

Comparison between phaco-deep sclerectomy converted into phaco-trabeculectomy and uneventful phaco-deep sclerectomy

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PURPOSE. To evaluate and compare the results and complications of eyes that underwent a phaco-deep sclerectomy (DS) converted into phaco-trabeculectomy due to an intraoperative macroperforation with eyes undergoing uneventful phaco-DS.

METHODS. The authors reviewed 106 eyes having a planned phaco-DS; 10 of them (9.4%) had to be converted into phaco-trabeculectomy because of a large perforation during the nonpenetrating procedure. Intraocular pressure (IOP), visual acuity, glaucoma medication evolution, and complications were evaluated and compared between groups.

RESULTS. Eyes undergoing uneventful phaco-DS (n=96, Group 1) had a significantly higher postoperative IOP compared with those undergoing transformed phaco-trabeculectomy (n=10, Group 2) ($p<0.05$). One year postoperatively, 81.2% and 100% of the eyes in the Group 1 and 2, respectively, had an IOP ≤ 21 mmHg without treatment ($p=0.206$). One year postoperatively, eyes that underwent uneventful phaco-DS needed more glaucoma medications than eyes converted into phaco-trabeculectomy ($p=0.014$). Visual acuity improved more quickly in Group 1 ($p<0.05$). Hyphema and choroidal detachment rates were significantly higher in Group 2 ($p=0.002$ and $p=0.027$, respectively).

CONCLUSIONS. Phaco-DS converted into phaco-trabeculectomy provides better midterm IOP control when compared with uneventful phaco-DS, but has more complications and worse visual acuity in the early postoperative period. (Eur J Ophthalmol 2005; 15: 343-6)

KEY WORDS. Deep sclerectomy, Macroperforation, Phacoemulsification, Trabeculo-decemet membrane

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INTRODUCTION

Deep sclerectomy (DS) is a nonpenetrating filtration procedure for the surgical treatment of glaucoma. This surgical procedure isolated or combined with phacoemulsification may offer success rates comparable to trabeculectomy or phaco-trabeculectomy, minimizing the risk of postoperative complications (1-4). The major intraoperative complication is perforation of the trabeculo-decemet membrane (TDM), which occurs mainly during the learning phase (5, 6). In reports on non-penetrating procedures, complicated cases transformed into penetrating surgeries are usually excluded from the outcome

analysis. Sanchez et al reported a similar long-term success rate in 19 eyes of 234 DS (8.1%) transformed into a trabeculectomy because of a perforation, compared with 19 matched eyes that underwent planned trabeculectomy. However, they did not compare the outcome of the noncomplicated cases (215 eyes) with those in which a penetrating procedure was used transforming the previous failed DS (7).

We recently reviewed 7 cases of 78 phacoemulsification-DS procedures that were transformed into a phaco-trabeculectomy because of TDM perforation (8); however, we did not compare the evolution of those cases with eyes that underwent an uneventful phaco-DS.

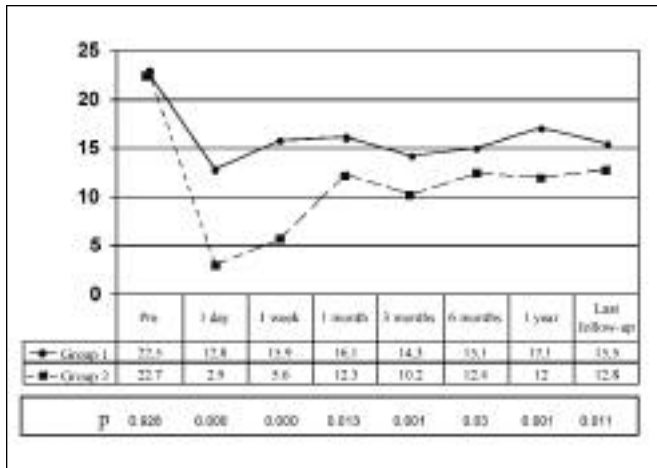


Fig. 1 - Mean intraocular pressures after noncomplicated phaco-deep sclerectomy (Group 1, n=96) and phaco-deep sclerectomy converted in phaco-trabeculectomy (Group 2, n=10). Two-tailed Student t-test.

The purpose of this study was to evaluate the success rate and the complications of phaco-DS transformed into a penetrating technique due to an intraoperative macroperforation and to compare the outcome with noncomplicated cases.

MATERIALS AND METHODS

We reviewed 106 consecutive eyes of 95 patients who underwent a planned phacoemulsification combined with DS performed between January 2001 and July 2003. Indications for combined surgery included a best-corrected visual acuity of 0.6 or worse, cataract, and significant glaucomatous damage of the optic nerve with insufficient control of intraocular pressure (IOP). All surgical procedures were performed by one of two surgeons (G.R., F.J.M.).

