23-Gauge Sutureless Vitreo-Retinal Surgery for Superior Rhegmatogenous Retinal Detachment

Shakir Zafar, Washoo Mal, Munira Shakir, Zeeshan Kamil, Syeda Aisha Bokhari and Syed Fawad Rizvi

ABSTRACT

Objective: To determine the results of 23-gauge sutureless vitreo-retinal surgery for superior/superotemporal rhegmatogenous retinal detachment (RRD).

Study Design: Quasi experimental study.

Place and Duration of Study: LRBT, Free Base Eye Hospital, Karachi, from January 2010 to December 2011.

Methodology: Adult patients who underwent 23-gauge sutureless vitreo-retinal surgery along with use of Perfluoropropane (C₃F₈) gas as internal tamponading agent for fresh (upto 3 weeks) superior/superotemporal RRD was reviewed. Major outcome measures were anatomical success, best corrected visual acuity (BCVA) with Log Mar and complications during and after surgery. Postoperative follow-up was done on 1st day and at 1st, 4th, 8th and finally at 12th week.

Results: Sixty eyes of 60 patients, age between 30 - 60 years including 37 (61.67%) males and 23 (38.33%) females having superior or superotemporal RRD underwent 23-gauge sutureless vitreo-retinal surgery with the use of perfluoropropane (C₃F₈) gas as internal tamponade at the end of procedure. Anatomical success rate was 81.66% (49 out of 60 eyes) with first surgery and raised to 90% (54 cases) with second surgery. Log Mar BCVA significantly improved from mean baseline 0.93 to 0.49 with mean difference of 0.43 (p < 0.001), 95% confidence interval. Postoperative complications were sub-conjunctival haemorrhage in 11 eyes (18.33%), wound leak in 7 eyes (11.66%), anterior chamber became shallow in 6 eyes (10%), cataract developed in 5 eyes (8.33%), re-retinal detachment in 4 eyes (6.66%), ocular hypotony and sterile inflammatory reaction in 3 eyes (5%) each, while iatrogenic breaks developed in 2 eyes (3.33%).

Conclusion: The 23-gauge sutureless vitreo-retinal surgery for superior rhegmatogenous retinal detachment achieved high anatomical success and significant visual improvement. Sub-conjunctival haemorrhage was the most frequent procedural complication.

Key Words: Perfluoropropane (C₃F₈), Superior rhegmatogenous retinal detachment, 23-gauge vitreo-retinal surgery.
from January 2010 to December 2011. All surgeries were carried out by one vitreo-retinal surgeon. The study was approved by the Institutional Ethical Review Committee.

Patients of fresh (up to 3 weeks elapsed) superior or superotemporal rhegmatogenous retinal detachment, aged between 30 - 60 years were selected from OPD and included in study. Patients with RRD associated with PVR-C (proliferative vitreo-retinopathy grade-C), vitreous haemorrhage, inferior breaks, uveitis, diabetic retinopathy, pseudophakic eyes and previous history of vitreo-retinal surgery were excluded.

Prior to the surgical intervention, all patients underwent detailed ophthalmic examination in outpatient department at surgical retina clinic on bio-microscopic slit lamp with and without +90 D lens, indirect ophthalmoscopic fundoscopy with +20 D lens, visual acuity (VA) measured on Log Mar chart and also evaluated for systemic problems. An informed consent was obtained from all patients.

All surgeries were performed under local retrobulbar anaesthesia with mixture of lidocain 2% and bupivacaïn 0.75%, total 2 - 3 ml injected. After taking strict aseptic measures, sterilized draping of patient done and after applying eye speculum; one step 23-gauge self retaining trocar and cannulae were 30° obliquely inserted to have tunneled wound construction superotemporally, superonasally and inferotemporally at about 4 mm from limbus transconjunctively. Vitrectomy systems with non-contact EBIOS viewing system were used in operation theater setup. After vitrectomy with 23-gauge, the heavy liquid Perfluorocarbons (PFCL) is inserted onto optic disc to flatten the elevated detached retina in order to drain out sub-retinal fluid (SRF) followed by 360° Argon laser photocoagulation around the breaks or drain out sub-retinal fluid (SRF) followed by 360° Argon laser photocoagulation and around the breaks or holes. PFCL removed and fluid replaced, then fluid air exchanged and finally long acting 16% Perfluoropropane (C₃F₈) gas was used as internal tamponade along with use of Perfluoropropane (C₃F₈) gas as internal tamponade at the end of procedure. Majority of patients with superior or superotemporal RRD had detached macula. BCVA (Log Mar) pre and postoperatively on 1st day and at 1st, 4th, 8th and finally at 12th week, were 0.93 baseline, and 0.95, 0.88, 0.74, 0.60, 0.49 respectively (Table I). Pre and postoperative, mean BCVA improved significantly (p < 0.001). Anatomical re-attachment of retina with first 23-gauge VR surgery gained 81.66% (49 out of 60 eyes) and rose to 90% (54 eyes) with second surgery, which was performed 6 - 8 weeks after initial surgery.

