Full-thickness eye-wall biopsy: long-term results in 9 patients

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SUMMARY Nine patients who had an eye-wall biopsy were evaluated for long-term results. The follow-up time ranged from 2½ months to 7 years. Six patients were followed up for more than 2 years. Few operative and postoperative complications were observed. Except for 1 patient with reticulum cell sarcoma, all eyes retained preoperative visual acuity. Tractional retinal detachment occurred only in 1 patient, who had vitreous bands around the biopsy site and did not undergo a simultaneous vitrectomy during the biopsy operation.

Encouraged by the results of eye-wall resection1,2 in the treatment of choroidal melanoma, we conceived the method of eye-wall biopsy to facilitate the study of diseases of the retina and uvea. In 1975 we reported the first studies from our laboratory in experimental eye-wall biopsy.3–6 The present report describes the long-term results of eye-wall biopsy in 9 patients.

The follow-up time ranged from 2½ months to 7 years (Table 1). Six patients were followed up for more than 2 years.

Materials and methods

Between 1973 and 1980 a total of 9 patients underwent schlerochorioretinal biopsies (Table 1). Cases 1 and 2 were done to rule out sympathetic ophthalmia. In case 7 the biopsy showed an intraocular reticulum cell

Table 1 Long-term follow-up data on 9 patients after eye-wall biopsy

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Age (yr), race, sex</th>
<th>Diagnosis before surgery</th>
<th>Follow-up period</th>
<th>Status of eye prior to surgery-biopsy</th>
<th>Anatomical success</th>
<th>Visual results Before surgery</th>
<th>Visual results After surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22 W/M</td>
<td>Retained intraocular foreign body; chalcosis; bilateral chorioretinitis of unknown aetiology</td>
<td>7 yr</td>
<td>Traction retinal detachment inferior temporal quadrant (left eye)</td>
<td>Yes</td>
<td>Light perception</td>
<td>Light perception for 6 mo. then no light perception</td>
</tr>
<tr>
<td>2</td>
<td>54 W/M</td>
<td>Phthisis bulbi, right eye; uveitis, left eye, for 4 years. Trauma, right eye 4 years previously</td>
<td>6 yr</td>
<td>Phthisis bulbi (right eye)</td>
<td>Unknown</td>
<td>No light perception</td>
<td>No light perception</td>
</tr>
<tr>
<td>3</td>
<td>22 B/F</td>
<td>Retinitis-pigmentosa-like syndrome. Leber’s amaurosis congenita</td>
<td>2½ mo</td>
<td>Pendular nystagmus, bone spicules, attenuated vessels (right eye)</td>
<td>Yes</td>
<td>Light perception</td>
<td>Light perception</td>
</tr>
<tr>
<td>4</td>
<td>22 B/F</td>
<td>Retinitis-pigmentosa-like syndrome</td>
<td>8 mo</td>
<td>3+ bone spicules, attenuated vessels (left eye)</td>
<td>Yes</td>
<td>Light perception</td>
<td>Light perception for 6 mo. then no light perception</td>
</tr>
<tr>
<td>5</td>
<td>27 B/F</td>
<td>Favre-Goldmann syndrome</td>
<td>14 mo</td>
<td>Atypical retinitis pigmentosa, peripheral retinoschisis (right eye)</td>
<td>Yes</td>
<td>Hand motions</td>
<td>Hand motions</td>
</tr>
<tr>
<td>6</td>
<td>23 B/F</td>
<td>Chorioretinal degeneration of unknown aetiology</td>
<td>5 yr</td>
<td>Atypical retinitis pigmentosa, macular hole</td>
<td>Yes</td>
<td>20/200</td>
<td>20/200</td>
</tr>
<tr>
<td>7</td>
<td>58 W/F</td>
<td>Chorioretinitis or intraocular reticulum cell sarcoma</td>
<td>2 yr</td>
<td>Marked vitreous haze, vitreous, retinal, and subretinal tumors (right eye)</td>
<td>Yes</td>
<td>Light perception</td>
<td>Light perception for 20 mo. then no light perception</td>
</tr>
<tr>
<td>8</td>
<td>35 W/M</td>
<td>Retinitis-pigmentosa-like syndrome</td>
<td>4 yr</td>
<td>Retina attached: 3+ bone spicules</td>
<td>Yes</td>
<td>Hand motions</td>
<td>Hand motions</td>
</tr>
<tr>
<td>9</td>
<td>28 W/M</td>
<td>Retinitis-pigmentosa-like syndrome</td>
<td>3 yr</td>
<td>Retina attached: 3+ bone spicules</td>
<td>Yes</td>
<td>Hand motions</td>
<td>Hand motions</td>
</tr>
</tbody>
</table>

B = black. F = female. M = male. W = white. 4 ft = 120 cm.
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sarcoma. The remaining cases had retinitis-pigmentosa-like syndromes. Three patients were lost to follow-up (cases 3, 4, and 5) at 2½, 8, and 14 months, respectively.