Variables retrieved from patient charts were IOP, visual acuity (VA), number of glaucoma medications, and complications preoperatively and on day 1, day 7, and at 1, 3, 6, and 12 months postoperatively. IOP and VA at the maximum follow-up were also registered.

Surgical technique

In all the cases we dissected a fornix-based conjunctival flap and a one-third scleral thickness superficial flap (5.0 mm x 5.0 mm) in the superior quadrant at least 1.0 mm into clear cornea. Phacoemulsification was performed through

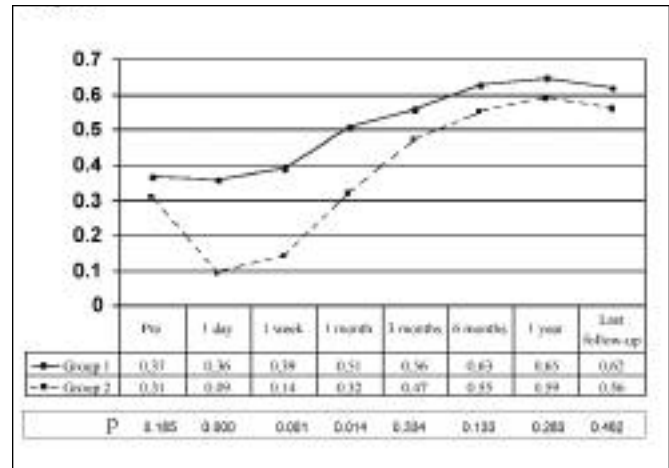


Fig. 2 - Comparison of visual acuity evolution in both groups (Mann-Whitney test).

a right clear corneal incision before deep scleral flap dissection. A second triangle or rectangle of deep sclera was dissected, the Schlemm's canal deroofed, and the TDM created. An ab-externo trabeculectomy was performed and a reticulated hyaluronic acid implant (SKGel, Corneal Laboratoires, France) was placed in the scleral bed. No antimetabolite therapy was used.

When a large intraoperative perforation of TDM occurred, surgery was transformed into a trabeculectomy, with rectangular resection of a block along the macroperforation and basal iridectomy. Deep scleral flap was excised and the superficial scleral flap sutured with 2-4 interrupted nylon 10/0 buried sutures.

In 10 cases (9.4%) surgery had to be transformed into a phaco-trabeculectomy because of a TDM perforation. Eight cases (80%) perforated during the TDM dissection, one case ruptured spontaneously coincident with a Valsalva maneuver, and one case when a cellulose sponge was used to assess the aqueous oozing.

We compared noncomplicated cases (Group 1, n=96) with cases converted into a penetrating surgery because of a large intraoperative macroperforation (Group 2, n=10).

When a TDM microperforation occurred without iris prolapse, the procedure followed normally and these cases were included in Group 1.

Longitudinal comparisons of IOP were made using the two-tailed Student's test. Comparisons of VA and the number of glaucoma medications were tested with the Mann-Whitney test. The Pearson chi-square test and the

TABLE I - DEMOGRAPHIC DATA AND CLINICAL CHARACTERISTICS OF THE STUDY POPULATION

	Group 1 (n=96)	Group 2 (n=10)	p
Eye, n (%)			
Right	50 (52.1)	6 (60)	0.746
Left	46 (47.9)	4 (40)	
Sex, n (%)			
Female	27 (28.1)	3 (30)	1.0
Male	69 (71.9)	7 (70)	
Age, yr, mean (SD)	76.8 (8.5)	76.9 (7.9)	0.982
Number of medications, mean (SD)	1.8 (0.8)	1.3(0.7)	0.071
IOP before surgery, mmHg, mean (SD)	22.5 (7.5)	22.7(4.9)	0.928
Follow-up, mo, mean (SD)	27.8 (8.5)	31.9 (8.8)	0.123

IOP = Intraocular pressure; SD = Standard deviation

Fisher exact test were also used for data analysis. A statistics program (SPSS 10.0 for Windows, SPSS Inc., Chicago, IL) was used for all analysis. A p value of 0.05 or less was considered statistically significant.

RESULTS

Patient data are listed in Table I. We found no significant differences in the mean age, sex, and glaucoma diagnosis between eyes that underwent an uncomplicated phaco-DS (Group 1) and eyes that underwent a phaco-DS converted into trabeculectomy (Group 2).

Perforation of the TDM occurred in 7 of the first 50 surgeries (14%). The complication rate decreased in the subsequent phaco-DS; only 3 of the subsequent 56 surgeries resulted in perforation (5.3%).

The mean follow-up was 27.8±8.5 months (range 12 to 42 months) and 31.9±8.8 months (range 16 to 42 months) in Group 1 and 2, respectively (p=0.123).

There was no statistically significant difference in the mean preoperative IOP between groups (p=0.928). Figure 1 shows the mean IOP evolution in both groups before and after surgery over time. At the last visit, the mean IOP

was 15.5±3.1 mmHg and 12.8±3.1 mmHg in Groups 1 and 2, respectively (p=0.011). At all follow-up points, the IOP remained significantly lower in Group 2 (n=10) than in Group 1 (n=96) (p 0.05).

