

Silicon Implant Dacryocystorhinostomy

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Aim: To study the results of silicon implant dacryocystorhinostomy in patients with chronic dacryocystitis.

Patients and Methods: Pawar silicon implant dacryocystorhinostomy was performed in 20 patients with chronic dacryocystitis. Patients were followed up for 6 months after the operation.

Results: The majority of the patients (85%) were women. The mean age of the patients was 38.5 years (range, 11 to 66 years); 70% of the patients were younger than 40 years. Success, defined as relief from watering of the eyes without infection, was achieved for 85% of patients after 6 months. Conventional external dacryocystorhinostomy was performed to relieve symptoms for the remaining 15% of patients who had developed closure of the nasal ostium or blockage of the lower end of the implant.

Conclusions: Silicon implant dacryocystorhinostomy is technically quick and easy to perform and can be done for all age groups with a high success rate. Conventional external dacryocystorhinostomy may be performed in patients for whom silicon implant dacryocystorhinostomy is not successful.

Key Words: Dacryocystitis, Dacryocystorhinostomy, Silicon

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Introduction

Dacryocystitis is a common eye disease in ophthalmic practice. The condition is usually unilateral and occurs secondary to obstruction of the nasolacrimal duct. Patients present with watering of the eye and, occasionally, a swelling in the lacrimal sac area owing to accumulation of mucopurulent or purulent discharge. The disease can be chronic, acute, or acute-on-chronic.

Dacryocystorhinostomy (DCR) is the operation of choice for relieving symptoms because it enables drainage of tears to bypass the obstruction in the nasolacrimal duct. In this procedure, the lacrimal sac is anastomosed with the nasal mucosa in the middle meatus. This procedure may be performed externally through a skin approach (external DCR) or internally via the nose (endonasal DCR). Implant DCR involves placing a silicon implant through the skin

connecting the medial wall of the lacrimal sac and the middle meatus of the nose. There are few previous reports of the implant DCR technique.¹⁻⁵ This report evaluates the procedure for the treatment of chronic dacryocystitis.

Patients and Methods

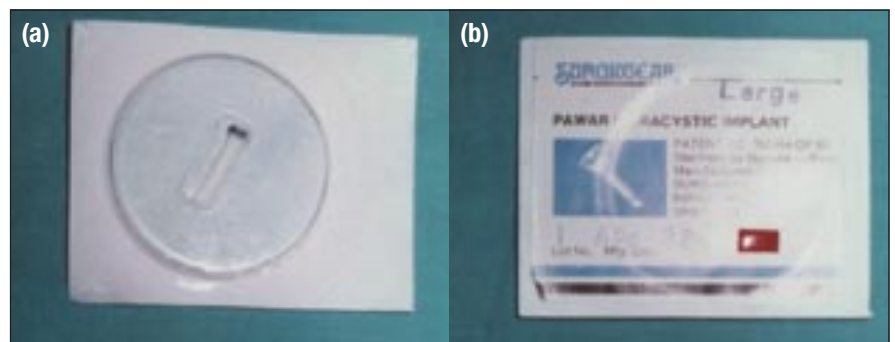
Twenty patients with chronic dacryocystitis, attending Kurnool Medical College and

Regional Eye Hospital, Kurnool, India, during a 1-year period were recruited into this study. The nasolacrimal duct blockage was confirmed using a syringing procedure. Patients with obstruction of either the upper or lower canaliculus, or the common canaliculus, and patients with nasal pathology causing obstruction of the nasolacrimal duct were excluded from this study. The discharge from the sac underwent culture and sensitivity testing, and the infection was controlled with appropriate systemic and topical antibiotics before the operation.

Dacryocystography was performed to assess the status of the lacrimal sac. After admission to hospital, full blood count, bleeding time, clotting time, fasting blood glucose, and xylocaine sensitivity tests were performed. Informed consent was obtained after explaining the surgical procedure and its consequences. Syringing with gentamycin eye drops (0.3%) was done 1 day prior to the operation.

The Pawar intracystic implant is made of a silicon elastomer with maximum tissue compatibility and minimal thrombogenicity (Figure 1). The length of the implant varies from 12.0 to 15.0 mm, with an outer diameter of 2.5 to 3.0 mm and an inner diameter of 2.0 to 2.5 mm. The upper end has a funnel-shaped collar and the implant is bevelled at the lower end. The upper end of the implant rests on the inner wall of the lacrimal sac. The implant has multiple openings of 1-mm diameter at the proximal and distal ends, which act as

Figure 1. (a) The Pawar silicon implant; and (b) the packaging of the sterile Pawar implant.



extra drainage channels.² The implant is supplied in sterilised packets, each containing a single piece (Figure 1). The implant should be washed with distilled water/normal saline before use.

