ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 07 | July - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARATIVE EVALUATION OF INTRACANALICULAR SILICONE TUBE IMPLANT VERSUS INTRACYSTIC PAWAR IMPLANT IN EXTERNAL DACRYOCYSTORHINOSTOMY FOR CHRONIC DACRYOCYSTITIS: A PROSPECTIVE STUDY

Ophthalomology

Deepak Singh Department of Ophthalmology, Amaltas Institute of Medical Sciences, Dewas, Madhya Pradesh, India

Deepshikha Solanki Department of Ophthalmology, Amaltas Institute of Medical Sciences, Dewas, Madhya Pradesh, India

Mamleshwari Patil Department of Ophthalmology, Amaltas Institute of Medical Sciences, Dewas, Madhya Pradesh, India

ABSTRACT

Background: Chronic dacryocystitis from nasolacrimal duct obstruction is a frequent ophthalmic condition that often requires surgical intervention. External dacryocystorhinostomy (DCR) is the established surgical treatment; implant based adjuncts such as intracanalicular silicone tubes and intracystic Pawar implants are used to reduce postoperative restenosis. Direct comparative data between these two implant modalities within a uniform surgical framework remain limited.**Objectives:** To evaluate the safety and efficacy of intracanalicular silicone tube implant and intracystic Pawar implant in external DCR for chronic dacryocystitis and to compare their intraoperative findings, postoperative complication profiles, implant stability and anatomical success.**Methods:** This prospective comparative study was conducted at the Department of Ophthalmology, Amaltas Institute of Medical Sciences, Dewas, over 18 months (March 2024 to September 2025). Forty patients with chronic dacryocystitis were enrolled: Group A (n=22) underwent external DCR with intracanalicular silicone tube implant and Group B (n=18) underwent external DCR with intracystic Pawar implant. Outcomes were assessed at postoperative day (POD) 1, 7, 30 and 90. The primary outcome was lacrimal passage patency at POD 90 by sac syringing. Categorical variables were compared using chi-square or Fisher's exact test; $p<0.05$ was considered significant.**Results:** The cohort was predominantly female (82.5%) with a peak age of 51 to 60 years. Incisional oedema was the most common complication at POD 1 (85.0%). Lid oedema at POD 7 was significantly higher in Group B (50.0%) than Group A (18.2%; p=0.046). Hypertrophic scar occurred exclusively in Group B (22.2%; p=0.033) and persisted at POD 90. Pawar implant displacement occurred in 3 patients (16.7%) at POD 7; all were successfully repositioned. The silicone tube remained stable at all timepoints. At POD 90, lacrimal passage patency was 100% in both groups.**Conclusion:** Both implant techniques achieved excellent short term anatomical success at three months. The silicone tube group demonstrated superior implant stability, faster resolution of periocular oedema and absence of hypertrophic scarring. Individualised implant selection based on preoperative clinical assessment is recommended. Larger randomised trials with extended follow up are warranted.

KEYWORDS

Dacryocystorhinostomy; Chronic Dacryocystitis; Silicone Tube Implant; Pawar Implant; Nasolacrimal Duct Obstruction; Lacrimal Surgery

INTRODUCTION

Acquired obstruction of nasolacrimal drainage system is a known clinical ailment that produces persistent epiphora, mucopurulent discharge and recurrent dacryocystitis.[1,2] The condition carries a marked female predominance and peaks in middle to older adulthood. Chronic inflammation & fibrosis within the nasolacrimal duct are the principal pathological substrates; once established, conservative treatment rarely provides durable relief and definitive surgical management becomes necessary.[1,3] The burden extends beyond ocular symptoms: repeated outpatient visits, antimicrobial courses and eventual surgical referral all contribute to cumulative healthcare utilisation.[4]

