Management of persistent loculated subretinal fluid after pneumatic retinopexy

Howard Desatnik, Amir Alhalel, Giora Treister, Joseph Moisseiev

Abstract

Aim—To report on the incidence and management of a unique and troublesome complication of pneumatic retinopexy—localised, delayed subretinal fluid absorption (DSRFA).

Methods—A retrospective chart review was done for all patients who underwent pneumatic retinopexy for retinal detachment over a 5 year period to identify the patients with DSRFA.

Results—Seven phakic patients (five females, two males, age range 26–87 years) were identified with the phenomenon of delayed resolution of subretinal fluid after pneumatic retinopexy and cryotherapy. In four patients the subretinal fluid involved the macula. Time taken to complete absorption of the subretinal fluid ranged from 10 to 26 months. In one patient there was still residual fluid inferiorly at 18 months of follow up. During the follow up period additional procedures were performed—scleral buckling (five eyes), pars plana vitrectomy (one eye), and mild laser scatter to extramacular areas of shallow subretinal fluid (four eyes). None of these procedures appeared to influence the rate of fluid absorption.

Conclusions—Loculated subretinal fluid following pneumatic retinopexy may persist for very long periods, extending up to more than 2 years. Additional surgical procedures or laser photocoagulation do not affect the rate of subretinal fluid absorption. Spontaneous reattachment eventually occurs in most eyes, and conservative management is indicated.

Table 2 Patient data

<table>
<thead>
<tr>
<th>Case No</th>
<th>Initial VA</th>
<th>Postop VA</th>
<th>SRF location</th>
<th>Additional treatments</th>
<th>Time to absorption (months)</th>
<th>Final VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20/25</td>
<td>20/25</td>
<td>Submacular</td>
<td>buckle × 2, laser × 1</td>
<td>18</td>
<td>20/25</td>
</tr>
<tr>
<td>2</td>
<td>20/100</td>
<td>20/25</td>
<td>Submacular</td>
<td>laser × 1</td>
<td>16</td>
<td>20/20</td>
</tr>
<tr>
<td>3</td>
<td>20/50</td>
<td>20/50</td>
<td>Inferotemporal</td>
<td>buckle</td>
<td>Not absorbed</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>20/25</td>
<td>20/50</td>
<td>Temporal</td>
<td>laser × 1</td>
<td>12</td>
<td>20/20</td>
</tr>
<tr>
<td>5</td>
<td>20/20</td>
<td>20/200</td>
<td>Submacular</td>
<td>buckle, PPVx ECCE and IOL</td>
<td>26</td>
<td>20/25</td>
</tr>
<tr>
<td>6</td>
<td>20/50</td>
<td>20/50</td>
<td>Submacular</td>
<td>buckle, laser × 3</td>
<td>17</td>
<td>20/80</td>
</tr>
<tr>
<td>7</td>
<td>20/100</td>
<td>20/100</td>
<td>Temporal</td>
<td>buckle, ECCE and IOL</td>
<td>25</td>
<td>20/50</td>
</tr>
</tbody>
</table>

VA = visual acuity; SRF = subretinal fluid; Postop VA = visual acuity 1 week following pneumatic retinopexy; ECCE and IOL = extracapsular cataract extraction and intraocular lens implantation; PPVx = pars plana vitrectomy.

Discussion

In our series of 160 eyes the incidence of delayed subretinal fluid absorption (DSRFA) following pneumatic retinopexy was 4.3% (7/160) over a 5 year period. The results from our series appear to fall within the lower end of the reported incidence from other series (4.1%–21%).1–3, 11–13 Our series was the largest of these reports.

When a patient has residual SRF in the immediate postoperative period after PR, close follow up is essential to re-evaluate the amount of SRF and to examine for the presence of new or missed breaks or reopening of previously closed breaks. The presence of the latter will indicate the need for further surgical intervention. If meticulous examination of the peripheral fundus fails to show the presence of new breaks or "anterior leakage", and if the residual SRF lacks the characteristics of typical rhegmatogenous RD, if it does not extend to the ora serrata or to the retinal break(s) and if it does not increase in amount over time, then it is reasonable to assume that the patient has the phenomenon of DSRFA.

