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Lincoff temporary balloon buckle in retinal detachment surgery

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PURPOSE. *To assess the long-term anatomical and functional results of balloon buckle surgery for rhegmatogenous retinal detachment.*

PATIENTS AND METHODS. *Twenty-five selected detachments with a single break or a group of breaks close together were treated with a temporary parabulbar balloon. Adhesion was obtained with transconjunctival cryopexy and argon laser photocoagulation. Retinal detachment was associated with the following risk factors: myopia (15 eyes), aphakia (2 eyes), blunt trauma (1 eye). Twenty-three eyes had a detached macula. The balloon was withdrawn after one week. The patients were kept under observation for at least six months (mean 44.7 months).*

RESULTS. *Initial retinal attachment was achieved in 29 eyes. After the balloon was removed redetachment occurred in two eyes; thus, complete attachment was attained in 27 eyes. Causes of failure were: undetected break (2 eyes), inadequate buckle (4 eyes), proliferative vitreoretinopathy (2 eyes). Conventional scleral buckling and subretinal fluid drainage was done in all failed cases. Vitrectomy and silicone oil were employed in one patient, and finally retinal attachment was achieved in all patients.*

CONCLUSIONS. *Temporary balloon buckling is a simple and curative technique for a selected group of patients with retinal detachments. (Eur J Ophthalmol 2001; 11: 372-6)*

KEY WORDS. *Lincoff temporary balloon, Rhegmatogenous retinal detachment, Scleral buckling*

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INTRODUCTION

The principles of retinal detachment surgery are first to find all breaks, and second to close all breaks. If all breaks are closed, subretinal fluid will be absorbed (1). The best treatment brings about a satisfactory visual result as quickly as possible with minimal complications, and results in permanent reattachment. A wide array of breaks involve retinal detachment. The problem is to select a technique appropriately matched with the severity of the case. Not only must the procedure result in a reattached retina, it is also extremely important that it causes no significant complications, prevents recurrences, and leads to the best postoperative vision (2-4).

In 1979, Lincoff, Kreissig, and Hahn (5) introduced a temporary balloon buckle for the treatment of selected retinal detachments. An inflatable silicone explant is inserted through the conjunctiva at the ora serrata and expanded beneath the retinal break. This achieves a buckling effect that closes the break and allows subretinal fluid to be absorbed. Adhesion is obtained by transconjunctival cryopexy before inserting the balloon or by laser coagulation postoperatively after the break has flattened against the retinal pigment epithelium. Several days are allowed for the adhesion to develop and then he balloon is removed at the bedside with the patient under topical anesthesia. This technique was initially limited to small detachments with a single tear or a group of tears that subtended less than 6 mm in the longest dimension (5, 6).

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PATIENTS AND METHODS

We used the temporary balloon buckle technique in 35 eyes of 35 patients at the Department of Ophthalmology in the Medical Faculty at the University of Ondokuz Mayis between February 1993 and April 1999. None of the patients had undergone scleral buckling on the study eye. This study comprised 20 men and 15 women ranging in age from 11 to 70 years (mean 53.1). We selected patients whose retinal detachments were caused by a single retinal break or a group of breaks close together that did not subtend more than 6-8 mm. The data were stored for prospective analysis.

We used a siliconized latex balloon at the end of a plastic catheter. The catheter and the unexpanded balloon measure 1.2 mm in diameter. The balloon expands to a diameter of 1.2 cm when 1.5 ml of liquid (balanced saline solution) is injected into it. A flexible steel spring is incorporated in the axis of the balloon, to provide stiffness and facilitate insertion of the balloon into Tenon's space.

Visual acuity, slit-lamp examination, intraocular pressure, fundus examination, break localisation, B-scan ultrasonography and systemic examinations were done before surgery for all patients. A detailed examination of the macula and suspected small breaks in the periphery was done using a slit-lamp microscope with a three-mirror contact lens. Retinal charting was done for all patients.

The detachments had been present for less than one week in 6 patients (17.1%), for one week to one month in 25 patients (71.4%), and one to six months in 4 patients (11.5%). The detachment involved one quadrant in 3 cases (8.6%), two quadrants in 16 cases (45.7%), three quadrants in 14 (40%), and four quadrants in 2 cases (5.7%). The causes of the detachment were a single horseshoe tear in 24 eyes, a single round hole in 4 eyes, a flap tear and round hole in 1 eye, two flap tear in 3 eyes and multiple holes in a small zone in 3 eyes. Lattice degeneration was present in 12 patients. The macula was attached preoperatively in 12 patients (34.3%), and completely detached in 23 patients (65.7%). There were 15 patients with myopia, 3 with hyperopia, 15 with emmetropia and 2 with aphakia.