External dacryocystorhinostomy (DCR) remains the reference surgical procedure. It establishes direct communication between lacrimal sac and nasal cavity. It bypasses the obstructed nasolacrimal duct. Reported success rates are consistently high, ranging from 85% to 97% across large series.[5,6] The principal cause of failure is ostium stenosis from cicatricial contraction, granulation tissue or inadequate mucosal healing.[5,7] To address this, implant based modifications have been incorporated into external DCR with the aim of maintaining ostium patency during the critical healing period.[8]

Two main strategies exist. Intracanalicular silicone tube intubation traverses the canalicular system and newly created ostium, acting as a scaffold until mucosal epithelialisation stabilises. A review of eight RCTs by Ing et al. (2018) demonstrated a modest but statistically marked improvement in success rates with silicone intubation via external DCR.[9] Intracystic Pawar implant takes a different approach. It is positioned within the lacrimal sac and functions as a conduit at the sac to nasal interface, where restenosis most commonly develops. Published comparative series have reported success rates comparable to conventional DCR, with reduced operative time and tissue handling.[10,11] Each modality carries a distinct complication profile: silicone tubes may cause punctal erosion, canalicular cheese wiring and tube prolapse, while Pawar implants have been associated with mucus plugging, displacement, extrusion and rare orbital misdirection.[9,10,12,13]

Direct head to head comparison of these two implant modalities within a uniform external DCR protocol is scarce. Published evidence for the Pawar implant derives largely from single centre, nonrandomised cohorts with limited follow up.[10,11,14] Evidence for silicone intubation is broader but heterogeneous in design, outcome definitions and case mix.[9,15] Data from Indian tertiary care settings, where disease severity and referral patterns may differ from Western cohorts, remain particularly limited. This study was designed to assess the safety & efficacy of intracanalicular silicone tube implant and intracystic Pawar implant in external DCR for chronic dacryocystitis, with systematic assessment of intraoperative findings, postoperative complications, implant stability and anatomical success at three months.

MATERIALS AND METHODS

Study Design and Setting

This prospective comparative interventional study was performed in the Department of Ophthalmology of a tertiary care teaching hospital in Madhya Pradesh, India. The study was approved by the Institutional Ethics Committee and Scientific Research Committee. Informed consent was obtained from all participants. The study was implemented based on the Declaration of Helsinki.

Study Duration and Population

Patients were enrolled over 18 months from March 2024 to September 2025. All individuals presenting with chronic dacryocystitis and fulfilling the eligibility criteria during this period were screened. Consecutive sampling was employed.

Eligibility Criteria

Patients aged 18 years and above diagnosed with chronic dacryocystitis were included. Patients with congenital dacryocystitis, acute dacryocystitis, hypertrophied inferior turbinates and paediatric patients were excluded.

Sample Size

A total of 40 patients were enrolled: 22 in Group A (intracanalicular silicone tube implant) and 18 in Group B (intracystic Pawar implant). Formal sample size calculation was not completed prospectively;

consecutive patients who met the inclusion criteria were enlisted throughout study period.

Preoperative Evaluation

Eligible patients underwent detailed history taking and ophthalmic examination. Preoperative lacrimal assessment included the regurgitation test, sac syringing with documentation of fluid character (clear or mucoid) and direction of regurgitation, and the probing test. Syringing was performed after punctal dilatation using a lacrimal cannula; sterile saline was injected while observing for regurgitation and asking the patient whether fluid was felt in the nose or throat. Dacryocystography (DCG) was performed where indicated to localise the site of obstruction.

Group Allocation

Participants were allocated to Group A or Group B based on preoperative lacrimal assessment findings and clinical judgement. This was not a randomised allocation. Group A patients had clinical features consistent with common canalicular block; Group B patients had features consistent with nasolacrimal duct block with mucocoele.

Surgical Technique

All procedures followed a standard external DCR approach under local anaesthesia. Nasal packing with 4% lignocaine and adrenaline was placed. Proparacaine 0.5% was instilled into the conjunctival sac. Lignocaine 2% with 1:200,000 adrenaline was infiltrated at the medial canthal region.

