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Comparison after 10 years of two 100-patient cohorts operated on for eviscerations or enucleations

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PURPOSE. *To compare the indications, surgical techniques, and operative outcome between two 100-patient populations operated on for evisceration or enucleation with a 10-year interval.*

METHODS. *This retrospective study involved 100 patients operated on between 1987 and 1990 (Group 1) compared with another 100 patients operated on between 1996 and 2000 (Group 2). Group 1 included 64 males and 36 females, mean age 49 years; Group 2 included 60 males and 40 females, mean age 53.*

RESULTS. *In Group 1, 19 eviscerations were performed, versus 55 in Group 2. In both groups, half of the indications for surgery were a painful blind eye. In Group 1, endophthalmia (23%) came second, whereas it was trauma (15%) in Group 2. Sixty-eight patients were implanted in Group 1 (silicone spheres 69%) versus 86 in Group 2 (hydroxyapatite spheres 69%). Twenty spheres (20%) were rejected in Group 1 versus 7% in Group 2.*

DISCUSSION AND CONCLUSIONS. *The proportion of eviscerations increased in 10 years. The number of endophthalmitis-related operations decreased and trauma-related operations increased. The number of implantations increased with hydroxyapatite as the first choice material instead of silicone. This most likely contributed to reducing the number of rejections. (Eur J Ophthalmol 2004; 14: 363-8)*

KEY WORDS. *Evisceration, Enucleation, Hydroxyapatite, Silicone*

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INTRODUCTION

Ablation surgery has evolved significantly since the beginning of the previous century and especially over the last 15 years. Orbital implants have been in use for more than 100 years to fill enucleated cavities, progressing from glass to methacrylate, then to silicone and now to biocolonizable materials. Operative techniques may not have progressed accordingly but a number of methods have recently been described, such as scleral flipping on colonizable sphere described by Mouriaux et al (1) for enucleation and the various evisceration techniques that now preserve cornea through a retro-entry approach, and more recently the Russian doll or the parachute techniques described by Adénis et al (2). Material advances have boosted surgical progress but the aim is still to maintain the largest volume possible, so as to preserve optimal mobility

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and acceptable cosmetic aspect, together with optimizing the prevention of implant rejection and other complications.

We elected to compare indications, surgical techniques, implant materials, and complications of the operations performed at the Rouen Academia Hospital (C.H.U.) over the last 10 years.

PATIENTS AND METHODS

This retrospective study was conducted after analyzing the medical records of patients operated on for ablation surgery between January 1987 and July 1990 (Group 1) and between September 1996 and December 2000 (Group 2). The first hundred patients who had been followed up for at least a year and had been operated on as a first intent indication were included in the study. The following criteria were documented in their record: age, sex, surgical technique, type of implant material, implant sizes, and postoperative complications, classified as early or late if occurring less or more than 6 months after surgery. Complications included those dehiscences that could be corrected by surgery without removing the material. Expulsions were taken into consideration when dehiscences were too extensive and made implant ablation necessary.

The surgical evisceration technique was classical: conjunctiva limbic release, Tenon's capsule-conjunctiva cleavage, removal of the four right muscles either on Vicryl 5/0 or on Dacron 5/0, oblique muscle resection, scissors or tourniquet enucleation, implantation of a silicone sphere with stitching of the muscles on the equator, closure of Tenon's capsule either with Dacron 5/0 in the earliest operations or with Vicryl 5/0, conjunctiva continuous suture with Vicryl 6/0 after separation of this conjunctive plane from Tenon's plane, no postoperative conformer in order not to pry on the sutures, that conformer being fitted after 3 weeks.

In Group 1, the cornea was not preserved by evisceration. After the limbic extraction of the conjunctiva, Tenon's capsule was separated from the conjunctive plane, the cornea was resectioned, lateral cuts were performed to insert a silicone sphere, then the sclera was closed with Dacron 5/0, Tenon's capsule was sutured with Vicryl 5/0, and conjunctive continuous suture independently of Tenon's capsule with Vicryl 6/0 and a conformer was fitted only after the third week, as for enucleations.

A number of conservative eviscerations were performed in Group 2. In such cases, the cornea was preserved but the superficial stroma was removed from the entire corneal surface with a Creshent knife and the limbic connective-epithelial part was ablated. After removal of the external right muscle on Vicryl 5/0, the sclera was cut at the equator level after evisceration of the ocular contents, side cuts were performed around the optical nerve, often with ablation of scleral patch fragments. A hydroxyapatite or bioceramic sphere was inserted using sugar pincers. The scleral wound was closed with Vicryl 5/0. Refitting of the removed muscle with Vicryl 5/0 followed by careful suture of the Tenon's capsule border by Vicryl 5/0 U stitches and conjunctive plane continuous suture with Vicryl 6/0, separate from Tenon's capsule plane.

