondary variables. Descriptive analysis of all the variables was done using mean and standard deviation for quantitative variables.

Results

On retrospective analysis of 98 eyes with primary pterygium operated by this technique, following results were obtained. The mean age was 52 ± 10.04 years. 51 males and 47 females were part of the study. Overall, the mean follow-up was 14 ± 8.24 months. Patients with follow-up of <6 months were not included in the study. The minimum follow-up period was 6 months in all cases and maximum follow-up was up to 3 years in certain cases. In Group 1, eyes with filtering bleb; the recurrence rate was 0% (0 eyes out of 25), whereas graft retraction rate was 32% (8 eyes out of 25). In Group 2, eyes which were glaucoma suspects; the recurrence rate was 0% (0 eye out of 20) and graft retraction rate was 30% (6 eyes out of 20). In Group 3, eyes with primary double-head pterygium; the recurrence rate was 7.5% (4 eyes out of 53), and graft retraction rate was 33.96% (18 eyes out of 53). The overall recurrence rate of this technique was 4.08% (4 eyes out of 98), whereas the overall retraction rate was 32.65% (32 eyes out of 98). All the 4 eyes with recurrence were from temporal side of bare scleral defect of Group 3 where conjunctival graft obtained from nasal pterygium tissue was placed without any rotation. These 4 eyes had graft loss eventually leading to recurrence. About 52.04% (51 eyes out of 98) had overall postoperative edema. Table 1 shows the percentage of various outcomes of this study.

In this technique, the pterygium tissue was subjected to biopsy, and the specimens were then processed for histopathological analysis. Section of the pterygium tissue [Fig. 4a] showed a hyperplastic stretched out conjunctival epithelium with 8–12 layers of cells [Fig. 4b] and few goblet cells, a network of blood capillaries lined by endothelium and surrounded by stromal perivascular actinic degeneration with no granulomata, no dysplasia, or malignancy. On the other hand, section of the normal conjunctiva had epithelium which was 2–4 cells thick [Fig. 4c] and showed scattered normal goblet cell component and had the normal festooned architecture with no dysplasia or malignancy.

Discussion

Successful management of pterygium requires a clear understanding of its pathogenesis and recognition of clinical features that indicate risk of recurrence. Recurrence-free surgery for pterygium is a difficult management problem. A variety of therapies have been proposed for the treatment of pterygium. Although conventional conjunctival

autografting is the gold standard in the management of primary pterygium, there are occasions when it is not possible to use superior bulbar conjunctiva as donor tissue. Various options available for the management of double-head pterygium are vertical split CAG without limbus–limbus orientation,[8] vertical split CAG with limbus–limbus orientation,[9] conjunctival rotational autograft with CAG,[10] and amniotic membrane transplantation,[11] but none of them has worldwide acceptance. All of these techniques have their own merits and demerits. Conventional bare sclera technique is not done routinely because of high recurrence rate.[12] In our technique, we have fashioned a

