23-Gauge Sutureless Vitrectomy and 20-Gauge Conventional Vitrectomy: A Case Series Comparison of Post Operative Intraocular Pressure

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Abstract

Purpose: To directly compare the post operative intraocular pressure (IOP) after 20- and 23-gauge vitrectomy.

Methods: This study is a randomized prospective study that included 60 eyes of 54 patients, these patients were recruited from the outpatient clinic of Kasr Al-Aini University hospital & International Eye Hospital. Patients were divided randomly into two groups:

Group A: Scheduled for 20-gauge conventional vitrectomy.
Group B: Scheduled for 23-gauge sutureless vitrectomy.

Results: The mean first day IOP was 19.4 mmHg in the 20-gauge vs 13mmHg in the 23-gauge (p < 0.001). Four patients (13%) in the 20-gauge group had a day one IOP above 26 mmHg compared to none in the 23-gauge group. In contrast, three patients (10%) had postoperative hypotony (IOP <10mmHg) in the 23-gauge group compared to one patient in the 20-gauge group. However, at the 1-week follow-up appointment all IOPs less than 10mmHg had returned to within normal limits.

Conclusion: Our study indicates less risk of considerably raised IOPs with sutureless 23-gauge system than 20-gauge conventional vitrectomy system. Additional advantages observed included faster wound healing, diminished conjunctival scarring, improved patient comfort, and decreased post operative inflammation.

Key Words: Intraocular pressure – 23-gauge sutureless vitrectomy – 20-gauge conventional vitrectomy.

Introduction

SINCE the introduction of pars plana vitrectomy (PPV) in 1971 [1], one of the most revolutionary developments in vitreoretinal surgery over the past few years has been transconjunctival sutureless vitrectomy (TSV). Fujii et al. [2,3] introduced the 25-gauge TSV in 2002 and 3 years later, based on the same surgical principle, Eckardt [4] developed the 23-gauge TSV.

Material and Methods

This study is a randomized prospective study that included 60 eyes of 54 patients, these patients were recruited from the outpatient clinic of Kasr Al-Aini University hospital & International Eye Hospital from 2010-2012. Patients were divided randomly using closed envelops into two groups:

Group A: 30 cases scheduled for 20-gauge conventional vitrectomy with sclerotomies closed by single 7/0 vicryl sutures.
Group B: 30 cases scheduled for 23-gauge sutureless vitrectomy. Using self sealed sclerotomies by the 23 gauge single step [Accurus system (Alcon, Fort Worth, TX)] using initial oblique insertion at 15-30° then 60-90° (Biplanar), and applying pressure to sclerotomy sites for thirty seconds by metal tip of tying forceps.

Inclusion criteria: Patients with indications for vitrectomy without buckling.

Exclusion criteria:
- Corneal opacities.
- History of previous intraocular surgery or disease (e.g. glaucoma, retinal detachment surgery. etc).
- Patients who are known to be steroid responders.
- Ocular hypertension.
• Patients who required combined phaco-vitrectomy.
• 23 gauge TSV with intraoperative leakage and requiring sutures at the end of the surgery.

Preoperative evaluation:

*Complete ophthalmological examination, including:*
• BCVA.
• Biomicroscopic anterior segment examination.
• IOP (measured with a Goldmann tonometer).
• Fundus examination.

Postoperative evaluation:

*Complete ophthalmological examination, including:*
• Refraction.
• BCVA.
• Biomicroscopic anterior segment examination.
• IOP (1 day, 1 week, and at two weeks). IOP was measured with a Goldmann applanation tonometer, and recorded for both groups of patients.
• Fundus examination.

### Statistical analysis:

Data were statistically described in terms of mean±standard deviation (± SD), median and range when appropriate. Comparison between the study groups was done using Student t-test for independent samples in comparing 2 groups when normally distributed and Mann Whitney U test for independent samples when not normally distributed. *p*-values less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

### Results

This study included 60 eyes of 54 patients [38 male (70.4%) and 16 female (29.6%)] who underwent primary pars plana vitrectomy.

In all cases, surgery was performed to treat ocular disease for one of the following retinal conditions.

Idiopathic macular hole n=6 (10%), non clearing vitreous haemorrhage n=14 (23.3%), tractional retinal detachment n=12 (20%) and rhegmatogenous retinal detachment n=28 (46.7%).

