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Extrusion and infection incidence in scleral buckling surgery with the use of silicone sponge: To soak or not to soak? An 11-year retrospective analysis

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PURPOSE. *To assess the incidence of extrusion and infections of encircling silicone sponges in scleral buckling surgery for retinal detachment with and without the use of an intraoperative antibiotic soaking procedure.*
METHODS. *The authors performed a retrospective analysis reviewing the charts of 1127 patients who underwent episcleral buckling surgery operated by the same surgeon in three different institutions during a period of 11 years. The authors reviewed the charts of patients treated with a single episcleral silicone sponge (Labtician®) indentation in three different models. The infection prophylaxis on the operating field was the same in all cases and only since February 1997 was the silicone sponge preoperatively treated with an antibiotic soaking procedure.*
RESULTS. *No immediate postoperative infections were reported in the operated eyes. Three eyes had an implant extrusion and in all these cases silicone sponge removal was performed. All three extrusion cases developed when sponge soaking was not adopted.*
CONCLUSIONS. *The data indicate that the soaking procedure does not decrease extrusion and infection incidence in scleral buckling surgery when both accurate surgical technique and disinfection prophylaxis are performed. (Eur J Ophthalmol 2007; 17: 399-403)*

KEY WORDS. *Extrusion, Infection, Preoperative antibiotic soaking, Scleral buckling, Silicone sponge removal*

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INTRODUCTION

Scleral buckling surgery is a commonly used surgical technique for the repair of retinal detachment. Custodis first suggested the idea of scleral indentation and then in 1951 Schepens introduced scleral buckling surgery adopting polyethylene tubing placed in a partial-thickness scleral bed (1). The use of silicone sponge was subsequently advocated by Lincoff and coworkers (2).

Scleral buckle techniques consist of buckling materials implantation into the sclera or on the episcleral surface with the use of scleral sutures (3).
Polyethylene tubing and Miragel have been discontinued owing to late swelling and fragmentation of these materials (4). Solid silicone and silicone sponge are presently the most adopted materials among the scleral buckling procedures (5). Erosion, intrusion, infection, and extrusion are the most frequent complications occurring when scle-

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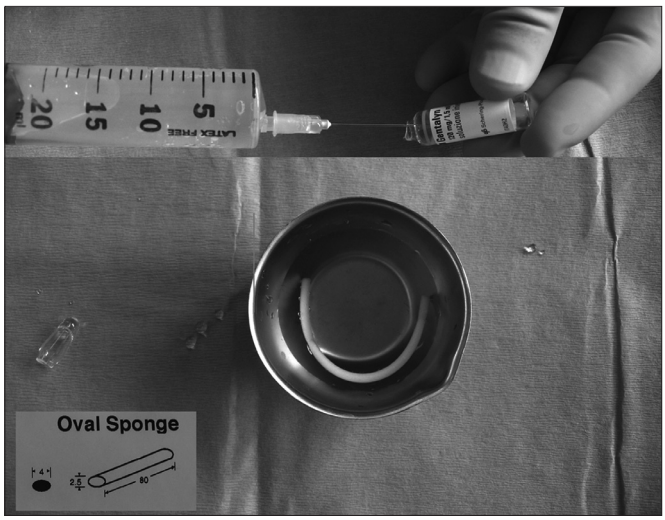

Fig. 1 - *The silicone sponge (Labtician®) placed in the gentamicin 0.6% solution for 30 minutes prior to insertion.*

ral buckling surgery is performed (6, 7). Erosion occurs when the implant has migrated internally through the sclera and choroid and rests in the subretinal space. Intrusion occurs when the scleral buckling materials have eroded and have protruded into the vitreous cavity (8).

Silicone sponge has mostly been described in scientific literature to be the less tolerated implant because of its porosity, which may offer an ideal mechanism for bacterial growth (9). Infections most frequently described on scleral buckling implants are due to the presence of Gram-positive cocci, acid-fast organism, and fungi (10).

