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# Comparison between Sutureless and Sutured Conjunctival Autograft for Surgical Treatment of Pterygium

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## ABSTRACT

**Background:** Pterygium, a progressive eye condition, is marked by the growth of fibrovascular tissue from the subconjunctival area to the cornea, resembling wings. A novel, straightforward, and reasonably priced method for managing pterygiums, sutureless conjunctival autograft has few known side effects. **Objective:** This study aimed to evaluate the efficacy of the sutureless conjunctival autograft technique compared to traditional suturing methods in securing the graft after pterygium removal.

**Patients and methods:** In a prospective, interventional, comparative study at Al Ahrar Teaching Hospital in Zagazig, Egypt, 20 pterygium-affected eyes were surgically treated. Participants were assigned to two groups, with 10 patients each. Group A underwent the sutureless procedure, with a bandage applied tightly for 24 hours post-surgery. In contrast, group B's grafts were secured using 8/0 polyglycolic acid sutures.

**Results:** The operation duration for group A was significantly shorter than that for group B (P=0.001). At 7 days post-operation, group A reported notably less pain than group B (P=0.05). Improvements in visual acuity and reduction in astigmatism were observed in both groups, without significant differences. The sutureless method resulted in one instance of graft displacement (10%), while the sutured approach had one recurrence (10%).

**Conclusion:** The sutureless technique for conjunctival autografts presented a safe, efficient, and cost-effective alternative for pterygium surgery. Its outcomes were on par with the traditional sutured method, with the advantages of fewer post-surgical complications, reduced discomfort, and higher patient satisfaction.

**Keywords:** Pterygium excision, Sutureless pterygium excision, Conjunctival autograft, Better pterygium outcomes.

## INTRODUCTION

A fibrovascular proliferation known as pterygium develops at the inter-palpebral conjunctival region, usually nasally, and invades the corneal epithelium nearby. Its proliferation may result in persistent inflammation of the ocular surface, corneal scarring, restricted ocular mobility, and uneven astigmatism. Epidemiologic research indicate that pterygium is an eye condition associated to sun exposure, albeit its exact pathophysiology is yet unknown. Pterygium formation has been linked to multiple factors, including genetic susceptibility, chronic conjunctival inflammation, repeated dust microtrauma, and ocular dryness. There is evidence to support this multifactorial etiology [1]. The best course of treatment for progressive pterygia is surgery. The primary difficulty still lies in reducing the likelihood of a recurrence. The therapy of pterygium has been recommended to involve many operations. Options include surgical excision, sliding flaps, or rotation of the conjunctiva. Topical beta radiation, an excimer laser, or external beta radiation chemotherapy drugs like mitomycin C may be used as adjuncts [2].

The most popular methods for fixing the graft are suturing or using tissue adhesives. Suturing has a number of disadvantages, though, including longer recovery times, pain following surgery, suture abscesses, buttonholes, and granuloma formation. The price and probable risk of infection transmission are the main issues with commercial fibrin glue [3]. Excision with Recurrence rates are associated with decreased rates of conjunctival autografting compared to other techniques [4].

A novel, uncomplicated, and cost-effective strategy for pterygium treatment involves using a conjunctival autograft without sutures, is noted for its minimal adverse effects [5]. Observations revealed that operations using the sutureless method were quicker than those employing sutures. Moreover, the sutureless group experienced no recurrences and fewer post-surgery symptoms such as pain, tearing, and the sensation of a foreign object in the eye [6]. Similar findings were reported by **Sharma *et al.*** [5] and **Chandra *et al.*** [7], where the sutureless method not only required less time for the pterygium removal but also resulted in reduced post-surgery inflammation and discomfort. The purpose of this study to evaluate the efficacy of the sutureless conjunctival autograft technique compared to traditional suturing methods in securing the graft after pterygium removal.

## PATIENTS AND METHODS

In this prospective, interventional, comparative study, pterygium was seen in 20 eyes that needed to be surgically excised at the Al Ahrar Teaching Hospital, Zagazig, Egypt.

**Inclusion criteria:** Individuals of both genders, aged 18 to 80, with pterygium deemed necessary for removal due to factors such as significant size and progressive growth encroaching on the cornea, or associated with high astigmatism.