Of the 9 biopsies 7 were performed at the University of Illinois Eye and Ear Infirmary and 2 at the Erskin Hospital in Madurai, India. All procedures were performed by one surgeon (G.A.P.). Patients selected for surgery were told in detail about the procedure, including its nontherapeutic and experimental features. Operations performed in the United States were approved by the Committee of Associates on Human Experimentation.

All patients had complete, extensive medical and ophthalmological examinations preoperatively. The 2 patients operated on in India were given local anaesthesia; those in the United States had general anaesthesia.

**SURGICAL TECHNIQUE**

A 360° peritomy was performed, and the rectus muscles were isolated with 4-0 silk sutures. A Peyman eye basket (Fig. 1A), 12 mm in diameter, was sutured to the sclera (Fig. 1B). An 8 mm trephine (Fig. 1C) was used to demarcate approximately half the thickness of the sclera. The sclera was then dissected (Fig. 1D) with a No. 64 Beaver blade. A partial-thickness disciform scleral button was removed and stored in saline solution containing 200 μg/ml of gentamicin. A 4 mm trephine was used to demarcate

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![Fig. 1](http://bjo.bmj.com/)

**Fig. 1**  A: Peyman eye basket, 12 mm in diameter. B: Eye basket sutured to sclera. C: Half thickness of sclera demarcated on 2/3 of its thickness by an 8 mm trephine. D: Sclera is dissected with a no. 64 Beaver blade. E: Sclera is further demarcated with a 4 mm trephine. F: Diathermy is applied. G: Biopsy is removed with corneoscleral scissors. H: Vitrectomy performed through biopsy site. I: 8 mm partial-thickness sclera is sutured back in its place. J: Injection of air to reestablish the intraocular pressure.
Results

During the surgical procedure minor choroidal bleeding occurred in 4 patients. The choroidal bleeding originated from the biopsy site and was easily controlled with diathermy (Table 1). Early postoperative vitreous haemorrhage that occurred in one eye cleared within 3 weeks. Also in the early postoperative period 1 patient (case 3, Table 1) developed thick vitreoretinal traction bands around the biopsy site that progressed to a tractional retinal detachment. This patient did not have a vitrectomy procedure during the biopsy operation. The patient's visual acuity remained unchanged, and it was thought that additional surgery to reattach the retina would not improve the vision. All patients operated on after this underwent subtotal vitrectomy through the biopsy site.

After surgery all eyes were inflamed for a period of 2 weeks. By slit-lamp examination the anterior chamber showed 2 to 3+ cells on the first postoperative day. By 1 to 2 weeks later there was only trace flare in the anterior chamber. No patient complained of pain or unusual discomfort. Within 2 weeks of surgery the ocular media were clear and a chorioretinal scar was visible (Fig. 2, top). Only 1 patient (case 7, Table 1) did not retain preoperative visual acuity. This patient had bilateral reticulum cell sarcoma. After 2 months the destruction of the patient's retina by tumour cells resulted in a visual acuity of no light perception bilaterally. One patient developed minimal posterior subcapsular cataract in the late postoperative period. Although small, the biopsy specimens showed intact sclera, choroid, and retina (Fig. 2, middle). The cellular structures were well preserved for light and electron microscopy (Fig. 2, bottom).
Table 2  Surgical and early and late postoperative complications

<table>
<thead>
<tr>
<th>Surgical</th>
<th>Early postoperative (14 days)</th>
<th>Late postoperative (14 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choroidal bleeding. 4 patients (bleeding from biopsy site, easily controlled by diathermy)</td>
<td>Vitreous haemorrhage. 1 patient (cleared in 3 weeks)</td>
<td>Minimal posterior subcapsular cataract. 1 patient</td>
</tr>
</tbody>
</table>

Discussion

The retina and choroid are among the few tissues in the human body that do not undergo biopsy routinely. Although the concept of eye-wall biopsy is unthinkable in a healthy eye, with proper technique it is possible to obtain a biopsy specimen of diseased retina and choroid without significant complication.

The purpose and value of eye-wall biopsy is 2-fold. It is helpful diagnostically to identify unknown ocular diseases that may be potential threats to the visual acuity in the contralateral eye (as in our patient with suspected sympathetic ophthalmia) or even to the patient’s life (as in our patient with reticulum cell sarcoma). Eye-wall biopsy is also useful to expand future research into diseases for which uveal tract lesion. This work was supported in part by core grant 1P 30EY01792 from the National Institutes of Health. Bethesda, Md.

References