This phenomenon has been described to occur in two forms.11 12 One is the persistence of subretinal fluid inferiorly (usually in a more dependent area), which tends to shift and its upper boundary usually rounds off. This fluid typically reabsors after 1–2 months. However, in some eyes this SRF may take longer than 6 months to reabsorb and has been described to persist even 12 months postoperatively.1

It has been postulated that this delayed absorption is possibly due to choroidal vascular insufficiency. It is a phenomenon well known to retinal surgeons who routinely do non-drainage scleral buckle operations and is well documented.13 14 This delayed absorption should not be mistaken for failure of the PR.

The other entity is more specific and usually consists of small (1–3 disc diameters) pockets of loculated SRF which can persist for several months.11 12 The fluid may involve the macula, tends to be subtle, does not shift, may be difficult to detect on indirect ophthalmoscopy, is better seen on slit lamp biomicroscopy,
Management of persistent loculated subretinal fluid after pneumatic retinopexy

and is associated with small subretinal precipitates. There are no associated retinal breaks. These pockets of SRF have also been reported to occur after scleral buckling.15 They may have an appearance that simulates serious pigment epithelial detachments6 15 and have been reported in experimental animals that had scleral buckling performed on them.16 The phenomenon of shallow loculated DSRFA is sufficiently different and subtler than typical residual fluid associated with non-drainage procedures previously described.17 In our series, the patients had either the second type or a combination of the two types of DSRFA. In the series reported by Chan and Wessels11 75% (6/8) of the patients with DSRFA were associated with small subretinal precipitates distributed diffusely within the shallow SRF or within the area of DSRFA. These precipitates are most probably indicative of chronicity as they have also been noted as a feature of chronic SRF in rhegmatogenous RD.

Loculated pockets of SRF in the macula have been described to adversely affect the visual prognosis.11 These patients have bothersome postoperative symptoms, which include visual fluctuation, “haze”, and metamorphopsia till the fluid is absorbed.

In one series11 it was observed that in those eyes with loculated postoperative fluid involving the macula, the macula was always located at or adjacent to the lowest point of the original RD. In this series11 the SRF persisted for 4–6 months before complete resolution, with poor visual outcome. In our series, of the four eyes with loculated submacular fluid three of the four patients had the most dependent part of the RD adjacent to the macula. In these four cases the SRF persisted between 10–24 months. In contrast with the patients reported by Chan and Wessels,11 three of the four patients in our series retained to excellent visual acuity (20/20–20/25) and one patient achieved only 20/80 acuity.

Although the causes of post-PR loculated DSRFA are unknown, factors that may contribute to the persistence of SRF after retinal reattachment surgery have been extensively reviewed in the literature.14 18–26 These factors include the presence of subretinal precipitates, increased protein content resulting in adverse osmotic effects, increased SRF viscosity, and defective choroidal functioning.

The use of extensive cryotherapy and the presence of subretinal precipitates were found to be significantly associated with DSRFA by Chan and Wessels.11 They also observed that presence of demarcation lines, dependent SRF by the macula, long duration of RD, and phakic status were more frequently found in eyes with DSRFA than those without, but the correlation did not achieve statistical significance. All eyes in our series were phakic, supporting the previous finding that phakic status is more often associated with DSRFA. The explanation of this association is not clear. Extensive cryoexy with the resultant release of retinal pigment epithelium cells into the vitreous has been postulated to be a possible explanation for the pigmented subretinal pre-

cipitates.11 The chronicity of the RD may also be responsible for the presence of these subretinal precipitates after PR. Judicious use of cryotherapy to surround the retinal break is thus advised. Alternatively, the retina may be flattened with the injection of gas and then one can perform postoperative laser. However, postoperative laser is sometimes technically difficult in the presence of a gas bubble or bubbles.

