

Comparison of Postoperative Ocular Surface and Patient Comfort between Transconjunctival 23 gauge and Conventional 20 gauge Vitrectomy Systems

Konvansiyonel 20 Gauge ve Transkonjunktival 23 Gauge Vitrektomi Sonrası Oküler Yüzey ve Hasta Konforunun Karşılaştırılması*

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Original Article

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ABSTRACT

Purpose: To compare the postoperative ocular surface problems and patient comfort of 23 gauge (g) transconjunctival vitrectomy with the conventional 20 g pars plana vitrectomy in macular surgery.

Materials and Methods: Sixty-one consecutive patients undergoing vitrectomy for idiopathic epiretinal membrane and macular hole were recruited to either 20 or 23 g vitrectomy groups and prospectively evaluated. The postoperative ocular surface reaction was qualitatively graded by slit-lamp examination. On postoperative month 1, the patients' postoperative degree of pain, discomfort, lacrimation and photophobia were assessed in a questionnaire.

Results: Mean ocular surface score significantly lower in 23 g group at all postoperative visits compared with 20 g group values ($p=0.001$). In early as well as late postoperative period, mean ocular surface scores of 23 g group were significantly lower compared with the scores of 20 g group. One month postoperatively, the mean score of the patient comfort questionnaire was 4.0 in 20 g group and 1.5 in 23 g group. The patients in 23 g group reported significantly higher postoperative comfort than the patients in 20 g group ($p=0.001$).

Conclusion: By comparison with conventional 20 g vitrectomy, 23 g transconjunctival vitrectomy system provided higher postoperative patient comfort and a faster postoperative recovery and less conjunctival scarring.

Key Words: Vitrectomy, patient satisfaction, quality of life.

ÖZ

Amaç: Maküler cerrahi için yapılan konvansiyonel 20 gauge (g) pars plana vitrektomi ve transkonjunktival 23 g vitrektomiv sonrası oküler yüzey problemlerinin ve hasta konforunun kıyaslanması amaçlanmıştır.

Gereç ve Yöntem: İdiyopatik epiretinal membran ve maküler hol tanılarıyla vitrektomi yapılan 61 hasta geliş sırasıyla 20 ya da 23 g grubuna dahil edildi ve veriler geriye dönük olarak değerlendirildi. Ameliyat sonrası oküler yüzey problemleri biyomikroskopik olarak değerlendirilerek skorlandı. Ameliyat sonrası 1. ayda hastalara ameliyat sonrası ağrı, rahatsızlık, sulanma ve fotofobi şikayetleri yapılan bir anket ile değerlendirildi.

Bulgular: Ameliyat sonrası tüm kontrollerde, 20 g grubuyla kıyaslandığında 23 g grubunda, ortalama oküler yüzey skorlarının anlamlı olarak düşük olduğu görüldü ($p=0.001$). Hem erken hem de geç postoperatif dönemde 23 g grubunun ortalama oküler yüzey skorlarının anlamlı olarak düşük olduğu görüldü. Ameliyat sonrası 1. ayda yapılan anket sonrası hasta konforu 20 g grubu için 4.0, 23 g grubu için ise 1.5 idi ve hastaların postoperatif konforu 23 g grubunda istatistiksel olarak anlamlı yüksekti ($p=0.001$).

Sonuç: Konvansiyonel 20 g vitrektomi ile kıyaslandığında, 23 g transkonjunktival vitrektominin daha yüksek hasta konforu, daha hızlı iyileşme ve daha az konjunktival yara oluşumuna imkan sağladığı görülmüştür.

Anahtar Kelimeler: Vitrektomi, hasta memnuniyeti, yaşam kalitesi.

