Transconjunctival retinopexy with active external drainage of subretinal fluid: a prospective pilot study of eight consecutive cases

INTRODUCTION

Although superior rhegmatogenous retinal detachments can be repaired surgically using non-drainage techniques, removal of subretinal fluid remains an important surgical step in retinal detachments with inferior breaks. Drainage of subretinal fluid has been reported to be the most hazardous step in retinal detachment surgery(1). The most common complications of subretinal fluid drainage include subretinal hemorrhage, retinal incarceration, and retinal perforation(2-3). Several external drainage techniques have been described(4-6), such as using a suture needle and argon laser for scleral and choroidal perforation(2). In 1985, McLeod described a technique for posterior transcleral drainage of subretinal fluid monitored by indirect ophthalmoscopy to drain posteriorly sequestrated subretinal fluid following vitrectomy(3). Drainage monitoring was also described by Char-
les, who used a 25-gauge needle and an automated system for external drainage, associated with conventional scleral buckling. In the current report, we describe a new technique of transconjunctival retinopexy with active external drainage of subretinal fluid.

METHODS

The study was approved by the Institutional Review Board of the University of São Paulo and written informed consent was obtained from all study participants. Eight consecutive patients with retinal detachment with minimal or no proliferative retinopathy (grade B) underwent transconjunctival retinopexy with active external drainage of subretinal fluid. Inclusion criteria for the study included:

1) Primary rhegmatogenous retinal detachment;
2) All retinal breaks located within 1 clock hour of the fundus; and
3) No or minimal proliferative vitreoretinopathy (grade B).

All patients were followed for a minimum of 10 months (10-20 months). Preoperative data collected included age, gender, race, involved eye, previous ocular surgery or trauma, duration of symptoms, presenting best-corrected visual acuity, status of the macula (attached or detached), circumferential extent of retinal detachment (number of clock hours), location of retinal breaks (in the superior 4 clock hours [10 to 2 o’clock, inclusive]; temporally or nasally [2 to 4 o’clock or 8 to 10 o’clock, inclusive]; or in the inferior 4 clock hours [4 to 8 o’clock, inclusive]), lens status (phakic, pseudophakic, aphakic).

Surgical technique

All patients underwent surgery by the same surgeon (RCS). Peribulbar anesthesia with 5 ml 2% lidocaine and 5 ml 0.5% bupivacaine was administered. The eye and surgical field were prepped with povidone-iodine and draped with a sterile drape. One drop 2% aqueous povidone was instilled into the fornix before surgery. Using indirect ophthalmoscopy, the drainage site was determined and marked on the sclera over the conjunctiva using bipolar cautery. A 29-gauge needle was coupled to the aspiration line (Figure 1) from the Accurus vitrectomy machine (Alcon, Fort Worth, Texas, USA). The distal 3 mm of the needle was bent and inserted through the conjunctiva and sclera at the point marked previously next to the biggest retinal elevation but non near the tear and the needle tip was visualized by indirect ophthalmoscopy as “flashing steel” in the subretinal space (Figure 2). Five hundred millimeters of mercury aspiration was employed to remove the subretinal fluid slowly under indirect ophthalmoscopic monitoring. During active aspiration, the needle tip was redirected in the subretinal space according to the level of subretinal fluid in order to avoid retinal perforation. As the retinal detachment became shallower, the aspiration was reduced by using the foot pedal control. The needle tip was withdrawn when the retina was in close proximity to the tip. Intravitreal injection of balanced salt solution (BSS, Alcon, Fort Worth, Texas, USA) was necessary in very extensive retinal detachments in order to avoid hypotony. After retinal reattachment, cryotherapy was applied to the scleral region that corresponded to the retinal break(s).

Postoperative examinations

Postoperative examinations were conducted on days 1, 7, and 14 and then months 1, 3, 6, and 12 after surgery. Each postoperative examination included measurement of best-corrected visual acuity, slit-lamp examination, applanation tonometry, and dilated fundus examination.

RESULTS

Clinical characteristics of the study population and study results are summarized in table 1. The mean follow-up duration
was 15 months, a period considered sufficient for analysis of results, since proliferative vitreoretinopathy typically develops between 6 and 8 weeks after surgery. The average age of the patients was 60 years (range, 35-86 years).

In all cases, there was complete retinal attachment at the end of surgery. One patient developed a subretinal hemorrhage during drainage that resolved spontaneously within 4 weeks. Retinal redetachment occurred in four of eight patients (all four patients who developed recurrent retinal detachment were pseudophakic with inferior proliferative vitreoretinopathy) at a mean of 17 days (range, 7-40 days) after initial retinal detachment repair; these patients then underwent successful retinal detachment repair using a standard three-port pars plana vitrectomy technique. The four phakic patients maintained retinal attachment during follow-up (13-20 months). None of the patients developed elevated intraocular pressure during the follow-up period.