Chan and Wessels11 reported on a single unsuccessful attempt to displace the DSRF from the macula by re-injecting a gas bubble and repositioning the patient. Although Hilton and Tornambe27 recommend that no specific treatment is required, a “light grid pattern” of argon laser photocoagulation was reported by Tornambe12 to result in resolution of SRF in one persistent case of DSRFA in the posterior pole. In our series, the laser grid done in four eyes in areas of shallow retinal detachment did not achieve any immediate results, and it still took a long time to resolution of SRF following the laser. Since mild grid laser photocoagulation has minimal adverse effects, if any, it is an option that could be considered in trying to achieve faster subretinal fluid reabsorption. However, from the findings in our small series we do not have objective evidence to prove this treatment is effective.

In the five patients who had a scleral buckle done, and the single patient who had a pars plana vitrectomy following a scleral buckle, no open retinal breaks were found and these interventions did not appear to have a notable effect on the DSRFA. Of interest is the observation during the single vitrectomy performed in our series, that the perfluorocarbon liquid did not induce any significant displacement of the loculated fluid. It may be that the fluid is not truly subretinal, and is located within the retina, as in retinoschisis. This could explain the extremely long persistence of the fluid, despite the documented ability of the RPE cells to pump out much larger amounts of subretinal fluid in non-drainage procedures. It could also explain the lack of apparent response to scatter laser treatment. The abrupt shift in subretinal fluid following the gas injection and positioning often relocates the fluid to retinal areas that were attached before the injection. It could be that the abrupt transition of fluid caused some of it to dissect into the retina and remain trapped in a schisis-like cavity. It would be of interest to see if the occurrence of loculated fluid would be affected by turning the patient to the prone position and then instructing him to sit up slowly (the steamroller technique). In this manoeuvre the gas bubble will first squeeze the subretinal fluid out through the retinal break instead of pushing it towards attached retina. The so called steamroller manoeuvre should be used more frequently in these detachments where the macula is threatened or shallowly detached. Information on the positioning method after the gas injection in our seven patients was not available in the surgical notes.

Although Hilton and Grizzard’s original report used C3F8 SF, has become the gas of
choice for PR in the United States. The question arises as to whether a smaller gas bubble would decrease the incidence of DSRFA. It could be argued that a larger bubble may forcefully displace and concentrate subretinal fluid inferiorly, thus causing loculated pockets of SRF or schisis, as we suggested earlier. In eyes where a smaller gas bubble of 1 ml (after injecting 0.4 ml SF₆) is used, where a 0.4 ml gas bubble expands to 1.6 ml. However, a recent report on 219 consecutive cases of SF₆ pneumatic retinopexy showed a 36% incidence of delay in subretinal fluid resorption. The findings of this series tend to negate the theory that the type of gas (longer acting, larger bubble) used may be responsible for an increased incidence of DSRFA.

Since analysing our data, we have adopted a more conservative approach to patients with delayed absorption of SRF after pneumatic retinopexy. As a clinical guide, the criteria for establishing the diagnosis of DSRFA include the absence of new retinal breaks, a closed original break, and residual subretinal fluid that (1) lacks communication to the original break, (2) does not extend to the ora serrata, (3) does not increase with time, (4) lacks the characteristics of a rhegmatogenous RD, and (5) is loculated, sometimes subtle, and does not shift. If the SRF is not located in the macula, it is not increasing over time, and does not appear to be associated with an open retinal break, we strongly advise non-intervention. We do not recommend a scleral buckle or vitrectomy in these cases. Performing gentle laser scatter over shallow areas of extramacular residual subretinal fluid is an option, but based on our data in this small series we cannot state that it had a significant effect. Conservative management of cases with the phenomenon of delayed subretinal fluid absorption following pneumatic retinopexy appears to be an appropriate approach, despite the frustratingly long time to spontaneous resolution.

Management of persistent loculated subretinal fluid after pneumatic retinopexy

Howard Desatnik, Amir Alhalel, Giora Treister and Joseph Moisseiev

doi: 10.1136/ajo.85.2.189

Updated information and services can be found at:
http://bjo.bmj.com/content/85/2/189

These include:

References

This article cites 26 articles, 3 of which you can access for free at:
http://bjo.bmj.com/content/85/2/189#BIBL

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections

Articles on similar topics can be found in the following collections
Ophthalmologic surgical procedures (1223)
Retina (1608)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/