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INTRODUCTION

Three port 20 g pars plana vitrectomy has been the gold standard for vitreoretinal surgery since 1974.¹ Over the last decade, transconjunctival sutureless vitrectomy aiming to improve patient comfort has been introduced and progressed dramatically. The transconjunctival sutureless vitrectomy was first successfully performed by Fuji et al by 25 g instruments.² Then, Eckardt promoted 23 g transconjunctival system in 2005.³ Since then, numerous investigators have reported their results, showing the effectiveness of these small g transconjunctival sutureless systems for various vitreoretinal diseases.⁴⁻⁸

There are some reported studies which have compared the postoperative ocular surface and patient comfort between 23 g transconjunctival vitrectomy with conventional 20 g vitrectomy. The authors claimed that 23 g transconjunctival vitrectomy system provided potential advantages over traditional 20 g vitrectomy, including reduced conjunctival manipulation, increased postoperative patient comfort and recovery, faster wound healing, less conjunctival scarring, and shortening of surgical time.⁹⁻¹¹ Yet, there is a few number of reported prospective comparative studies on patient comfort and conjunctival healing.^{12,13}

Surgical techniques for both idiopathic macular holes (MH) and idiopathic epiretinal membranes (ERM) are well described and consist of similar surgical manipulations. Both ERM and MH cases undergoing vitrectomy surgery, don't have noticeable individual anatomic differences that would affect surgical steps during vitrectomy, thus constitute homogeneous groups and be suitable for a comparison between the transconjunctival 23 g vitrectomy and conventional 20 g vitrectomy systems in terms of postoperative ocular surface problems and patient comfort.

In this prospective study, our aim was to compare the postoperative ocular surface inflammation-scarring and postoperative patient comfort between the 20 g and 23 g systems in macular surgery.

MATERIALS AND METHODS

A prospective clinical trial was designed, comparing 20 g and 23 g vitrectomy systems in a group of patients with MH and ERM requiring uncomplicated macular surgery. Institutional review board approval was required and signed informed consent was obtained from all participants in accordance with the Declaration of Helsinki. The patients were recruited consecutively to each group between July 2007 and April 2009 in the order in which they were attended. The patients with additional ocular pathologies, ocular surface problems and the patients who underwent an ocular surgery other than uncomplicated cataract surgery were excluded from the study. Detailed preoperative and postoperative evaluation includ-

ing biomicroscopic anterior segment examination and color anterior segment photograph was performed in each case. Postoperative visits were performed at 1 day, 1 week and 1 month.

Surgeries were performed by only one experienced surgeon (G.G.) at a single center. All patients underwent surgery in retrobulbar anaesthesia. The periorcular skin was prepared thoroughly with 10% povidine-iodine and 5% povidine-iodine solution instilled into the ocular surface and inferior fornix. Patients were draped, everting and covering lashes from the operative field. The vitrectomy system for all surgeries was the DORC surgical system (Dutch Ophthalmic Research Center Inc., Zuidland, The Netherlands).

In the 20 g vitrectomy, the conjunctiva was opened in correspondence of the sclerotomy sites. Diathermy was used when necessary and three scleral incisions were made 3.5 mm behind the limbus in the inferotemporal, superonasal, and superotemporal quadrants with a direct entry using 20 g microvitreoretinal blade. At the conclusion of the surgery, the sclerotomies were closed with 7.0 vicryl and conjunctiva with 8.0 vicryl suture.

In the 23 g vitrectomy, the two-step 23 g vitrectomy system was used as described initially by Eckardt.³ The conjunctiva was displaced over the sclera to mismatch the conjunctival and scleral entry sites, 3 angled scleral tunnel incision were made with an angled stiletto blade positioned at a 20° to 30° angle to the entry site, and then the sclera was entered with the trocars.

At the end of the procedure, the infusion line was clamped then the superonasal cannula was removed and sclerotomy site was immediately massaged using a cotton swab. Infusion line was then unclamped and the sclerotomy site was inspected for any leakage. The superotemporal cannula was removed in a similar fashion. If no leak was present, the inferotemporal cannula and infusion line were removed. If any site demonstrated persistent leakage 8-0 Vicryl sutures were placed to the sclerotomy site together with the overlying conjunctiva without opening the conjunctiva.

Postoperative treatment consisted of lomefloxacin 0.3%, dexamethasone 0.5% eye drops applied topically 4 times daily for 2 weeks in all cases in both groups then which was adapted in postoperative visits.