A curvilinear incision was made along the front of the lacrimal crest. The lacrimal sac was identified and carefully separated from the lacrimal fossa, while the periosteum was elevated. An opening measuring approximately 1 cm by 1 cm was created to reveal the nasal mucosa. Flaps of nasal mucosa were formed using an H-shaped incision on the lateral wall of the nose, with a corresponding incision made on the medial wall of the lacrimal sac's mucosa.

In Group A, a bicanalicular silicone tube was threaded through both upper and lower puncta, passing through their respective canaliculi and common canaliculus into both the lacrimal sac and nasal cavity. Both ends were then brought out through the nasal cavity, tied together, and secured using nasal mucosal packing.

In Group B, a Pawar implant was inserted via the opening of the lacrimal sac into the nasal cavity. This implant was positioned so that one end resided within the lacrimal sac while its distal end extended into the nasal cavity. The patency of this setup was verified through syringing.

In both groups, interrupted sutures of 6-0 Vicryl were used to approximate the orbicularis oculi muscle, followed by closure of the skin with 6-0 silk sutures. An antibiotic ointment was subsequently applied.

Outcome Measures

The primary outcome was lacrimal passage patency at POD 90 assessed by sac syringing after implant removal. Secondary outcomes included intraoperative complications (bleeding, difficulty in implant placement), postoperative complications (lid oedema, incisional oedema, nasal mucosal haemorrhage, sac infection, wound gap, hypertrophic scar, implant displacement) and implant stability across follow up visits.

Follow up

All patients were followed up at POD 1, 7, 30 and 90. At each visit, symptoms, complications, implant position and lacrimal passage patency were assessed. Both silicone tubes and Pawar implants were removed at POD 90, followed by syringing to confirm final patency.

Statistical Analysis

Categorical variables were represented in terms of frequencies and percentages. Comparisons between groups were conducted using either the chi-square test or Fisher's exact test, depending on the situation. A p-value below 0.05 was deemed statistically significant.

RESULTS

Demographics and Baseline Clinical Characteristics

Forty patients were enrolled: 22 (55.0%) in Group A and 18 (45.0%) in Group B. The cohort was predominantly female, with 33 women (82.5%) and 7 men (17.5%). The female proportion was 77.3% in Group A and 88.9% in Group B (p=0.427). The largest age group was 51 to 60 years, accounting for 15 patients (37.5%) overall and 11 patients (50.0%) in Group A compared with 4 (22.2%) in Group B. The age distribution did not differ significantly between groups (p=0.111). Watering (epiphora) was the dominant presenting complaint, reported by 25 patients (62.5%). It was markedly more frequent in Group A (81.8%) than Group B (38.9%). Watering combined with discharge occurred exclusively in Group B (27.8%). Mucopurulent discharge alone was reported by 8 patients (20.0%). The distribution of presenting complaints differed significantly between groups (p=0.018).

Preoperative lacrimal assessment showed complete separation between groups (p<0.0001 for all variables). All 22 Group A patients had negative regurgitation, clear fluid on syringing, soft stop on probing and common canalicular block on DCG. All 18 Group B patients had positive regurgitation, mucoid fluid on syringing, hard stop on probing and nasolacrimal duct block on DCG (Table 1).

Table 1. Baseline demographics, presenting complaints and preoperative lacrimal assessment by procedure group (n=40).