The surgery was performed under general anaesthesia in children and young patients, and under assisted local anaesthesia in adults. The skin over the lacrimal sac was prepared with povidone-iodine solution. The skin incision was made 3 mm nasal to the inner canthus and carried vertically downwards and outwards for 5 mm along the line of the anterior lacrimal crest, and 3 mm below the infraorbital margin. The orbicularis muscle was separated and the incision was deepened to bone depth. After obtaining haemostasis, the skin edges, including the separated orbicularis muscle, were retracted with Muller's self-retaining haemostatic retractor. The lacrimal fascia was cut near the anterior lacrimal crest with a blunt dissector. The lacrimal sac was separated from the surrounding structures and laterally retracted to expose the lower part of the lacrimal fossa.

An ostium was made downwards and obliquely in the lower part of the lacrimal fossa (3 mm in diameter) with a perforator (Figure 2). A 3-mm vertical incision was made through the anterior wall of the lacrimal sac just above the anterior crest. A second incision 2 mm in length was made in the posteriomedial wall of the sac, just opposite the ostium, with the blade piercing the nasal mucous membrane.²

The sterile silicon implant was mounted on the introducer (Figure 2) and introduced through the anterior opening of the lacrimal sac into the nasal cavity, passing through the posteriomedial wall of the lacrimal sac, the newly fashioned ostium, and the nasal mucous membrane. The implant was placed in such a way that the wider collar of the implant was in the cavity of the lacrimal sac and the other end was in the

Figure 2. Instruments for insertion of the Pawar silicon implant. (a) Perforator; (b) small introducer; and (c) large introducer.



middle meatus of the nose. The implant was thus prevented from slipping into the nose. The surgical field and the implant were irrigated with normal saline and 1:1000 adrenaline.

After obtaining complete haemostasis, the wound was closed in layers with 6-0 catgut and 8-0 silk. Gentamicin eye ointment was placed in the eye and on the skin wound, and the eye was patched. Oral antibiotics, oral anti-inflammatory drugs, and vitamin C 500 mg daily were given for 1 week. Children were given a proportionate dose of oral medications. Topical antibiotic eye drops and decongestant nasal drops were instilled 4 times daily.

The first dressing change was done after 24 hours. After cleaning the skin wound, gentamicin eye ointment was applied daily over the skin, and the eye remained open. Patients were discharged on the third postoperative day. Patients were instructed not to blow their nose and to avoid forcible sneezing for 1 month. The skin sutures were removed 1 week after the operation. The antibiotic eye drops and nasal decongestant drops were continued

4 times daily for 1 month. The first syringing was done on the third day and repeated once a week for 4 weeks. All patients were followed up once a month for 6 months. Syringing was performed at each visit.

Results

Pawar silicon implant DCR was performed in 20 patients with blockage of the nasolacrimal duct. The majority of the patients (85%) were women. The mean age of the patients was 38.5 years (range, 11 to 66 years); 70% of the patients were younger than 40 years. Sixteen patients had chronic dacryocystitis, and 4 had a mucocoele of the lacrimal sac. The surgery was performed on the right side in 6 patients, on the left side in 10, and bilaterally in 4.

Several complications were encountered in this study. Accidental opening of the anterior wall of the lacrimal sac occurred in 3 patients. The same opening in the sac was used for the introduction of the silicon implant. Excessive blood loss during surgery occurred in 3 patients. Haemostasis was obtained by applying local adrenaline drops (1:1000) and pressure was applied. Postoperative partial block of the implant occurred on the fifth day in 1 patient. This was probably due to a blood clot, and was relieved by forceful syringing. Extrusion of the implant into the nose occurred in 1 patient, probably due to a large ostium. Conventional external DCR was performed at a later date owing to closure of the ostium. Late postoperative obstruction of the lower end of the implant occurred in 3 patients. The obstruction was relieved with forceful syringing in 1 patient. However, in the other 2 patients, the cause was thought to be fibrous tissue blocking the openings in the implants. Conventional external DCR was performed for these 2 patients. The margin of the implant was palpable under the skin in 2 patients. This was thought to be due to improper positioning of the upper end of the implant

Table 1. Complications and success rates for silicon implant dacryocystorhinostomy.