**Exclusion criteria:** Patients unwilling or unsuitable for a minimum 3-month post-surgery follow-up, those with



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symblepharon, glaucoma, a history of eye trauma, ocular conditions like rheumatoid arthritis and dry eye syndrome predisposing to ulceration or impaired wound healing.

**Operated eyes were divided into 2 groups of 10 patients each: Group A:** Sutures were not used during the placement of the conjunctival autograft. **Group B:** the autograft of the conjunctiva was sutured with 8/0 polyglycolic acid (Vicryl).

**All patients were subjected to** ocular examination, which included pterygium photography, slit lamp biomicroscopy, and evaluation of best corrected visual acuity.

**Grading of pterygium for all cases by using Anbesse *et al.* [8]: Grade 1:** Covering the cornea by less than 2 mm. An iron deposit known as the Stocker line can be observed in the corneal epithelium just in front of the pterygium's advancing head. **Grade 2:** Covering the cornea by up to 4 mm in size and can be primary or recurring after surgery. **Grade 3:** Involved the visual axis and extended over 4 mm into the cornea.

The logMAR scale was utilized to assess the best-corrected visual acuity (BCVA). Utilizing the Orbscan® IIz system (Bausch and Lomb Inc., Rochester, NY, USA) and computerized videokeratography was conducted, noting key topographic measures such as simulated keratometry (Sim K) astigmatism, irregularities, and average refractive powers within the central 3- and 5-mm zones, along with the axes of high astigmatism. To evaluate spatial contrast sensitivity, the VCTS 6500 device (Vistech Consultants, Inc., Dayton, OH, USA), was used under mesopic conditions with subdued lighting at a chart brightness of 220 lux and a test distance of 3 meters. These measurements were taken for each eye individually, with corrections made for eyewear [9].

**Operative procedure:** Using an operational microscope, all procedures were carried out with the normal ophthalmologic sterile preparation. Topical anesthesia in the form of hydrochlorobenzoate surface anaesthesia 0.4% [(Benox) (EGYPTIAN INT. PHARMACEUTICAL INDUSTRIES CO. (E.I.P.I.CO.) – Egypt)] was administered first, followed by perbulbar anesthesia with 0.5% bupivacaine (Aspen, Lake Drive, Citywest Business Campus, Dublin 24, Ireland) and 2% lignocaine (German Remedies, a division of Zydus Healthcare Ltd.) in 1:1 proportion was added. After the eye was draped and the lid speculum was placed, a surgical caliper was used to measure the pterygium's size from the limbus to the apex. Sharp and blunt dissection was employed to separate the conjunctiva with Tenon's capsule below from the pterygium head on the cornea was removed, exposing the sclera. Through avulsion, pterygium was extracted from the cornea. The only areas removed were the conjunctiva's thicker part and the Tenon's capsule that was directly next to and subjacent, displaying its convoluted vasculature. Direct compression halted significant bleeding, avoiding the need for cautery. After injecting subconjunctival saline to elevate the conjunctiva, a graft 1 mm larger than the defect was removed from the superior conjunctiva at 12 o'clock. The epithelium was facing up as the graft was moved over the cornea. After that, the graft was positioned correctly. For Group B, the graft was secured with 8/0 polyglycolic acid sutures (Vicryl) (Ethicon Inc., a Johnson and Johnson company). Conversely, in Group A, the graft was held in position for 8–10 minutes using gentle pressure from a lens spatula, without any sutures (Figure 1).

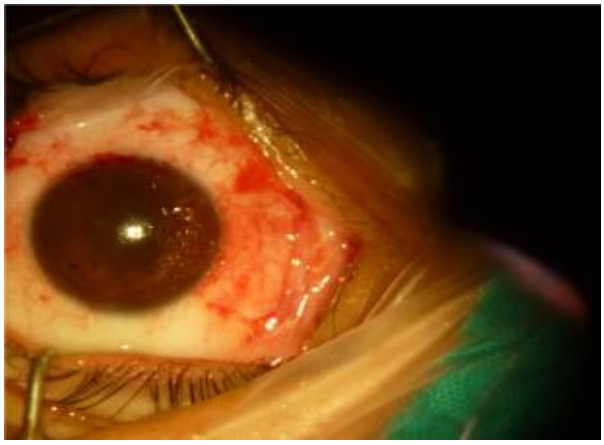

**Figure (1):** Intraoperative view of patient after fixation of conjunctival auto graft (CAG) without sutures.

Knots were hidden whenever possible, and sutures were utilised to secure the graft's four corners and the temporal edge's centre to the conjunctiva (Figure 2).