Among all complications described, extrusion of the scleral buckling materials is more common and easier to manage than erosion or intrusion (8). Extrusion of the buckle takes place when the implant has penetrated externally through the scleral flaps, Tenon capsule, and conjunctiva.

Le Raic et al (4) reported that more than 80% of silicone implant removal occurred subsequent to the extrusion of the buckle, concordant with previous studies (6, 7, 11). In most cases it was impossible to understand the mechanism leading to extrusion: primary infection, mechanical irritation of surrounding tissue, or inadequate suture of the implant. The incidence of explant infections and extrusions with modern techniques is about 1% (9, 12, 13).

Scholda et al (14) described the use of a new sponge profile (Labtician®, Canada) for scleral buckling surgery in order to obtain indentation effect, decreasing the rate and degree of irritations, motility disturbances, and the rate of sponge extrusions.

We describe a retrospective analysis of procedures adopted in patients presenting retinal detachment who underwent scleral buckling surgery with silicone sponge (Labtician®, Canada). The intraoperative prophylaxis procedures we adopted in order to eliminate scleral buckling surgery complications are described.

METHODS

We reviewed the charts of patients who underwent episcleral buckling over a period of 11 years, operated by the same surgeon in three different institutions. We selected the charts of patients treated for retinal detachment with an episcleral silicone sponge (Labtician®) indentation in three different models (style 501, style 510, and style 516). From February 1997, the silicone sponge (Labtician®) was preoperatively soaked for 30 minutes in a gentamicin 0.6% solution (Fig. 1). Since February 1997, the same antibiotic solution used to soak the sponge has been utilized for sclera irrigation before suturing the conjunctiva.

We divided the study population into two groups according to the use of this soaking procedure.

Group 1 included patients treated without antibiotic prophylaxis who were operated before February 1997.

Group 2 included patients treated with silicone sponge prophylaxis since February 1997 to December 2001.

The patients were followed for a minimum of 6 months to a maximum of 12 months. At the end of the postoperative follow-up all patients were visited once a year at our hospital outpatient clinic.

In all cases a conventional scleral buckling surgery was performed and non-readsorbable mattress sutures (Ti-Kron 5-0) were placed both on the four scleral quadrants and to the ends of the buckle to hold the sponge in place.

Tenon capsule was closed separately over the sponge with interrupted 7-0 sutures and the conjunctival incision was closed with an interrupted 7-0 readsorbable suture.

We used a standard infection prophylaxis on the operating field that was the same in all cases, consisting of iodopovidone 0.25% (Oftasteril®) eyedrop instillation, disinfection of the external periocular skin with Betadine® 10%, and accurate delimitation of the field by covering the eyelid margins with the operating ophthalmic plastic adhesive cloth.

None of the patients received preoperative antibiotic

eyedrop prophylaxis; all patients underwent postoperative therapy with the same drug association and dosage: dexamethasone and tobramycin eyedrops or ointment QID for 7 days, ofloxacin eyedrops QID for 7 days, cefazolin 1 g IM for 5 days.
We performed a statistical analysis between Group 1 and Group 2 using the χ^2 test. Significance levels were set at $p \leq 0.05$.

RESULTS

From January 1990 to December 2001 we treated 1127 patients (1127 eyes) for retinal detachment with episcleral surgery procedure. During the years included in the study we did not report any postoperative buckle infection.
We found 3 cases (0.26%) of silicone sponge (Labtician®) extrusion (Tab. I): the first case developed extrusion after 2 years from the operation, the second case after 5 years, and the third case after 2 years. The three cases needed the implant removal when extrusion complications occurred. All the implants removed for the extrusion were submitted to bacteriologic analysis. A microbiologic culture was performed on each of the three implants removed, revealing the presence of *Staphylococcus aureus* in two cases and of *Staphylococcus epidermidis* in one case.
All three extrusion cases developed in Group 1 (0.4%); no extrusions were evaluated in Group 2.
We performed a statistical analysis in order to evaluate if the difference obtained between the two groups may be related to the presence of the prophylactic soaking procedure used in Group 2. There was no statistical difference between the two groups (p=0.2, χ^2 test) according to the extrusion complications, so the null hypothesis is verified: the soaking procedure does not influence the frequency of extrusion.