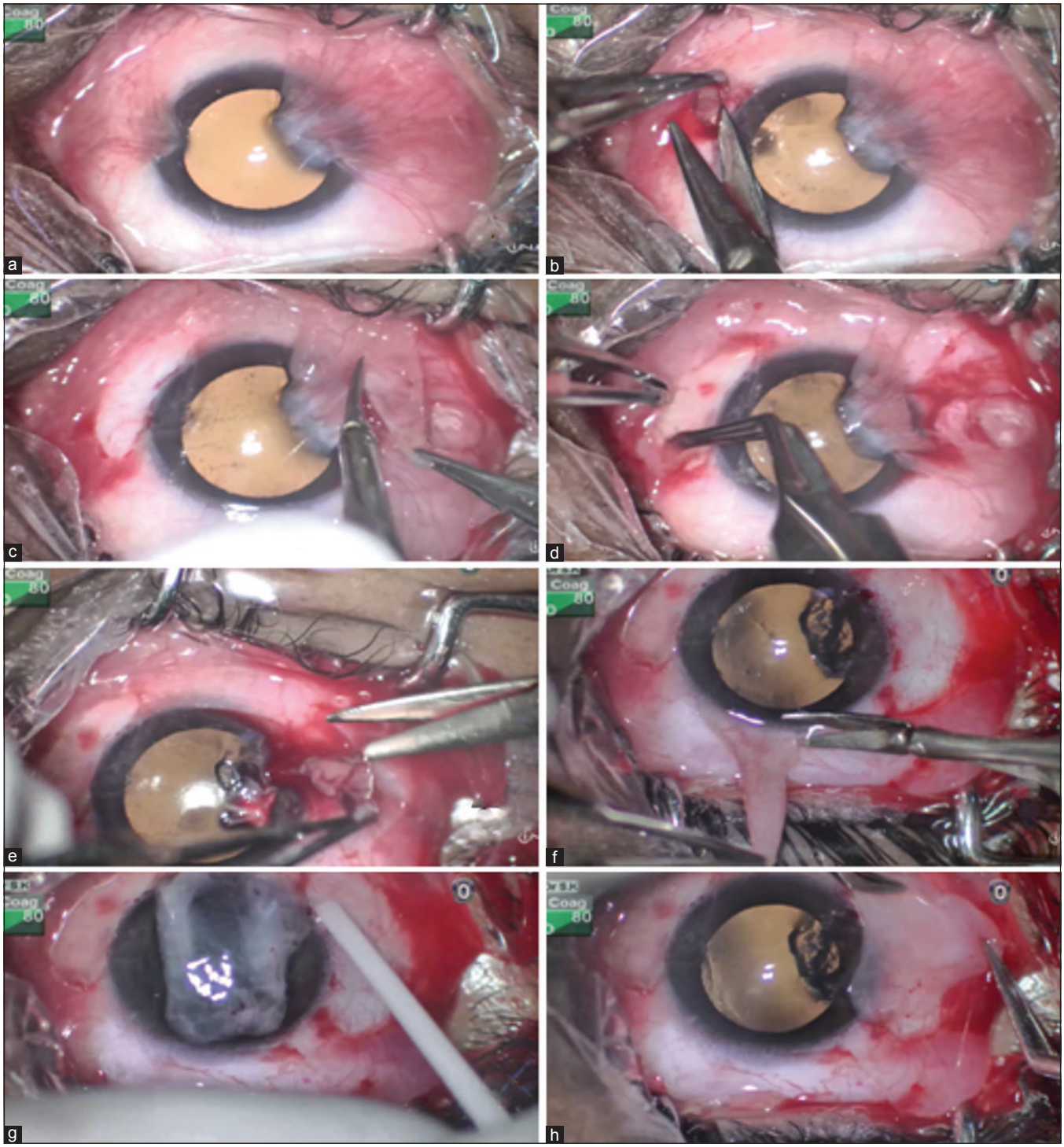

Figure 2: (a) Preoperative image of double-head pterygium. (b) Temporal pterygium excision. (c) Fashioning of thin conjunctival layer from nasal pterygium. (d) Nasal conjunctival graft adhered to temporal bare scleral defect using fibrin glue without rotation. (e) Excision of fibrovascular tissue of nasal pterygium. (f) Fashioning of superior conjunctival autograft. (g) Fibrin glue on nasal bare scleral defect. (h) Conjunctival autograft adhered to nasal bare scleral defect

thin layer of conjunctival graft from the pterygium surface itself and placed it on the bare scleral defect without any rotation. In general, the pterygium recurrence occurs within the first 6 months after surgery.[13] In this study, the overall rate of recurrence was 4.08% (4 eyes out of 98) which was comparable to other published studies.[5,8-11] This could be explained, as obtaining a thin conjunctival layer graft from the pterygium tissue is technically more challenging, and also, this conjunctival sheet is more fragile and prone to fracture with slightest manipulation. It is difficult to obtain an oversized graft from the pterygium. The graft is either of the same size as the defect or slightly smaller than the defect. This can lead to increased tension on the graft which can lead to retraction of the graft and loss of graft with subsequent increased risk of recurrence. The recurrence *per se* is not because of the technique, but as a result of the exposed bare sclera due to graft loss. In glaucoma suspect eyes with nasal pterygium, it may not be possible to oversize this conjunctival sheet graft and place it on the same bare scleral defect. Adequate coverage of bare scleral defect was the main aim. Furthermore, graft retraction could be due to inclusion of subepithelial tissue in the graft and can be minimized by meticulous dissection of subepithelial tissue.[14] Jap *et al*.[5] showed good results with this procedure, but with 180° rotation of the graft thinking that the success rate will increase by rotating the graft in such a way that the diseased epithelium at the limbal end is shifted away to prevent recurrence; however, there is no scientific proof to confirm this. This formed the basis of our technique, where we found that rotation of conjunctival sheet had no significance as far as the overall outcome was concerned. Furthermore, the recurrence rates were very much comparable. Table 2 shows comparison with previous study.

