Use of Viscoelastics Post-Trabeculectomy: A Survey of Members of the American Glaucoma Society

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BACKGROUND AND OBJECTIVE: American Glaucoma Society members were surveyed to determine the pattern of use of viscoelastics for anterior chamber reformation at the slit-lamp in the post-operative clinical management of patients who have undergone trabeculectomy in order to give ophthalmologists an indication of how these materials are being used by their colleagues.

MATERIALS AND METHODS: We surveyed 196 members of the American Glaucoma Society regarding the following: (1) whether they inject viscoelastic post-operatively at the slit-lamp as an in-office procedure, (2) the type of viscoelastic used most often, (3) the criteria for injection of viscoelastic, (4) the time to first follow-up, (5) the average number of injections, and (6) the occurrence of post-injection endophthalmitis.

RESULTS: One hundred twenty-five (64%) of the 196 mailed surveys were answered and returned. Ninety-four (75%) of the respondents reported injecting viscoelastics in the postoperative period at the slit-lamp as an in-office procedure. Healon (60%) (Pharmacia & Upjohn Co, Kalamazoo, MI), Viscoat (17%) (Alcon, Ft. Worth, TX), and Healon GV (7%) (Pharmacia & Upjohn Co, Kalamazoo, MI) were the three most often used viscoelastics. Hypotonix, iris-cornea touch, and lens-cornea touch were given as criteria for injection 19%, 47%, and 88% of the time, respectively. Range of time to first follow-up was 1 hour to 7 days, with a mean time of 1 day. Range of average number of injections was 1 to 3 with a mean of 2 injections for patients requiring injection. Only one respondent reported an incidence of endophthalmitis.

CONCLUSIONS: The use of viscoelastic materials in the postoperative trabeculectomy patient in the office at the slit-lamp for anterior chamber reformation is a prevalent practice. Healon is the most commonly used viscoelastic postoperatively and lens-corneal touch is the most common criterion for injection. The average number of injections is 2, with a mean and mode follow-up time of 1 day. Endophthalmitis is a rare complication.

INTRODUCTION

Glaucoma filtering surgery has been refined and modified in many ways since trabeculectomy was first described in 1968, but many postoperative problems continue to exist. Most are a result of over filtration and/or decreased aqueous production in combination with choroidal detachment. These problems include
flat anterior chamber, choroidal hemorrhage, posterior and peripheral synechiae, corneal decompensation, cataract, ciliary block, maculopathy, and ultimately bleb failure. Although there have been reports of using viscoelastics intra-operatively in an attempt to prevent these problems, the use of these materials can be helpful in postoperative management as well.8–16

The reformation of the anterior chamber at the slit lamp following trabeculectomy using viscoelastic materials appears to be a safe, effective method of restoring anterior chamber depth while at the same time it avoids the time and expense of returning to the operating room.8,9,11,12 Although the use of viscoelastics in this way appears to be a prevalent management technique, little is known regarding the pattern of general use. This survey was conducted to better define how viscoelastics are being used post-trabeculectomy at the slit-lamp as an in-office procedure to reform the anterior chamber.

MATERIALS AND METHODS

To assess the pattern of use of viscoelastics in the post-operative management of patients who have undergone trabeculectomy and to give ophthalmologists an indication of how these materials are being used by those who perform these procedures routinely, the following survey was mailed to 196 members of the American Glaucoma Society (Table 1). Those surveyed represented the complete membership for the United States. Sufficient time was allotted to allow for response and a second mailing was not performed due to a high response rate to the initial mailing.

RESULTS

One hundred twenty-five (64%) of the 196 mailed surveys were answered and returned. Ninety-four (75%) of the respondents answered yes to the question: "Do you inject viscoelastic post-operatively at the slit-lamp in the office?" Healon (60%), Viscoat (17%), and Healon GV (7%) were the three most often used viscoelastics. Other viscoelastics used less often are listed in Table 2. As several respondents listed the use of more than one viscoelastic but gave no preference, the results reflect the number of times a particular viscoelastic was listed divided by the total of all viscoelastics (n=105).

Hypotony, iris-corneal touch, and lens-corneal touch were noted as criteria for injection 19%, 47% and 88% of the time, respectively. Other criteria mentioned were; (1) wound leak, (2) IOL-corneal touch, (3) drainage tube-endothelial touch, (4) injection into bleb if flat early post-operatively, (5) corneal decompensation, and (6) in conjunction with autologous blood injection. Because many respondents listed more than one criterion, the results reflect the number of times a particular criterion was listed divided by the number of respondents who inject viscoelastic (n=94).
Table 2. Summary of responses to American Glaucoma Society Survey: Use of Viscoelastics Post-trabeculectomy

<table>
<thead>
<tr>
<th>Response rate: 125/196 = 64%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inject viscoelastic post-op at slit-lamp in office (n=125)</td>
<td>94</td>
<td>75</td>
</tr>
<tr>
<td>Type of viscoelastic used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healon</td>
<td>63</td>
<td>60</td>
</tr>
<tr>
<td>Viscoat</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Healon GV</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Amvisc</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Ocucoat</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Proviso</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Vita</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Amvisc (+)</td>
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<td>2</td>
</tr>
<tr>
<td>Criteria for injection of viscoelastic (n=94)</td>
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<td></td>
</tr>
<tr>
<td>Hypotony</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Iris-cornea touch</td>
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<td>47</td>
</tr>
<tr>
<td>Lens-cornea touch</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>Other</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>