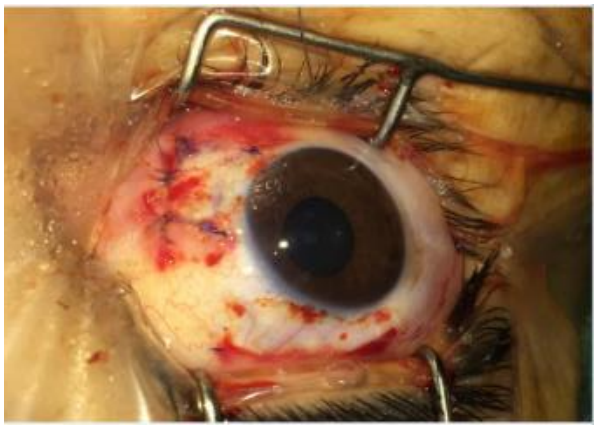

**Figure (2):** Illustrated the operative scene showing the patient post-fixation of the conjunctival autograft (CAG) using 0.8 Vicryl sutures.

The duration of the surgical procedure was meticulously documented for both groups. After completing the surgery, patients in group A received an eye bandage, which was kept in place for 24 hours. The graft was carefully positioned with its epithelial side facing upwards, ensuring the limbal edge was correctly aligned with the nasal limbus. The graft was harvested without incorporating any corneal limbal cells, and cautery was avoided during the process.

**Post-Operative:** Four times a day for ten days, topical eye drops with a mix of steroids and antibiotics were

given; the dosage was then reduced throughout the following week. For a month, lubricant eye drops were applied three times each day.

Following surgery, the patients were checked on after 24 hours, one week, six weeks, and finally three months. To check for problems and pterygium recurrence, Digital anterior segment imaging, refraction visual acuity, and slit lamp testing were carried out.

**Ethical considerations: The study was done after being accepted by The Research Ethics Committees, Faculty of Medicine, Banah University and Al Ahrar Teaching Hospital. All patients provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in the study and for the publication of data, ensuring protection of their confidentiality and privacy. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.**

***Statistical Analysis***

The analysis of data was carried out using SPSS software version 26 (IBM Inc., located in Armonk, NY, USA). To describe quantitative data, measures such as the average, standard deviation, median, lowest, and highest values were employed. For qualitative data, the analysis involved counting occurrences and calculating their percentage representation. The Mann-Whitney test, a non-parametric method, was utilized for assessing differences in numerical data. For comparing groups based on categorical data, the Chi-square ($\chi^2$) test was used. In situations where the expected count was below five, an exact test was chosen as the alternative. P-value $\leq 0.05$ was indicative of statistical significance.

## RESULTS

In this study, the mean age was 49.5 ± 8.6 years and 51.5 ± 9.7 years. There were 5 (50%) females in sutured group, 4 (40%) females in sutureless group, 5 (50%) males in sutured group and 6 (60%) males in sutureless group. So, there is no significant variation between the two groups regarding age (p=0.63), gender (p=0.65) and grading (1, 2, and 3) (Table 1).

**Table (1):** Comparison of Demographic Data and Pterygium grade between studied groups:

| | | Sutured | | Sutureless | | p value |
|---|---|---|---|---|---|---|
| | | Mean ± SD | | Mean ± SD | | |
| **Age** | | 49.5± 8.6 | | 51.5± 9.7 | | 0.63 |
| | | **N** | **%** | **N** | **%** | |
| **Gender** | **Female** | 5 | 50% | 4 | 40% | 0.65 |
| | **Male** | 5 | 50% | 6 | 60% | |
| | | **N** | **%** | **N** | **%** | |
| **Grading** | **1** | 3 | 30% | 3 | 30% | 0.86 |
| | **2** | 4 | 40% | 5 | 50% | |
| | **3** | 3 | 30% | 2 | 20% | |

Independent t-test; Chi Square test.