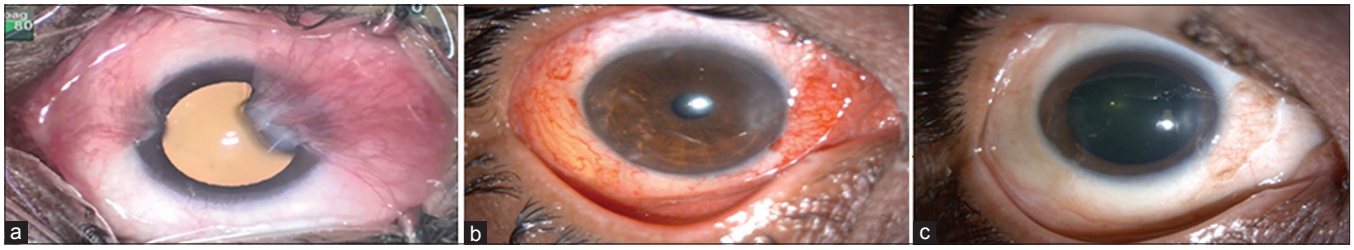

Figure 3: (a): Preoperative image of double-head pterygium.(b) One-week postoperative image after double-head pterygium excision. (c) One-year follow-up image after double-head pterygium excision of same patient

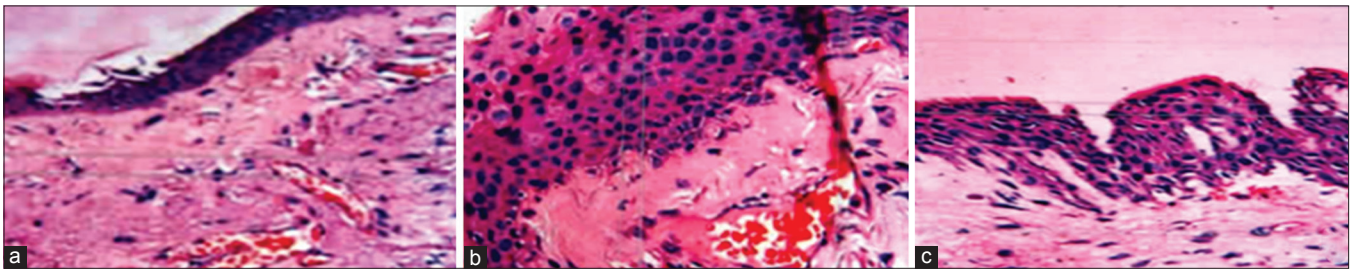

Figure 4: (a) Histological image of full section of pterygium tissue (H and E, ×100). (b) Histological image of 8–12 layers thick epithelium over pterygium tissue (H and E, ×400). (c) Histological image of 2–4 layers thick of normal conjunctival epithelium (H and E, ×200)

Table 1: Results of this study

Group	Patient profile with primary pterygium	Number of patients (*n*)	Mean follow-up (months)	Recurrence rate (%)	Retraction rate (%)	Edema (%)
Group 1	With filtering bleb	25	-	0 (0/25)	32 (8/25)	56 (14/25)
Group 2	Glaucoma suspects	20	-	0 (0/20)	30 (6/20)	60 (12/20)
Group 3	With double-head pterygium	53	-	7.5 (4/53)	33.96 (18/53)	47.16 (25/53)
Overall (*n*)		98	14±8.24	4.08 (4/98)	32.65 (32/98)	52.04 (51/98)

Table 2: Comparison with previous study

	Number of eyes (*n*)	Type of pterygium	Technique	Age (years)	Mean follow-up (months)	Recurrence rate (%)
Our series	98	Primary	Conjunctival tissue from the pterygium itself without rotation with fibrin glue	52±10.04	14±8.24	4.08 (4/98)
Jap *et al*.[5]	51	Primary and recurrent	Conjunctival tissue from the pterygium itself with 180° rotation with sutures	65	12	3.92 (2/51)

Previous studies reported that limbal stem cells act as a barrier between the conjunctiva and corneal epithelium and destruction of this barrier limbal tissue leads to the growth of conjunctival tissue on to the cornea.[15,16] However, very recently, a study showing long-term results concluded that limbus–limbus orientation need not be necessarily maintained to avoid recurrence, and the graft should be adequate enough to cover bare scleral defect irrespective of its orientation.[8]

The histopathological analysis further substantiated our point that epithelium over the pterygium being uniformly 8–12 layers thick without any dysplasia, can definitely be used as thin graft with epithelial side facing up, irrespective of its rotational orientation.

Graft edema was observed in 52.04% (51 eyes out of 98) and was the most common outcome of our study. This could be due to excessive handling of the graft. Graft edema subsided without any intervention at the end of 1–2 weeks postoperatively. Mutlu *et al.* reported that the most frequent complication in limbal CAG transplantation was graft edema.[17]

Conclusion

The procedure of use of conjunctival tissue from the pterygium itself is safe and effective with lower recurrence rate and can be recommended for patients with primary pterygium having superior filtering bleb, glaucoma suspects; wherein, the superior bulbar conjunctiva is either not available or may need future filtering procedure, and in patients with double-head pterygium, where the superior bulbar conjunctiva is not adequate enough to cover both the bare scleral defects. To the best of our knowledge, this is probably the first study with this technique where thin conjunctival layer from the same primary pterygium tissue was used as a graft to cover the bare scleral defect with fibrin glue, with any actual rotation of graft.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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