The postoperative ocular surface reaction was qualitatively graded by slit-lamp examination using a modified scale which was reported previously.^{11,13} (Table 1).

On postoperative month 1, the patients' postoperative degree of pain, discomfort, lacrimation and photophobia were assessed in a questionnaire. (Table 2) The total score of patient comfort was between 0 and 9. Also, in this questionnaire the patients were asked the question "How many days after the operation did you leave the sick feeling?".

Table 1: Postoperative assessment of ocular surface.

| | Score | Definition |
|-----------------------|-------|---------------------------------------|
| Inflammation | 0 | None |
| | 1 | Mild (1 quadrant or less) |
| | 2 | Moderate (1 to 3 quadrant) |
| | 3 | Severe (3 quadrant or more) |
| Hemorrhage | 0 | None |
| | 1 | Mild (1 quadrant or less) |
| | 2 | Moderate (1 to 3 quadrant) |
| | 3 | Severe (3 quadrant or more) |
| Conjunctival scarring | 0 | Yok |
| | 1 | Mild (1 quadrant, minimal) |
| | 2 | Moderate (1 quadrant, prominent) |
| | 3 | Severe (2 quadrant or more extensive) |

Statistical Analysis

The differences between the patient groups were assessed for statistical significance using the student t test when the distribution of the data is normal. Non-parametric analysis was selected when the distribution of data differs significantly from normal. Mann-Whitney test was used in order to estimate intergroup differences and the Wilcoxon test was used to estimate differences within the groups.

The differences between the patient groups chi-square test was used for data in frequency form. Histogram graphs and Kolmogorov-Smirnoff test were used to test whether the distribution of the data differs significantly from a Normal distribution. Statistical analysis was conducted using the SPSS 11.5 for Windows soft package (SPSS Inc, Chicago, USA), $P < 0.05$ was considered significant.

RESULTS

Thirty-one eyes of 30 patients undergoing vitrectomy for ERM and MH were recruited to 20 g vitrectomy group and 33 eyes of 31 patients to 23 g vitrectomy group. As shown in table 3, there was no statistically significant

Table 3: Baseline characteristics of patients.

| Characteristics | 20-gauge | 23-gauge | p value |
|---------------------|-----------|----------|-------------------|
| Mean age (years±SD) | 60.0±10.5 | 64.4±8.1 | 0.07* |
| Gender | | | 0.43 ^v |
| Male | 20 | 17 | |
| Female | 10 | 14 | |
| Diagnosis | | | 0.79 ^v |
| MH | 12 | 11 | |
| ERM | 19 | 22 | |

* student t test, ^v chi-square test.

MH, Idiopathic Macular Hole; ERM, Idiopathic Epiretinal Membranes; SD, Standard Deviation.

Table 2: Postoperative assessment of patient comfort.

| | Score | Definition |
|--------------------------|-------|------------|
| Pain | 0 | None |
| | 1 | Mild |
| | 2 | Moderate |
| | 3 | Severe |
| Discomfort | 0 | None |
| | 1 | Mild |
| | 2 | Moderate |
| | 3 | Severe |
| Photophobia- Lacrimation | 0 | None |
| | 1 | Mild |
| | 2 | Moderate |
| | 3 | Severe |

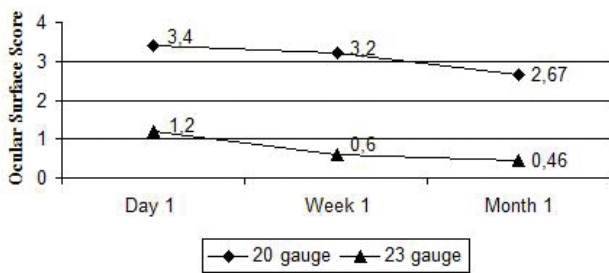
differences in baseline patient characteristics and diagnoses between 20 and 23 g vitrectomy groups (Table 3).