The balloon was inserted under retrobulbar anesthesia in most patients. One patient, age 11, was operated under general anesthesia. Chorioretinal adhesion was obtained by transconjunctival cryoretinopexy before the balloon was inserted. The catheter was inserted into Tenon's space through a 1.5-2 mm incision in the conjunctiva, maneuvered beneath the break and inflated with 1.5 ml normal saline. Sutures were not used to secure it. If fluid absorption was delayed or there was inadequate buckling, the balloon was extended by 0.3-0.5 ml of saline solution (maximum volume 2 ml). If necessary, the balloon was repositioned for the break in the postoperative period. Chorioretinal adhesion was strengthened by argon laser photocoagulation on the first postoperative day. Deflation and withdrawal of the belloon was scheduled after one week. In one patient, the conjunctiva was lacerated by mistake and the balloon was extracted on the second postoperative day, but the retina maintained attached. Patients were not discharged from the hospital until the balloon had been withdrawn.

Patients were followed after the balloon was extracted at one week, two weeks, and at the first, third, sixth and twelfth months, then annually. All these patients were followed up for six months at least; the average follow-up was 44.7 months.

RESULTS

The results, in relation to preoperative characteristics, are shown in Table I.

Initial success, defined as complete flattening of the retina before removal of the balloon was achieved in 29 eyes (82.9%) but after the balloon was extracted redetachment occurred in two patients within the first month. These patients had developed proliferative retinopathy (PVR). They were treated with scleral buckling procedures and subretinal fluid aspiration, and the retinas became attached. Final complete attachment was achieved in 27 of the 35 patients at the last follow-up examination. In three patients with lower quadrant detachments subretinal fluid persisted when the balloon was removed. This fluid was graually resorbed over a period of several months and at the last follow-up examination the retina was completely attached. In two eyes in which the break was incompletely buckled, the balloon was repositioned on the first postoperative day, and retinal attachment was achieved.

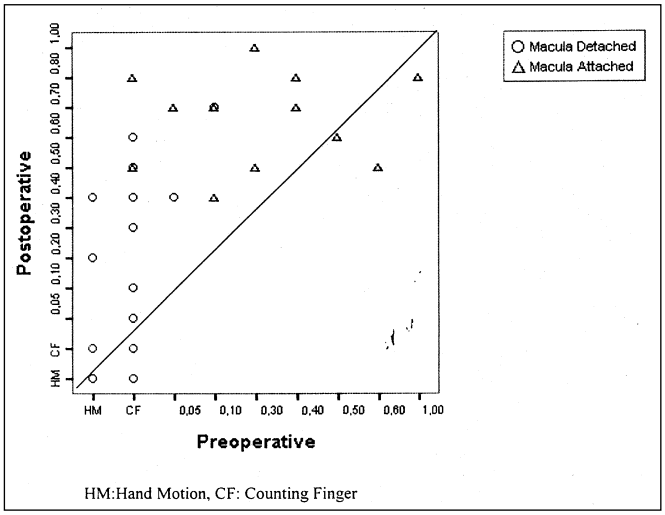

Fig. 1 - *Preoperative and postoperative visual acuity in all patients.*

The results concerning visual acuity are shown in Figure 1. After balloon surgery, visual acuity improved in 24 eyes and deteriorated in 4. In 7 of the 35 eyes, visual acuity did not change. Of the 12 eyes with a preoperatively attached macula, postoperative visual acuity was 0.4 or better in all. Of the 23 eyes with a detached macula, the postoperative visual acuity was 0.4 or better in 7, 0.1-0.3 in 8 and less in 8.

In this sudy, balloon surgery failed in 8 patients. Causes of failure were an undetected break in 2 eyes, an inadequate buckle in 4 eyes and PVR in 2 eyes. All eight recurrent detachments were managed with conventional scleral buckling procedures with subretinal fluid aspiration. The retina remained anatomically reattached in all except one patient. This patient had PVR and was treated with vitrectomy plus silicone; attachment was achieved.

No serious intraoperative and postoperative complications arose. However, superficial corneal erosion occurred in two eyes, raised intraocular pressure in three eyes, the balloon deflated in one eye, and choroidal effusion occurred in one eye. These complications were overcome with no difficulty.