Enucleation with scleral flip was performed according to the technique described by Mouriaux et al (1).

Materials used

Silicone spheres, either solid or hollow, 14- or 15-mm Hervouet implants, i.e., methacrylate or glass spheres coated with pig sclera all over the inert material, were used in Group 1. Two hydroxyapatite implants, covered with PTFE stitched around the sphere on the operating table with Vicryl 6/0, were also used in Group 1.

In Group 2, silicone implants were also used, or alternatively biomaterials of the hydroxyapatite type marketed by FCI and bioceramics. These spheres were either inserted in the evisceration sclera or wrapped in the enucleated and flipped sclera, or in Vicryl patches stitched around the sphere so as to cover it, with a 6/0 Vicryl, on the operating table.

The Chi square test was used for result analysis.

RESULTS

Group 1 was composed of 100 patients (64 males, 36 females) successively eviscerated or enucleated in the department between January 1987 and July 1990. Their mean age was 48 years and 7 months (range 2 months to 89 years). Group 2 included 40 females and

60 males successively eviscerated or enucleated in the department between September 1996 and December 2000. Their mean age was 52 years and 8 months (range: 2 months to 100 years).

Mean age and sex ratio were comparable in both groups (nonsignificant differences) and two thirds of the patients were male in both groups (64% and 60% in Groups 1 and 2, respectively).

Etiologies were distributed as follows:

- Group 1–52 painful blind eye (PBE), 23 endophthalmias, 12 phthisic eyes, 9 melanomas, 3 retinoblastomas, 5 disgraceful blind eyes, 5 traumas, 1 micro-ophthalmia, 1 sympathetic ophthalmia
- Group 2–50 PBE, 15 traumas, 12 melanomas, 8 endophthalmias, 5 disgraceful blind eyes, 3 micro-ophthalmias, 3 retinoblastomas, 3 others (Fig. 1)

Enucleation was performed in 8 out of 10 cases in Group 1 versus only 4.5 of 10 cases in Group 2 (Fig. 2). That intergroup difference was statistically significant ($p<0.01$).

Only 68% of Group 1 patients were eligible for implantations, versus 86% in Group 2. Silicone was the first choice implant material in Group 1 (69%) whereas it came second in Group 2 (31%) behind hydroxyapatite (69%). Nineteen Group 1 patients received Hervouet implants, two received PTFE (Fig. 3).

Overall, there were 20.5% rejections in Group 1 versus 7% in Group 2, that difference being statistically significant ($p<0.01$).

Materials used

In Group 1, 47 silicone spheres were implanted, 10 of which (21%) were rejected, whereas in Group 2 only 4 (15%) of the 27 silicone spheres implanted were rejected. This difference in the silicone rejection rate between the two groups was considered as nonsignificant.

No significant differences were found in the rejection probability among the various types of graft (silicone, Gore-Tex, Hervouet) in Group 1. Hydroxyapatite was used in Group 2 only; 59 spheres were implanted, only 2 of which were rejected (3.4%). Hydroxyapatite apparently was the material least rejected, the difference in rejection probability between silicone and hydroxyapatite on the significance threshold ($p = 0.05$).

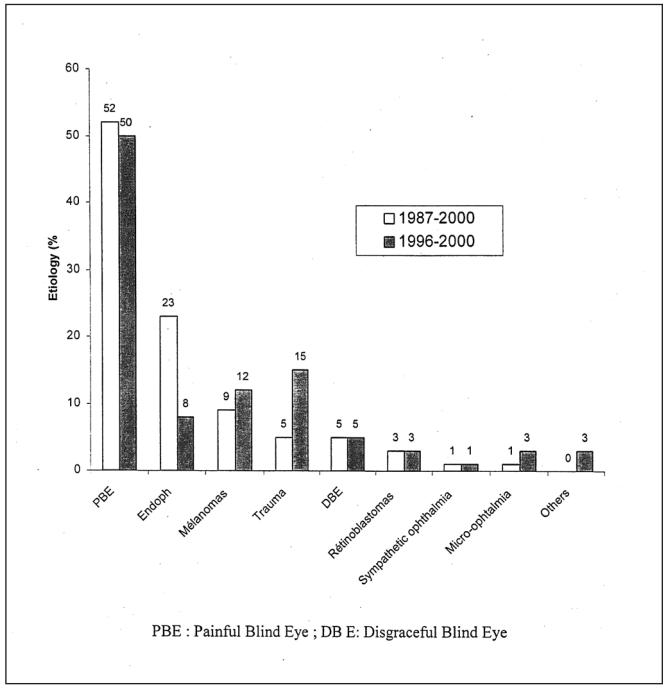

Fig. 1 - *Distribution of enucleations and eviscerations according to etiologies in the two groups. Painful blind eye remains the number one etiology in half of the patients. Endophthalmia, initially the number two etiology with 25% of cases, decreased and is partially replaced by traumas.*