TABLE I - COMPARISON OF EXTRUSION RATE BETWEEN SOAKED VS NONSOAKED

	Extrusion	Nonextrusion	Total
Group 1	3	735	738
Group 2	0	389	389
Total	3	1124	1127

DISCUSSION

Authors researching the management of extrusions and infections after scleral buckling surgery are limited due to the low incidence of these complications. Scleral buckling removal during extrusion or infections remains a rare event, mostly due to careful sterilization and prophylactic use of broad-spectrum antibiotics such as gentamicin and β-lactam compounds (15). Infection sites during scleral buckling surgery originate from the periocular skin, eyelids, and conjunctival tissues by bacterial Gram-positive cocci, acid-fast organism, and fungi development, as described by Lincoff, Pathengay et al, and Arribas et al (9, 10, 12).
Intra- or postoperative timing is the most crucial passage for acute infection occurrence (6). Usually the infection appears 2 weeks to 2 months after surgery, including fistula formation, granuloma formation, purulent discharge, and subconjunctival hemorrhage (16).
Explant extrusion often occurs without evidence of infection. Although chronic subclinical infections may play a role, mechanical factors involving the explant and suture placement have also been implicated (17).
Scleral buckling material extrusion without evidence of infection also usually requires removal of the offending buckle element. Removal of scleral buckling material carries a risk of redetachment of 4% to 33% (18).
Arribas et al (12) evaluated the incidence of extrusion (2.5%) and infections (1.9%) using soft Silastic® sponge without the soaking procedure performing scleral buckling. They also reported lower incidences of extrusions (0.4%) and infections (0.2%) when adopting the soaking procedures.
Other authors (19) underlined an increased incidence of infections and extrusion with the use of multiple sponges or long circumferential sponges when compared to cases of single sponge usage as we retrospectively evaluated in our study.
The first outcome of the retrospective analysis is the lack of acute infection in both groups. Acute infections most likely result from contamination at the time of surgery or in the immediate postoperative period (6), so the infection prophylaxis we adopted has been effective.
In our patients we established a postoperative topical therapy based on dexamethasone against inflammation and ofloxacin against Gram-positive and tobramycin against Gram-negative bacteria. In addition, systemic use of cefazolin was administered in order to achieve a higher

concentration of antibiotic in the periocular tissues (20).
At present, we are adopting two new drugs recently introduced on the Italian market: netilmicin 0.3% combined with dexamethasone 0.1% as topical administration QID for 7 days and then scaling down, and moxifloxacin 400 mg per os for 5 days (21, 22).
Soaking procedure does not seem to influence infection risk. Another relevant result of our data is the reduction of the incidence of extrusion (0.26%) among both groups, which is lower compared to other authors (12).
The three extrusions reported in our study occurred in Group 1, but the difference vs Group 2 was not statistically significant (p= 0.2, χ^2 test). According to this data, we can conclude that the soaking procedure does not represent the discriminating element.
The cause of extruded sponges cannot be easily explained. Late infections, erosion, foreign body rejection, or exposure secondary to suture failure have all been implicated. The late extrusion onset, from 2 to 5 years, reduces the importance of postoperative infections, so the cultures of staphylococcus upon the event of extrusion are probably conjunctival infections and independent of operative or postoperative prophylaxis.
Another conflicting element that negates the importance of the infection in our extruded sponges is the high potency of *S aureus*, contrary to the late occurrence of the extrusion onset.
In conclusion, the soaking procedure adopted on silicone sponge bands before performing scleral buckling surgery seems not to decrease extrusion phenomena that may be related to erosion or suture failure.

No author has a financial or proprietary interest in any material or method mentioned in the article.

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