TABLE I - SUCCESS RATE ACCORDING TO PREOPERATIVE CHARACTERISTICS

Characteristics	No. cases	Success	Failure
Extent			
1 quadrant	3	3 (100%)	–
2 quadrant	16	11 (68.8%)	5
3 quadrant	14	11 (78.6%)	3
4 quadrant	2	2 (100%)	–
Total	35	27 (77.1%)	8
Macular detachment			
Yes	23	15 (65.2%)	8
No	12	12 (100%)	–
Refractive condition			
Myopia	15	9	6
Aphakia	2	2	-
Hyperopia	3	2	1
Emmetropia	15	14	1
Visual acuity			
Increase	24		
Decrease	4		
Stable	7		

DISCUSSION

The temporary balloon buckle technique is simple and has been widely described and performed. Its main advantage is its simplicity. No foreign body is permanently buried in the orbital tissues, no postoperative positioning of the patient is necessary, and no intraocular manipulations are needed (7). This technique offers several significant advantages over conventional scleral buckling procedures. Primary among these is the lower risk of complications, both during surgery and afterwards. Because no scleral suturing is required, the risk of scleral perforation is eliminated, operating times are short, averaging 15 to 30 minutes, and the surgical trauma to the periocular tissues is much less than with conventional techniques. Postoperative swelling and discomfort are minimal and patients are usually comfortable with the balloon in place (3, 6, 7). There are several additional advantages related to the temporary nature of the balloon buckle. Obviously, there is no risk of intrusion or extrusion since the balloon is removed. There is no risk of postoperative infection since the surgery does not require leaving a foreign body attached to the eye, as would be the case with conventional techniques. There can be no significant change in refractive error because there is no permanent distortion of the eye wall (6-9). In this study, no serious ocular complications arose.

TABLE II - RESULTS OF UNCOMPLICATED DETACHMENTS TREATED BY THE BALLOON BUCKLE

Surgeons	No. of patients	Initially attached		Redetached	
		No.	%	No.	%
Lincoff-Kreissig (1981)	100	90	90	8	8.9
Lincoff-Kreissig (1985)	100	79	79	10	12.6
Binder (1986)	52	50	96	–	–
Schoch-Olk (1986)	45	42	93	7	16.7
Richard (1987)	100	94	94	–	–
Kreissig-Failer (1989)	500	466	93	12	12.4
Il'nitskii (1994)	159	134	84	20	14.9
Green-Yarian (1996)	162	143	88	–	–
This study	35	29	83	2	6.9

Buckling using Lincoff's temporary balloon may be advisable when the detachment is caused by a single break, preferably located between the equator and the ora serrata. Multiple breaks clustered in one clock hour are also treatable by this technique. However, the indications for the balloon technique have increased (7, 10-12). For example Il'nitskii (13) used double and sectorial balloon buckling, in combination with drainage of subretinal fluid. Rhegmatogenous retinal detachment with posterior breaks was treated with temporary buckles by Ferrara (14). Lincoff and Kreissig (10) used a parabulbar balloon over failing scleral buckles to reinforce the buckle. In our series, all breaks were located between the equator and the ora serrata. However, most of the patients had macular detachment, and retinal detachment involved in three quadrants in 14 patients, and four quadrants in two.

In this study, initial attachment was achieved in 29 patients (82.8%) but redetachment developed in two. Consequently, final retinal attachment was achieved in 27 patients (77.1%) by the balloon technique. However, attachment was achieved in all attached-macula cases. The results of treating uncomplicated detachments in other studies which used the balloon buckle are shown in Table II (6-9, 11, 13, 15-17). Redetachment occurred in 5-17% patients. Redetachment usually happens within the first months. In this study, redetachment occurred in the first week in one case and in the second week in another one, after removal of the balloon. The cause of redetachment was PVR in both patients. Other causes of redetachment were an inadequate buckle, an undetected break, choroidal detachment, balloon prolapse, another break and inadequate adhesion (11, 18). In order to provide adequate adhesion we applied argon laser photocoagulation around the break after the contact was made.

Complications with the balloon are few and mild (5, 6, 9, 11). We observed deflation in one patient, corneal erosion in two, intraocular pressure rises in three, choroidal effusion in one, and balloon prolapse in one. These complications did not affect the prognosis.

Recently, pneumatic retinopexy has been recommended for retinal detachments. However, its complications are more frequent and severe than a temporary balloon buckle (11, 19, 20). The temporary balloon buckle is probably more advantageous in appropriate cases. The balloon technique is simple, the complications are minimal, and functional results are excellent so it is to be preferred in selected cases.

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