Nd:YAG goniopuncture was performed in 24 eyes (Group 1) (25%). No postoperative bleb manipulation was performed in Group 2. The mean preoperative number of glaucoma medications was 1.8±0.8 and 1.3±0.7 in Groups 1 and 2, respectively (p=0.071). One year postoperatively, the mean number was 0.5±0.6 and 0 in Groups 1 and 2, respectively (p=0.014). One year after surgery, 100% and 81.2% of the eyes in Groups 2 and 1, respectively, had an IOP 21 mmHg without treatment (p=0.206).

The VA improved significantly after surgery in both groups (p=0.000). A comparison of patients' VA post-surgery between groups showed that eyes following uneventful phaco-DS had a better VA level during the first postoperative month (p<0.05) (Fig. 2). At the last visit, there was not any significant difference in the mean VA between groups (p=0.462).

Hypphema occurred in 5 eyes (50%) in Group 2 and in 8 cases (8.3%) in Group 1 (p=0.002). Choroidal detachment was observed in 3 eyes (30%) in Group 2, and in 5 cases (5.2%) in Group 1 (p=0.027).

DISCUSSION

In nonpenetrating surgical procedures the preservation of the TDM is technically challenging. When a large TDM perforation occurs, surgery has to be converted into a modified trabeculectomy.

In this study, 10 (9.4%) of 106 phaco-DS had to be transformed intraoperatively into a phaco-trabeculectomy because of a large TDM perforation. This rate is similar to that previously reported (5-9). This complication occurs mainly during the learning phase and decreases as surgical experience increases; however, it is not completely eliminated (5). Macroperforation may occur during the external trabeculectomy, and during the TDM dissection. In our experience, the chance for perforation was highest during this part of the procedure (8).

Only a few studies compare penetrating and nonpenetrating filtering surgery combined with phacoemulsification (2-4). Gianoli et al reported that DS combined with phacoemulsification resulted in an IOP reduction similar to that in phaco-trabeculectomy (2). Di Staso et al reported a higher percentage of tonometric success without

therapy in eyes undergoing phacoemulsification associated with DS than in phaco-trabeculectomy (3). Cillino et al reported that the medium-term success rates of DS and punch trabeculectomy, both single and combined with phacoemulsification, without enhancements, such as implants or antimetabolites, were similar (4). However, we have observed a significant better IOP control at each follow-up visit in eyes that had a phaco-DS converted into a penetrating procedure compared with noncomplicated cases ($p < 0.05$). This finding can be explained because phaco-DS converted into phaco-trabeculectomy differs in several aspects of standard trabeculectomy. In fact, in failed cases, the excised internal block is larger and the superficial scleral flap is thinner as compared with standard trabeculectomy. Both elements could increase the aqueous flow, explaining the lower IOP values and the higher rate of complications in our study.

Gianoli et al reported a complete success rate at 12 months (defined as IOP less than 21 mmHg without additional glaucoma medication) in 59% and 52% in the phaco-DS and phaco-trabeculectomy groups, respectively (2). In Di Staso et al's report the success rate without addition of hypotensive therapy at 1 year postoperatively was 73.3% and 53.3% in phaco-DS and phaco-trabeculectomy (3). Cillino et al reported a complete success rate of 46.6% in both groups (4). In our study, at 12 months, the complete success rate obtained was higher than reported by these authors in both groups (81.2% in uneventful phaco-DS and 100% in failed phaco-DS converted in phaco-trabeculectomy). It is difficult to compare these results because of the numerous surgical variations. Di Staso et al did not explain the surgical technique. Gianoli et al used a collagen im-

plant, and in Cillino et al's study no implant and no adjuncts, such as Nd:YAG laser goniopuncture, were used. However, we used a reticulated hyaluronic acid implant, and goniopuncture was performed in 25% of eyes. Moreover, results of this surgery are better if the iuxtacanalicular trabeculum is removed (1) and this surgical step was not included in Gianoli et al's report, making comparison difficult between studies.

Although the mean VA was not significantly different between groups after the first postoperative month, it was significantly lower on days 1 and 7 and 1 month postoperatively in Group 2 ($p < 0.05$). In this group, the choroidal detachment and hyphema rate in the early postoperative period were also significantly more common.

The limitations of our study include the retrospective design and the relatively small number of cases included in Group 2. On the other hand, this limitation is intimately related with the fact that the TDM macroperforation's percentage decreases as the surgeon's experience increases.

Nonetheless, based on our review, it appears that when a phaco-DS is complicated with a TDM perforation and converted into a phaco-penetrating surgery, the midterm success rate of the surgery is better in terms of IOP control than in an uneventful phaco-DS, but there is a higher rate of complications and VA recovery is delayed.

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