In 20 g group, mean postoperative ocular surface scores were 3.4 ± 1.1 at day 1, 3.2 ± 1.4 at week 1 and 2.67 ± 1.3 at month 1. In 23 g group, mean postoperative ocular surface scores were 1.2 ± 1.1 at day 1, 0.6 ± 0.8 at week 1 and 0.47 ± 0.8 at month 1. Mean ocular surface score significantly lower in 23 g group at all postoperative visits compared with 20 g group values ($p = 0.001$), (Graphic).

In 20 g group, there was no statistically significant differences between mean ocular surface score at day 1 and at week 1 ($p = 0.38$) but the score was significantly reduced at 1 month compared with both day 1 and week 1 values ($p = 0.008$ and $p = 0.032$ respectively). Whereas in 23 g group, both mean ocular surface score at week 1 and at month 1 were significantly lower than the score at day 1 ($p = 0.01$ and $p = 0.002$ respectively). There was no statistically significant differences between the ocular surface score at week 1 and month 1 in 23 g vitrectomy groups ($p = 0.15$).

We also observed that the immediate postoperative appearance of ocular surface was less traumatic and the patients were more comfortable after 23 g vitrectomy than conventional 20 g vitrectomy. Postoperative discomfort was reduced to a mild level as early as the first postoperative day in most cases and a much diminished traumatic external appearance was observed with the 23 g system (Figure 1) compared with external photographs after vitrectomy with the 20 g system (Figure 2).

One month postoperatively, the mean score of the patient comfort questionnaire was 4.0 in 20 g group and 1.5 in 23 g group. The patients in 23 g group reported significantly higher postoperative comfort than the patients in 20 g group ($p = 0.001$).



Graphic: Comparison among the postoperative mean ocular surface scores for the 20 g and 23 g groups. Postoperative mean ocular surface score of 23 g group was significantly lower at all postoperative visits compared to 20 g group (student t-test, $p=0.001$)

The mean duration of the sick feeling was 17.6 ± 13.1 days and 3.8 ± 2.6 days in 20 and 23 g group respectively. The difference in the duration of sick feeling was shown to be statistically significant between the groups ($p=0.001$).

DISCUSSION

In this prospective study, postoperative ocular surface inflammation and patient postoperative comfort between 23 g transconjunctival vitrectomy and conventional 20 g vitrectomy were compared in patient who underwent similar macular surgery.

Given its versatility and vast array of instruments, 20 g vitrectomy is still the standard of the vitreoretinal surgery. In recent years, transconjunctival sutureless vitrectomy has gained popularity and offers several advantages

over conventional 20 g vitrectomy. Conventional 20 g surgery requires opening the conjunctiva and closing of the conjunctiva and sclera with sutures at the conclusion of surgery. In addition, suturing the sclera and overlying conjunctiva may result in increased patient discomfort and postoperative inflammation.

In our study, there was less postoperative ocular surface inflammation and conjunctival scarring with 23 g vitrectomy compared with 20 g vitrectomy in all postoperative visits (1 day, 1 week and 1 month). In 20 g group, mean postoperative ocular surface scores were 3.4 at day 1, 3.2 at week 1 whereas in 23 g group, the scores were 1.2 at day 1 and 0.6 at week 1. When we consider the early postoperative period corresponding to day 1 to week 1 which mainly represents postoperative inflammation and subconjunctival hemorrhage, the mean ocular surface score of 23 g group at day 1 as well as the score at week 1 were significantly lower compared with the scores of 20 g group.

Within the 20 g group, we did not observe a statistically significant difference between ocular surface score at day 1 and at week 1 but in 23 g group ocular surface score at week 1 significantly lower than the score at day 1. This may be related to the faster wound healing and being free of sutures in 23 g vitrectomy. Regarding, the late postoperative period corresponding to month 1 which represents mainly postoperative conjunctival scarring, we noted that mean postoperative ocular surface scores was 2.67 in 20 g group and 0.46 in 23 g group. Obviously, conjunctival scarring was significantly lower in 23 g group.