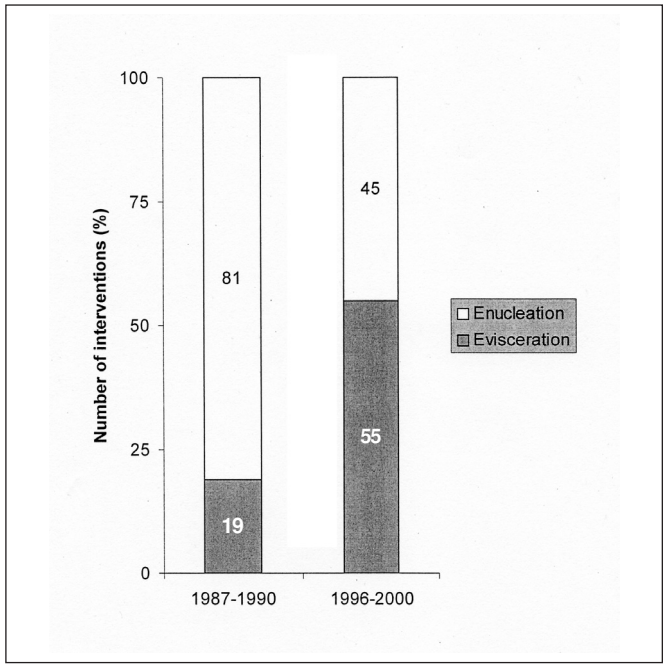

Fig. 2 - *Incidence of eviscerations and enucleations in the 1987–1990 and 1996–2000 patient groups. The proportion of eviscerations increased considerably.*

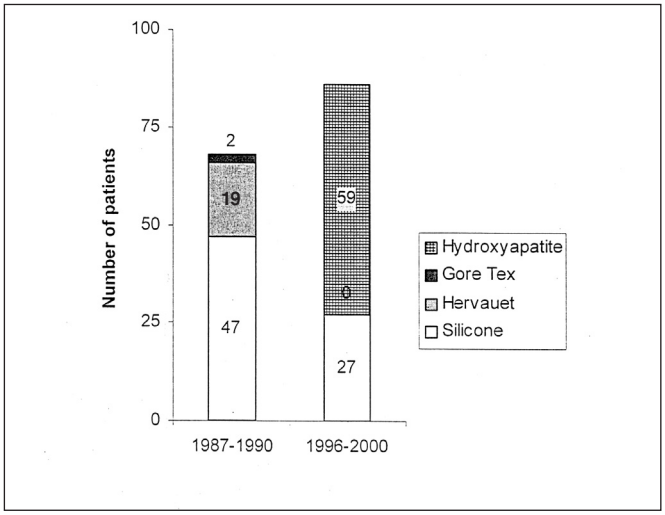

Fig. 3 - *Proportion of the various implant materials used during surgery in the two groups. Hydroxyapatite spheres have replaced silicone spheres, the number one implant material in Group 1.*

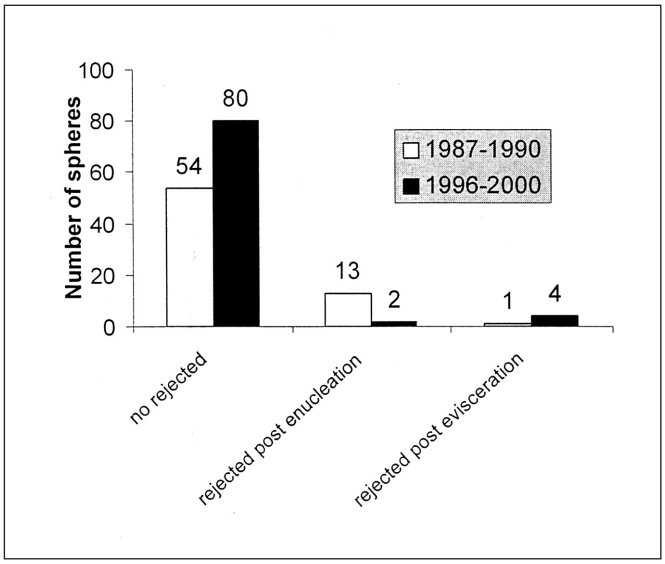

Fig. 4 - *Comparison of sphere rejections according to the type of surgery in the two groups. The rejection rate decreased in Group 2 through a decrease in the rejection rate following enucleation followed by implantations.*

Technique

Of the 49 enucleations performed and followed by implantations in Group 1, 13 spheres were rejected (26.5%), whereas in Group 2 only 2 of the 31 postenucleation implants were rejected (6%) (Fig. 4). The decrease in the number of implant rejections following enucleations differed significantly between the two groups ($p<0.01$). Of the 19 eviscerations performed and followed by implantations in Group 1, only one was rejected (5.2%), whereas in Group 2, 4 implants out of 55 were rejected (7%). This difference was not statistically significant. Seven eviscerations with preservation of the cornea were performed in Group 2.