Sutureless group had significantly shorter operative time (24 ± 3.7) than sutured group (32.1 ± 3.8) (P= 0.001).

Table (2) showed significantly lower pain frequency in sutureless group at 7 days post-operative (P=0.05). Postoperative lacrimation in sutureless group were significantly lower than sutured group at 1st day post-operative. Post-operative FB sensation was significantly less frequent in sutureless group than in sutured group at 1st and 7 days postoperative (P= 0.025). There were no significant differences regarding post-operative pain in 1 month, lacrimation in 7 days, and FB sensation in 1 month and there was no post-operative pain in 3-month, lacrimation in 1 months, and FB sensation in 3 months.

**Table (2):** Comparison of post-operative pain, lacrimation and FB between studied groups:

| | Sutured | | Sutureless | | p-value |
|---|---|---|---|---|---|
| | **N** | **%** | **N** | **%** | |
| **Post-operative pain** | | | | | |
| **1 day** | 10 | 100% | 10 | 100% | - |
| **7 days** | 5 | 50% | 1 | 10% | **0.05*** |
| **1 month** | 2 | 20% | 0 | 0 | 0.14 |
| **3 months** | 0 | 0 | 0 | 0 | - |
| **Post-operative lacrimation** | | | | | |
| **1 day** | 10 | 100% | 6 | 60% | **0.025*** |
| **7 days** | 2 | 20% | 0 | 0 | 0.14 |
| **1 month** | 0 | 0 | 0 | 0 | - |
| **Post-operative FB sensation** | | | | | |
| **1 day** | 10 | 100% | 6 | 60% | **0.025*** |
| **7 days** | 5 | 50% | 1 | 10% | **0.05*** |
| **1 month** | 1 | 10% | 0 | 0 | 0.3 |
| **3 months** | 0 | 0 | 0 | 0 | - |

Chi Square test; *significant.

We found in sutureless group one case (10%) of graft loss and one case of recurrence (10%) in sutured group. Graft-related problems were monitored for six months while the patients were under observation post-operative symptoms and recurrence if any were noted (Table 3).

**Table (3):** Comparison of post-operative complications between studied groups:

| | Sutured | | Sutureless | | p value |
|---|---|---|---|---|---|
| | **N** | **%** | **N** | **%** | |
| **Graft loss** | 0(0%) | | 1(10%) | | 0.3 |
| **Recurrence** | 1(10%) | | 0 (0%) | | 0.3 |

Chi Square test.

We found a significant improvement in astigmatism in both studied groups from pre- to post-operative (P= 0.004, 0.001 respectively) with difference in changes of astigmatism in pre-operative and post-operative in both studied groups were not statistically significant (Table 4).

**Table (4):** Comparison of pre-operative and post-operative astigmatism in studied groups.

| | Preoperative | | P value | Postoperative | | P value |
|---|---|---|---|---|---|---|
| | **Sutured** | **Sutureless** | | **Sutured** | **Sutureless** | |
| **Astigmatism** | 3± 0.7 | 3.3± 1.1 | 0.64 | 2± 0.7 | 1.6± 0.5 | 0.14 |
| | **Sutured** | | | **Sutureless** | | |
| | **Preoperative** | **Postoperative** | **P value** | **Preoperative** | **Postoperative** | **P value** |
| **Astigmatism improvement** | 3± 0.7 | 2± 0.7 | **0.004*** | 3.3± 1.1 | 1.6± 0.5 | **0.001*** |

Independent t-test; *significant.

We found that a significant improvement in visual acuity in both studied groups from pre-operative and post-operative (P= 0.001) with difference in changes of visual acuity in pre-operative and post-operative in both studied groups were not statistically significant (Table 5).

**Table (5):** Comparison of pre-operative and post-operative visual acuity improvement in studied groups

| | Preoperative | | P value | Postoperative | | P value |
|---|---|---|---|---|---|---|
| | **Sutured** | **Sutureless** | | **Sutured** | **Sutureless** | |
| **Visual** | 0.65±0.1 | 0.59± 0.2 | 0.18 | 0.73± 0.1 | 0.78± 0.1 | 0.1 |
| | **Sutured** | | | **Sutureless** | | |
| | **Preoperative** | **Postoperative** | **P value** | **Preoperative** | **Postoperative** | **P value** |
| **Visual improvement** | 0.65±0.1 | 0.73± 0.1 | **0.001*** | 0.59± 0.2 | 0.78± 0.1 | **0.001*** |

Independent t-test; *significant.