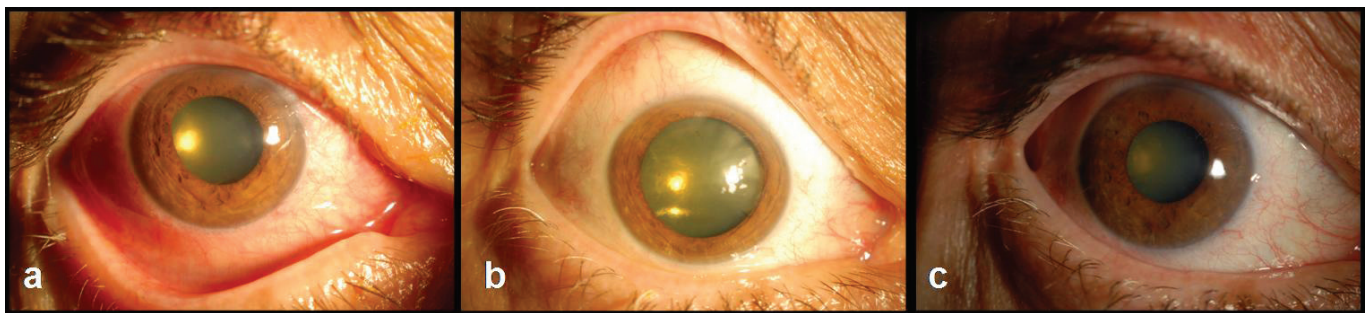


Figure 1: Anterior segment photographs of an eye which underwent 23 gauge vitrectomy **a:** postoperative 1 day, **b:** postoperative 1 week, **c:** postoperative 1 month). In early postoperative period, less traumatic ocular surface and less inflammation was observed with the 23 g system. In late postoperative period, conjunctival scarring after 23 g vitrectomy was almost negligible.



Figure 2: Anterior segment photographs of an eye which underwent 20 gauge vitrectomy **a:** postoperative 1 day, **b:** postoperative 1 week, **c:** postoperative 1 month). In early postoperative period suture reaction and more inflammation was observed. In late postoperative period scarring was observed in limbal region and superotemporal sclerotomy site.

Our data, shows that 23 g transconjunctival vitrectomy is superior to 20 g vitrectomy in terms of postoperative ocular surface problems and additionally 23 g vitrectomy offers faster ocular surface healing and less conjunctival scarring. These may benefit patients who have had multiple previous surgeries or patients with glaucoma who may require filtering surgery in future.

In a number of previous studies reported that the clinical inflammation score was lower after transconjunctival vitrectomy either 23 g or 25 g compared with 20 g vitrectomy.^{9,12,14,15} In a prospective study by Wimpissinger et al reported that postoperative conjunctival injection was less pronounced with 23 g vitrectomy system compared to 20 g vitrectomy.¹²

A recent prospective study found similar postoperative ocular surface scores between 23 g vitrectomy and 25 g vitrectomy.¹⁶ In a study which compared wound dynamics of 20, 23 and 25 g, noted that postoperatively 100% of 20 g group showed conjunctival problems in contrast, the rates of 23 and 25 g group were 93.3% and 96.6% respectively.¹⁷

One of the stated advantages of transconjunctival vitrectomy is higher postoperative patient comfort, though this has been examined in a limited number of scientific reports.^{12,14,18,19} In our study, we have shown that the postoperative patient comfort was significantly higher in the patients of 23 g vitrectomy than the patients of 20 g vitrectomy and the mean duration of the sick feeling was significantly shorter in 23 g vitrectomy.

This mirrors the results of related studies. In a large retrospective study of 877 patients having either 20 g or 23 g vitrectomy, a questionnaire to assess postoperative comfort was performed and the authors reported that 23 g vitrectomy caused less postoperative pain and discomfort compared to 20 g vitrectomy.¹⁸ In a prospective randomised clinical trial, the authors noted that 23 g vitrectomy offered significantly higher patient comfort during early postoperative period.¹²

In conclusion, compared to conventional 20 g vitrectomy, the 23 g transconjunctival vitrectomy system provided higher postoperative comfort for the patients and the minimally invasive nature resulted to a faster postoperative recovery and less conjunctival scarring.

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