These 60 eyes were randomly divided into two groups: A and B.

**Group (A):** Included 30 eyes performed using conventional 20 gauge pars plana vitrectomy system (20-gauge group).

**Group (B):** Included 30 eyes performed using sutureless 23 gauge pars plana vitrectomy system (23-gauge group).

### Demographic data:

<table>
<thead>
<tr>
<th>Demographic Data</th>
<th>20g</th>
<th>23g</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Male:Female</td>
<td>17:13</td>
<td>22:8</td>
</tr>
<tr>
<td>Age (Mean±SD)</td>
<td>61±8</td>
<td>56±5</td>
</tr>
<tr>
<td>OD/OS</td>
<td>16:14</td>
<td>16:14</td>
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</table>

### IOP measurements:

<table>
<thead>
<tr>
<th>IOP Measurements</th>
<th>20g</th>
<th>23g</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st day</td>
<td>Mean±Std Dev.</td>
<td>19.4±7.9</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
</tr>
<tr>
<td>1st week</td>
<td>Mean±Std Dev.</td>
<td>15.5±2.6</td>
</tr>
<tr>
<td></td>
<td>N</td>
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</tr>
<tr>
<td>2nd weeks</td>
<td>Mean±Std Dev.</td>
<td>15.3±1.1</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
</tr>
</tbody>
</table>

The mean first day IOP was 19.4mmHg in the 20 gauge vs 13mmHg in the 23 gauge which was statistically significant (*p*=0.001). Mean IOP differences between 20-gauge and 23-gauge groups over the study period are shown in Fig. (1).

![Fig. (1): Mean IOP between 20g and 23g groups over the study period.](image-url)
however, [4] four patients (13%) had a day 1 IOP above 26 mmHg and required a short course of oral acetazolamide and topical antiglaucoma medications. In contrast, [7] three patients (10%) had postoperative hypotony (IOP <10mmHg) in the 23-gauge group compared to one patient (3%) in the 20-gauge group. However, at the 1-week follow-up appointment all IOPs less than 10mmHg had returned to within normal limits.

Three cases of the 23 gauge group (10%) that were left without tamponading had postoperative posterior segment haze that resolved within two weeks. In our study there were no cases of postoperative endophthalmitis, anatomical success was achieved in all cases.

Discussion

Eckardt made a study on 41 eyes that underwent PPV with the 23-gauge TSV system. He found that the intraocular pressure (IOP) on the first postoperative day never dropped <12mmHg, with no postoperative hypotony (Eckardt, 2005) [4].

Misra et al., in a case series comparison on 50 consecutive PPV cases performed using the 20-gauge system and 50 consecutive cases of 23-gauge TSV, four patients in the 20-Gauge group had a day one IOP above 40mmHg and required a short course of oral acetazolamide, compared with no patients in the 23-Gauge group. In contrast IOP was <10mmHg in four patients on the first postoperative day in the 23-gauge group, compared with no patients in the 20-gauge group. In all cases IOP was normal within 2 weeks of surgery with no effect on the visual outcome (Misra et al., 2009) [7].

Nagpal et al., (in a case series comparison on 30 consecutive PPV cases performed using the 20-gauge system, 30 consecutive cases of 23-gauge TSV and 30 consecutive cases of 25-gauge TSV system), did not encounter any postoperative hypotony in any of the groups of 20 gauge system and TSV system (Nagpal et al., 2007) [8].

In this study there was only a statistically significant difference in the first day postoperative measurements ($p=0.001$) while at one and two weeks there was no statistically significant difference between both groups ($p=1$ & 0.6 respectively).

No patients of our study in the 23-gauge group had a first day IOP recorded above 26mmHg. In the 20-gauge group, however, four patients (13%) had a day 1 IOP above 26mmHg and required a short course of oral acetazolamide and/or topical antiglaucoma medications. In contrast, three patients (10%) had postoperative hypotony (IOP <10mmHg) in the 23-gauge group compared to one patient in the 20-gauge group. None of the hypotonous patients developed choroidal detachment. However, at the 1st week follow-up appointment all IOPs less than 10mmHg had returned to within normal limits (Fig. 1).

The postoperative hypotony in the 23 gauge vitrectomy group is attributed to leakage through sclerotomy sites.

In this study there were no cases of postoperative endophthalmitis but this sample is too small as the incidence of endophthalmitis is very rare after vitrectomy.

References