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## DISCUSSION

In the current investigation, group A received the conjunctival autograft via group B's graft was sutured, while group A was compressed without stitches. It was found out that compared to the sutured procedure, the A quicker surgery time was demonstrated by the sutureless approach. Less pain, lacrimation, and other post-operative symptoms were experienced by the sutureless group FB feeling, and no recurrences.

A number of studies have explored the effectiveness of using a sutureless autograft for pterygium removal. **Elwan** [10] conducted a study on 150 eyes from 150 patients with pterygium. The procedure involved a simple excision under local anesthesia, followed by the application of a conjunctival autograft without the use of sutures or glue to cover the bare sclera. This method was applied to 50 eyes in 50 patients (group 1), while the traditional technique of securing a conjunctival autograft with sutures was used on 100 eyes of 100 patients (group 2). The outcomes measured included a recurrence rate of 6% in group 1 and 8% in group 2, graft retraction in 8% of group 1, granuloma formation in 3% of group 2, and improvement in visual acuity postoperatively by 8% in group 1 and 6% in group 2.

**Sharma *et al.*** [5] examined 50 consecutive cases of pterygium requiring surgical intervention. Half of these patients (25 eyes) underwent a simple excision under local anesthesia followed by the conventional suturing of the conjunctival autograft with 10-0 nylon stitches (group 2). The other half (25 eyes) were treated using a sutureless and glue-free method to secure the conjunctival autograft (group 1). All patients had their surgical sites bandaged for 24 hours post-operation, and the duration of each surgery was meticulously documented.

We found in sutureless group one case (10%) of graft loss and one case of recurrence (10%) in sutured group. Graft-related problems were monitored for six months while the patients were under observation post-operative symptoms and recurrence if any were noted. In a recent study by **Chandra *et al.*** [7] twenty patients with pterygium, totaling twenty eyes, were divided into two randomized groups for treatment. Group I, consisting of ten eyes, received a conjunctival autograft (CAG) using the patient's own blood clot as a natural adhesive. In contrast, group II, also with ten eyes, underwent CAG secured with stitches. The study noted differences in postoperative discomfort, with 20% of group I and 40% of group II experiencing symptoms. Additionally, they documented the surgery's duration, observed a 10% incidence of granuloma formation in group II, and reported no instances of recurrence in either group. **Massaoutis *et al.*** [11] described successful pterygium surgery as achieving a cosmetically pleasing white conjunctiva without ongoing symptoms and maintaining a recurrence rate below 10%. This definition aligns closely with findings from **Malik *et al.*** [12] who observed a 2.5% recurrence rate following a procedure that also did not use sutures or glue for the graft. In a related study, **Mohamed *et al.*** [6] conducted

a prospective interventional case study on 20 eyes afflicted with pterygium that required surgical removal. The patients' eyes were equally divided into two groups for treatment. In group A, the conjunctival autograft was applied without sutures, and a tight bandage was placed for 24 hours post-operation. The rates of recurrence and the formation of conjunctival granulomas in both group A and group B showed no significant statistical difference.

According to our research, the two groups differed statistically, and the sutureless group underwent surgery for a shorter duration of time than the sutured group (p value= 0.002). Demonstrated that the sutureless group needed less surgical time than the sutured group to perform pterygium removal. This also showed up in the degree of discomfort and inflammation following surgery [5, 7]. **Mohamed *et al.*** [6] found that the duration of surgery was significantly shorter for patients in group A compared to those in group B. Additionally, a smaller number of patients in group A experienced postoperative symptoms, and those symptoms lasted for a shorter period than in group B. **Elwan** [10] noted that the average surgery time for group 1 was 24 minutes (± 5.64), while for group 2, it was 28.64 minutes (± 6.45). Although these times are similar, they exceed the durations reported in studies involving fibrin glue, where the average surgical time was 16 minutes (ranging from 14 to 16 minutes) for procedures using fibrin glue and 20 minutes (ranging from 20 to 29 minutes) for those using sutures. In the case of suture-less and glue-free conjunctival autografts, the reported average was notably lower, at 14 minutes (± 1.4).