Incidence of endophthalmitis (n=93)

| Range of time to first follow-up | 1 hour to 7 days |
| Mode and mean time to first follow-up | 1 day  |
| Range of average number of injections | 1 to 3 |
| Average number of injections | 2 |

Time to first follow-up ranged from 1 hour to 7 days, with a mean time of 1 day (n=95). The majority (n=75) of respondents listed 1 day as their time to first follow-up. Range of average number of injections was 1 to 3 with a mean of 2 injections for each patient (n=93). Only one respondent reported the incidence of post-viscoelastic injection endophthalmitis, which occurred in one patient (1%).

**DISCUSSION**

The incidence of flat anterior chamber in the first 5 days following trabeculectomy has been reported to be as high as 67% depending on the criteria used. Our criteria of hypotony, iris-cornea touch, and lens-cornea touch, as well as a category for “other” in this survey, allowed respondents to indicate their relative indications for anterior chamber reformation. Although there is agreement that lens-cornea touch should be treated if present for more than 12 to 24 hours, shallowing of the anterior chamber in the absence of lens-cornea touch can be allowed to resolve spontaneously for 4 to 5 days or longer without significant long-term complication. Our results reflect the general agreement regarding lens-cornea touch, as well as the differing approaches toward a shallow anterior chamber without lens-cornea contact.

Healon (sodium hyaluronate), was the first viscoelastic used in anterior segment surgery and, as a result, has been the material most often used when studying the behavior of viscoelastics in glaucoma filtering surgery. It is an inert, totally transparent, non-osmotic, viscoelastic material composed of 98% water and is 400,000 times more viscous than saline. It is effective in post-trabeculectomy anterior chamber reformation, as well as in management of post-operative ciliary block. It was also the viscoelastic most often specified (60%) in this survey. The use of other viscoelastic materials may be related to factors such as cost, availability, or viscosity level.
Of the 31 respondents who answered "No" to the use of viscoelastics post-operatively, 3 specified that they use air instead. The use of air has been described intra-operatively as well as post-operatively in the maintenance of the anterior chamber. Although it has been shown that air is effective at reforming and maintaining the anterior chambers, there are concerns that it may have deleterious effects on the corneal endothelium.

The use of intraocular gas to reform the anterior chamber after trabeculectomy has also been described. Theoretically, it is possible to cause corneal, iris, or lens damage during the injection of viscoelastic into the anterior chamber. However, one study reported no such complications in a series of 19 anterior chamber reformation operations. It is also conceivable that the injection of viscoelastic could cause an elevation of intraocular pressure, but in an eye that is hypotonic with a patent sclerostomy this would seem unlikely. There have been reports of endophthalmitis as a result of anterior chamber paracentesis, but only one respondent (1%) in this survey reported this complication. He stated that this occurred in one patient.

Given the low complication rate, and that 75% of respondents answered "Yes" to injecting viscoelastic post-operatively at the slit-lamp in the office, the issue of standard of care in terms of this procedure should be less of a concern.

Four respondents gave specific reasons for not injecting viscoelastic post-operatively. Three respondents use air instead, and one reported that the use of releasable sutures obviated the need to reform the anterior chamber. Other possible reasons may include tight closure of the scleral flap, the use of a bandage contact lens or Simmon's shell, or a return to the operating room for revision of the flap.

The range of average number of injections given to a patient who required injection was 1 to 3. It is not known whether further injections were necessary or if respondents resorted to other techniques if the injection of viscoelastic was not successful. We could not determine from the survey results if the use of the thicker viscoelastics would show a decreased number of injections required to reform the anterior chamber.

There was a wide range of time to first follow-up (1 hour to 7 days), with a mean and mode of 1 day. Respondents were not requested to give a rationale for their time to first follow-up, but 1 day would seem to be a reasonable interval since lens-cornea touch can persist without complication for about that length of time. One day was given as the response by 75 (80%) of the 94 respondents who inject viscoelastic post trabeculectomy.

Questions that remain unanswered include:
1. What management techniques are being used by those who do not reform the anterior chamber with viscoelastic?
2. Why is a particular viscoelastic used post trabeculectomy in reforming the anterior chamber?
3. Does the use of thicker viscoelastics reduce the number of times required to reform the anterior chamber?
4. What is the maximum time one can wait before reforming the anterior chamber in the absence of lens-cornea touch?
5. What is the optimal time to first follow-up after injection of viscoelastic for anterior chamber reformation?
6. What is the true incidence of endophthalmitis after this procedure?
7. Is there a limit to the number of injections of viscoelastic that can be given to reform the anterior chamber before reaching a point of diminishing returns?

REFERENCES

9. Cantor LB, Gerber S, Lin C. Adjunctive viscoelastic...