Complications (Table II) observed during surgery were iatrogenic retinal breaks in 2 eyes (3.33%) which were endolasered within 2 weeks of observation and postoperatively re-retinal detachment developed in 4 eyes (6.66%). Sub-conjunctival haemorrhage observed in 11 eyes (18.33%) and wound leaked in 7 eyes (11.66%), anterior chamber became shallow in 6 eyes (10%), cataract formation in 5 eyes (8.33%), while sterile inflammatory reaction and transient ocular hypotony ≤ 5 mmHg in 3 eyes (5%) each.

Table I: BCVA (Log Mar) n=60.

<table>
<thead>
<tr>
<th>BCVA</th>
<th>Mean BCVA</th>
<th>Mean 95% confidence</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline (preoperative)</td>
<td>0.93</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Postoperative day 1</td>
<td>0.95</td>
<td>-0.019 (-0.03,-0.004)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>One week</td>
<td>0.88</td>
<td>0.04 (0.017,0.06)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Four weeks</td>
<td>0.74</td>
<td>0.18 (0.15,0.22)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Eight weeks</td>
<td>0.60</td>
<td>0.32 (0.28,0.36)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Twelve weeks</td>
<td>0.49</td>
<td>0.43 (0.37,0.48)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

BCVA= Best corrected visual acuity.

Table II: Complications n=60.

<table>
<thead>
<tr>
<th>Complications</th>
<th>Frequency (No.)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retinal detachment</td>
<td>4</td>
<td>6.66%</td>
</tr>
<tr>
<td>Ocular hypotony ≤ 5 mmHg</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>Wound leak</td>
<td>7</td>
<td>11.66%</td>
</tr>
<tr>
<td>Cataract</td>
<td>5</td>
<td>8.33%</td>
</tr>
<tr>
<td>Iatrogenic break</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>Anterior chamber shallow</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>Sterile inflammatory reaction</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>Sub-conjunctival haemorrhage</td>
<td>11</td>
<td>18.33%</td>
</tr>
</tbody>
</table>

DISCUSSION

The sutureless pars plana vitrectomy with internal tamponade without scleral buckling for RRD is being carried out frequently and has potential advantage to avoid myopic shift.12 The vitrectomy without scleral buckling for RRD was first reported by Escoffery et al. in 1985.13 In this study, all eyes of RRD were phakic with clear crystalline lens and other optical media and only internal tamponade was used without any scleral buckling to prevent induced refractive errors which may confound the postoperative BCVA results.
The BCVA was significantly improved in this study from 0.93 (Log Mar) to 0.49 at the end of 6 months, Romano et al. in their study showing improvement in BCVA at 6 months 0.48 ± 0.36 to 0.26 ± 0.31.14 Heimann et al. showed postoperative BCVA ≥ 0.1 and ≥ 0.4 in 82.8% and 48.2% respectively.12 In another study, Ehrlich et al. showed BCVA 0.07 (SD 1.09) and 0.63 (SD 0.85) pre and postoperatively.15

Anatomical reattachment of retina in this study was 81.66% with first surgery and raised to 90% with second surgery which is less frequent than the study carried out by Johnson et al. which showed 87% with single surgery and 95% reattachment with additional surgery.16 In the study by Romano et al. reattachment occurred in 82% - 98%.14 Retinal reattachment success depends on multiple factors including appropriate vitrectomy to vitreo-retinal tractions, SRF drainage, finding and sealing of all primary breaks with lasers, 360° endolaser photoagulation and use of internal tamponade.17

Main complication encountered during surgery was iatrogenic retinal breaks for that endolaser photoagulation done pre-operatively. Yanyali et al. showed 2% iatrogenic retinal breaks in their study.17 Transient hypotony (≤ 5 mmHg) occurred in 3 cases (5%), but various studies showed that use of gas tamponade rarely developed hypotony.18-21 Sable et al. showed hypotony frequency to be 7.4% in their study and also mentioned spontaneous normalization within one week.22 Citirk et al. showed cataract formation 25.8% and subconjunctival haemorrhage 13.2%; development of choroidal detachment was not found in their study.23 While in this study, cataract formation was 8.33%, subconjunctival haemorrhage was 18.33% and choroidal detachment did not develop. Variability among complications are seen in multiple studies but exact causative factors were not clear.24,25 Whereas other reversible complications like wound leak, shallow anterior chamber and sub-conjunctival haemorrhage were cured with passage of time; while development of cataract in phakic eyes remained major issue for many years especially for younger patients in whom accommodation is compromised after cataract surgery.26

While endophthalmitis is reported in sutureless vitrectomy, Sable et al. did not see any case of endophthalmitis.22 No case developed endophthalmitis in this study as well. There were certain limitations in this study like, cases were only superior or superotemporal RRD, same internal tamponade used in all cases and had no control group to detect efficacy over other vitrectomy techniques. Further large trials are required.

CONCLUSION

The 23-gauge sutureless vitrectomy with Perfluoropropane gas internal tamponade, 360° endolaser photoagulation around the breaks and peripheral retina without scleral buckling is easier, safe. Acceptable success achieve anatomical reattachment and visual acuity. Subconjunctival haemorrhage was the most frequent complication.

REFERENCES