About sphere sizes

Between 1987 and 1990, the mean sphere diameter was 16.2 mm (range: 10 to 18). In Group 2 between 1996 and 2000, the mean diameter of the silicone spheres was 17.5 mm (range: 10 to 20) and 18 mm for biomaterial prostheses (range: 14 to 20).

DISCUSSION

Our two groups were similar to literature reports with regard to the sex ratio (two thirds men, one third women) (4, 5) and mean age of patients: 48 and 52 in our study, 57 in Sigurdsson et al's (4), and 49 in Kostick et al's (5).

The main etiology was the same in both groups: PBE for half of the indications. PBE was also reported as the first cause in the various studies (4).

Endopththalmia, on the other hand, was the cause in 23% of Group 1 patients and only 8% in Group 2. Conversely, trauma accounted for only 5% in Group 1 and for 15% in Group 2, where it became the number two cause. The melanoma indication was also slightly increased from 9% in Group 1 to 12% in Group 2. The overall decrease in endophthalmia incidence accounts for the decrease in related surgical indications. The incidence of other etiologies – i.e., disgraceful blind eye, retinoblastoma, sympathetic ophthalmia, micro-ophthalmia – remained unchanged. Sigurdsson et al reviewed the types of indications for enucleation and evisceration in 200 eyes over a period from 1964 to 1991 (4). The first etiology was PBE, the second was consecutive melanomas, and the third was trauma.

Group 1 was formed in 3 years and 6 months, whereas it took 4 years and 2 months to round up the same number of patients in Group 2. This type of surgery therefore is becoming less frequent overall.

The pros and cons of evisceration and enucleation have long been a matter of debate (6, 7). Eviscera-

tion, obviously, is contraindicated in patients with suspected malignant tumors. Evisceration warrants the restitution of an adequate cavity volume, hence better plastic results than enucleation (8). The technique is simpler and shorter. A few authors have described cases of sympathetic ophthalmia (SO) following evisceration, although it has yet to be determined whether SO was secondary to surgery or to the initial trauma (5). Several authors recommend evisceration rather than enucleation (5). Comparing between the two groups shows that this team has followed that trend, as the rate of evisceration increased from 19% to 55% of the overall number of surgical operations. Comparing the two groups reveals that sphere rejection was more frequent following enucleations and that it remained the same after eviscerations.

Bio-implants are classified as non-integrated (silicone) or integrated (hydroxyapatite). The advantage of the latter is to reduce the risk of late rejection and infection (6). The outcome of hydroxyapatite implants following enucleations (6) and eviscerations (5) is very positive. Hydroxyapatite has been used for eye implants since the late 1980s (5). A number of publications describe its good tolerance following enucleation or evisceration (9, 10). In this study, the rejection rate decreased dramatically from 30.5% to 7% despite an increase in the number of implantations. Comparing silicone sphere implantations, the only material used in both groups, the rejection rate decreased significantly from 21.2% to 15%. That decrease can be explained by the systematic use of self-resorbent suture, wider surgical experience, and increased attention given to that type of surgery.

Early ocular surgical ablations were not followed by secondary implantation. It was only in the 19th century that the implantation technique was described. In 1885, Mules first described a successful implantation of an intraocular glass eye (11). Early materials included ivory, decalcified bone, and cartilage. Ruedmann in 1941 proposed a combined acrylic and eye implant prosthesis (12). Because of the increased infectious risk and postoperative strabismus, these implants have been discarded. Then, in the 1950s, polymethylacrylate and silicone implants were introduced (13). These novel materials reduced infectious risks and implant exposure. In 1985, Perry described the first hydroxyapatite implants. This new colonizable material has considerably reduced the number of rejections following implantation, which has made its success (14). Implantation warrants the restitution of adequate volume and increased prosthesis mobility. Porous implant materials are therefore preferred.

CONCLUSIONS

This study reveals that in 10 years the proportion of tissue preservation has significantly increased in parallel with the number of eviscerations and enucleations with scleral flip. The number of implantations aiming at preserving the largest cavity volume has increased considerably and biocolonizable materials are now the first choice, which most likely reduces the rate of late rejections.

It is also worth noting the increased size of implants and the attention given to that type of surgery, which contributes to improvement of plastic results through the preservation of the largest volume possible and of natural tissue. The decrease in injury rejection rate was confirmed in this study as a direct result from the use of biocolonizable materials combined with more precise and conservative surgery.

Improved cosmetic results are directly linked to the increased interest of ophthalmologists in this type of surgery and also to the newly established cooperation between ophthalmologists and ocular surgeons.

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