Study	Number of patients	Follow-up	Number of failed procedures	Causes of failure	Success rate (%)
Pawar and Sutaria ¹	50	1 Year	1	Fibrotic sac; 1 patient	98.0
Pawar and Patil ²	100	1 Year	2	Fibrotic sac; 2 patients	98.0
Lele et al ³	30	3 Months	4	Late infection; 1 patient Mucoïd plug formation; 3 patients	86.7
Bhatt et al ⁴	40	3 Months	4	Late infection; 1 patient Extrusion of implant; 3 patients	90.0
Pawar et al ⁵	1500	1 Year	225	Extrusion of implant; 15 patients Non-perforation of nasal mucous membrane; 15 patients Infection; 75 patients Displacement or misplacement of implant; 45 patients Blockage of implant by mucous/blood; 75 patients	85.0
Present study	20	6 Months	3	Extrusion of implant; 1 patient Fibrous tissue blocking the openings of implant; 2 patients	85.0

and possibly a lack of subcutaneous fat. The patients became used to the presence of the implant over time, and there was no need for further intervention.

After 6 months, the silicon implant was working successfully in 17 patients (85%), and only 3 patients required a second operation (conventional DCR) to relieve their symptoms after developing closure of the nasal ostium or blockage of the lower end of the implant.

Discussion

The original treatment of chronic dacryocystitis was extirpation of the lacrimal sac (dacryocystectomy). However, patients were not happy with this procedure, as watering of the eyes was not relieved despite cure of the infection. Today, the standard surgical procedures include conventional external DCR with a success rate of approximately 90%, endoscopic DCR with a success rate of approximately 85%, or endolaser DCR with a success rate of approximately 70%.⁶ Failures in DCR surgery are primarily the result of osteum occlusion from the membrane or synechia formation between the osteum and the middle turbinate.⁷ Attempts to improve the failure rate have centred on placement of stenting material such as a silicon tube⁸ or a special Pyrex tube⁹ across the lacrimal sac and nasal mucosal anastomosis to prevent recurrent obstruction. Whenever

there is absence of canalicular function, either due to obstruction less than 8 mm from the puncta or to lacrimal pump failure, conjunctivo-canalicular DCR with Lester Jones tube insertion has been done for the relief of epiphora. Recently, balloon dacryocystoplasty has been performed for adults with partial nasolacrimal duct obstruction who do not exhibit signs of chronic infection.⁶

Intubation with a Pawar intracystic implant was done in this study to simplify the procedure of conventional DCR. The relief of the symptom of watering eyes with no residual infection was defined as success of the surgical procedure. The most common causes of failure were blockage of the implant by mucous or a blood clot (which can be relieved by repeated syringing to wash out the blood clot and by using acetyl cystine eye drops to dissolve the mucous plug) and infection (which can be prevented or controlled using postoperative systemic and topical antibiotics and systemic anti-inflammatory drugs). The patency of the implant was maintained by repeated syringing during postoperative follow-up. The other causes of failure included expulsion of the implant, non-perforation of the mucous membrane, and displacement or misplacement of the implant.⁵

Lele et al³ and Bhatt et al⁴ reported better success rates of 86.7% and 90.0%,

respectively, with implant DCR than 80.0% and 75.0%, respectively, with conventional DCR 3 months after surgery. The success rate and complications of the implant DCR procedure in this study are within the range reported in the literature (Table 1). The long-term success rate of implant DCR in a large series of patients by Pawar et al⁵ was lower than in several smaller series.¹⁻⁴

The advantages of implant DCR over conventional DCR are that it is technically easier and less time-consuming to perform with less bleeding and it can be easily performed in all age groups. In addition, no nasal packing is required; there is no need to make a large bony osteum or flaps of the lacrimal sac and nasal mucosa; there is no reaction in the nose from the silicon implant; the duration of time in hospital is reduced; the success rate is the same or improved; the procedure may be performed in patients with a deformity of nasal bridge (leprosy) or an atrophic nasal mucous membrane; and, in patients for whom the surgery fails, conventional DCR can be easily performed after removing the implant because the anatomy of the operation site is not disturbed.

Implant DCR is a simple, quick, easy, and effective surgical mode of treatment for the treatment of chronic dacryocystitis. Conventional external DCR can easily be performed afterwards if required.

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Correction

In Table 1 of the Conference Report: *Angle closure glaucoma in Asian eyes* in Asian J Ophthalmol 2004;6(2):17-18, the data in the columns headed *Angle closure glaucoma* and *Open angle glaucoma* were erroneously transposed. The correct table is shown below, and the online version of the article will be corrected.

Table 1. Estimated number of people affected by glaucoma worldwide.

Area	Angle closure glaucoma	Open angle glaucoma
China	22,333,990	7,444,663
India	5,591,042	5,591,042
South Asia	4,224,819	4,224,819
Europe	609,287	6,945,870
Africa	46,285	7,026,081
Latin America	560,856	1,278,751
Near East	280,719	640,040
Total	33,646,997	33,151,266