**DISCUSSION**

Various techniques of subretinal fluid drainage have been described using passive and active drainage with or without indirect ophthalmoscopic monitoring. Passive needle drainage of subretinal fluid without monitoring is the most extensively used technique. Our technique consists of a transconjunctival approach with active external drainage of subretinal fluid under indirect ophthalmoscopic monitoring.

Scleral buckling requires partial or 360 degrees of conjunctival and Tenon’s capsule reflection and rectus muscle isolation. Our technique does not require conjunctival, Tenon’s or rectus muscle manipulation.

Ophthalmoscopic monitoring of subretinal fluid drainage was reported and this technique consisted of external drainage of posteriorly-sequestrated subretinal fluid following vitrectomy and fluid/gas or fluid/silicone oil exchange, thereby avoiding the need to create a drainage retinotomy site. These authors emphasized the reduced risk of retinal incarceration and prolapse with ophthalmoscopic monitoring. However, monitoring of subretinal fluid drainage requires clear media for optimal visualization of the needle tip in the subretinal space. For this reason, scleral buckling may be more appropriate for patients with moderate or advanced cataract.

Subretinal hemorrhage is a potential complication of subretinal fluid drainage. One patient in the current series developed this complication. Subretinal hemorrhage is less likely to occur during active monitored drainage because there is a sharp choroidal penetration with a very thin 29-gauge needle and there is no choroidal congestion induced by prior cryotherapy. In addition, if there is bleeding into the subretinal space, the blood tends to be aspirated with the subretinal fluid while choroidal vascular thrombosis occurs.

Hypotony is another potential complication of subretinal fluid drainage. To avoid this complication, some surgeons perform drainage with concomitant injection of vitreous substitutes or tighten the scleral buckle prior to drainage. In the current series, intravitreal injection of balanced salt solution

**Table 1. Clinical characteristics of study population and study results**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Gender</th>
<th>Age</th>
<th>Eye</th>
<th>Preop VA</th>
<th>Final VA</th>
<th>RD and distribution of breaks</th>
<th>Recurrent RD</th>
<th>Complications</th>
<th>Lens status</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>18</td>
<td>Left</td>
<td>HM</td>
<td>CF 1 m</td>
<td>Superior RD (tear at 12 o'clock) macula-off</td>
<td>yes</td>
<td>Inferior PVR Phakic</td>
<td>18 months</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>27</td>
<td>Left</td>
<td>20/30</td>
<td>20/60</td>
<td>Inferior RD (tear at 6 o'clock) macula-on</td>
<td>yes</td>
<td>Inferior PVR Pseudophakic</td>
<td>10 months</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>52</td>
<td>Left</td>
<td>20/20</td>
<td>20/60</td>
<td>Temporal RD macula-on</td>
<td>yes</td>
<td>Subretinal hemorrhage Pseudophakic</td>
<td>12 months</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>39</td>
<td>Left</td>
<td>20/40</td>
<td>20/20</td>
<td>Inferior RD (tear at 7 o'clock) macula-on</td>
<td>no</td>
<td>no</td>
<td>Phakic</td>
<td>20 months</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>58</td>
<td>Right</td>
<td>20/60</td>
<td>20/200</td>
<td>Superior RD (tear at 11 o'clock) macula-off</td>
<td>yes</td>
<td>Inferior tear Pseudophakic</td>
<td>15 months</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>19</td>
<td>Right</td>
<td>20/60</td>
<td>20/20</td>
<td>Inferior RD (tear at 3 o'clock) macula-off</td>
<td>no</td>
<td>no</td>
<td>Phakic</td>
<td>16 months</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>40</td>
<td>Right</td>
<td>20/200</td>
<td>20/80</td>
<td>Temporal RD (tear at 3 o'clock) macula-off</td>
<td>no</td>
<td>no</td>
<td>Phakic</td>
<td>13 months</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>52</td>
<td>Right</td>
<td>20/40</td>
<td>20/20</td>
<td>RD (tear at 10 o'clock) macula-on</td>
<td>no</td>
<td>no</td>
<td>Phakic</td>
<td>14 months</td>
</tr>
</tbody>
</table>

F = female; M = male; CF = counting fingers; LP = light perception; HM = hand motion; VA = visual acuity; RD = retinal detachment; PVR = proliferative vitreoretinopathy

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TRANSJUNCTIVAL RETINOPEXY WITH ACTIVE EXTERNAL DRAINAGE OF SUBRETINAL FLUID: A PROSPECTIVE PILOT STUDY OF EIGHT CONSECUTIVE CASES

CONCLUSION

Transconjunctival retinopexy with active external drainage of subretinal fluid represents a useful alternative technique for retinal detachment repair in phakic patients with little proliferative vitreoretinopathy; this technique is quicker and cheaper compared with scleral buckling, and is not associated with induced myopia. Further studies are needed to determine the safety and efficacy of this new technique to repair phakic retinal detachments with no or minimal proliferative vitreoretinopathy (grade B).

REFERENCES


Descritores: Retina; Descolamento retiniano/cirurgia; Drenagem/métodos; Líquidos corporais