No significant statistical difference was observed in the level of postoperative stitching discomfort between the two groups during the initial days of follow-up. Similarly, the sensation of a foreign body on the first day post-operation did not show a significant difference between the groups, although it was more pronounced in the group with sutures, likely due to suture irritation and greater manipulation in group B (with p values of 0.057, 0.087, 0.141, 0.087 respectively). **Mohamed *et al.*** [6] reported that on the first day after surgery, all patients experienced some degree of stitching pain, but by the end of the first week, those in the sutureless group reported a noticeable reduction in pain. By the end of the first month, pain had significantly decreased and was not observed at the final follow-up, showing an insignificant difference in postoperative stitching pain between the two groups (p value<0.05).

Moreover, there was no significant difference in the rates of postoperative tearing between the two groups on the first day, although the group with sutures experienced higher levels of tearing (P value=0.087) and on the seventh day (P value= 0.476). We found in sutureless group one case (10%) of graft loss and one case of recurrence (10%) in sutured group. Graft-related problems were monitored for six months while the patients were under observation post-operatively. Similarly, **Elwan** [10] discovered that patients treated with the sutureless approach had much fewer postoperative complaints, such as pain, foreign body sensation, and irritation, than patients treated with sutures on both the first and seventh postoperative days (p value<0.003).

**Chandra *et al.*** [5] revealed that there was statistically significant levels of pain, FB feeling, and lacrimation (P value=0.002). The group without sutures exhibited notably reduced pain levels [7]. Only one case in the sutureless group of our current study experienced graft loss, which may have been brought on by the patient's continuous rubbing of the eyes throughout the first postoperative phase. No graft was lost in any group. Additionally, they reported that although there was only one occurrence of graft edema in each group, there was no graft loss in either. Graft edema was not evaluated post-operatively in a previous study [7].

In **Elwan** [10] study, he reported that there was no statistically significant difference between both groups. This could be explained by the significant increase in recurrences compared to our study, the larger patient sample and longer follow-up period. In the suture group, there was one case recurrence.

No granulomas were seen in the two patients' post-operative follow-up patients in our investigation. However in **Elwan** [10] research, three individuals in the suture group and none in the group without sutures had granulomas. In the suture group, a granuloma was seen in just one case during the follow-up after surgery [5, 7].

Regarding the visual outcomes, 60% of the patients in group A (six patients) showed an improvement in visual acuity, while 70% in group B (seven patients) did as well, yet there was no statistically significant difference between the two groups (p value=1).

Astigmatism showed no improvement, however only one study looked into the differences in visual acuity between the two groups. Three months post-surgery, there was an improvement in UCVA ranging from 0.2 to 0.5 Log MAR in 10 eyes. Of these, four eyes (representing 8%) were from group 1, and six eyes (representing 6%) were from group 2. The improvement in UCVA for all patients was attributed to the preoperative removal of the pterygium that occupied the visual axis [10]. Astigmatism decreased after surgery in both groups in our study, yet between the two groups, we found a significant improvement in astigmatism in both studied groups from pre- to post-operative (P= 0.004, 0.001, respectively) with difference in changes of astigmatism in pre-operative and post-operative in both studied groups were not statistically significant. But astigmatism was not examined in the majority of other comparable investigations.

**Altan-Yaycioglu *et al.*** [13] examined 240 eyes that had pterygium removal by five distinct surgical techniques: amniotic membrane transplantation using glue or sutures, conjunctival rotational flap, and conjunctival autograft. The study highlighted that both

before and after surgery, keratometric readings were recorded using an automated keratorefractometer, showing an enhancement in astigmatism across all groups.

**Limitations:** It was a single center study with relatively small sample size.

## CONCLUSION

An affordable, safe, and efficient approach for pterygium surgery was the sutureless autograft, which does not require sutures. The surgical results were similar to those of a traditional suture conjunctival autograft, with less discomfort, less difficulties due to the sutures coming out after surgery, and higher levels of patient satisfaction.

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