Variable	Category	Overall n (%)	Group A (n=22)	Group B (n=18)	p
Age (years)	20-30	3 (7.5)	0 (0.0)	3 (16.7)	0.11
	31-40	7 (17.5)	5 (22.7)	2 (11.1)	
	41-50	8 (20.0)	3 (13.6)	5 (27.8)	
	51-60	15 (37.5)	11 (50.0)	4 (22.2)	
	61-70	7 (17.5)	3 (13.6)	4 (22.2)	
Gender	Female	33 (82.5)	17 (77.3)	16 (88.9)	0.42
	Male	7 (17.5)	5 (22.7)	2 (11.1)	
Presenting complaint	Watering	25 (62.5)	18 (81.8)	7 (38.9)	0.018
	Watering + Discharge	5 (12.5)	0 (0.0)	5 (27.8)	
	Mucopurulent discharge	8 (20.0)	3 (13.6)	5 (27.8)	
	Discharge + Fistula	2 (5.0)	1 (4.5)	1 (5.6)	
Regurgitation test	Positive	18 (45.0)	0 (0.0)	18 (100.0)	<0.001
	Negative	22 (55.0)	22 (100.0)	0 (0.0)	
Sac syringing	Clear fluid regurgitation	22 (55.0)	22 (100.0)	0 (0.0)	<0.001
	Mucoid regurgitation	18 (45.0)	0 (0.0)	18 (100.0)	
Probing test	Soft stop	22 (55.0)	22 (100.0)	0 (0.0)	<0.0
	Hard stop	18 (45.0)	0 (0.0)	18 (100.0)	
DCG finding	Common canalicular block	22 (55.0)	22 (100.0)	0 (0.0)	<0.001
	NLD block	18 (45.0)	0 (0.0)	18 (100.0)	

DCG = dacryocystography; NLD = nasolacrimal duct. Bolded p values indicate statistical significance.

Intraoperative Findings and Complications

The most common intraoperative finding was a distended lacrimal sac, observed in 24 patients (60.0%) overall: 14 (63.6%) in Group A and 10 (55.6%) in Group B. A normal sized sac was found in 8 patients (20.0%), a fibrosed sac in 4 (10.0%), an atrophic sac in 2 (5.0%) and a fibrosed sac with fistula in 2 (5.0%). The distribution of sac findings did not differ significantly between groups (p=0.348). Moderate bleeding was the most frequent intraoperative complication, occurring in 3 patients (13.6%) in Group A and 4 (22.2%) in Group B. Difficulty in implant placement was noted in 3 Group B patients (16.7%). No significant between group difference in complication distribution was observed (p=0.211; Table 2).

Table 2. Intraoperative findings and complications by procedure group (n=40).

Variable	Overall n (%)	Group A (n=22)	Group B (n=18)	p value
Sac findings				0.348
Distended sac	24 (60.0)	14 (63.6)	10 (55.6)	

Normal sized sac	8 (20.0)	3 (13.6)	5 (27.8)	
Fibrosed sac	4 (10.0)	2 (9.1)	2 (11.1)	
Atrophic sac	2 (5.0)	2 (9.1)	0 (0.0)	
Fibrosed sac with	2 (5.0)	1 (4.5)	1 (5.6)	
Intraoperative complications				0.211
Mild bleeding	3 (7.5)	2 (9.1)	1 (5.6)	
Moderate bleeding	7 (17.5)	3 (13.6)	4 (22.2)	
Difficulty in implant placement	3 (7.5)	0 (0.0)	3 (16.7)	
Difficulty in tube placement	1 (2.5)	1 (4.5)	0 (0.0)	

Percentages calculated from total group n.

Postoperative Complications

Postoperative complications were assessed systematically at POD 1, 7, 30 and 90 (Table 3). At POD 1, incisional oedema was universal in scope, observed in 34 patients (85.0%), and lid oedema was present in 26 (65.0%). Nasal mucosal haemorrhage occurred in 8 patients (20.0%). None of the POD 1 complications differed significantly between groups.

At POD 7, lid oedema showed significantly slower resolution in Group B (50.0%) than Group A (18.2%; p=0.046). Incisional oedema persisted in 15 patients (37.5%) without between group difference (p=1.000). Nasal mucosal haemorrhage was observed in 5 patients (12.5%), with a numerically higher proportion in Group B (22.2%) than Group A (4.5%; p=0.155). Sac infection occurred in 3 patients (7.5%).

At POD 30, all acute complications had resolved except sac infection in 2 Group B patients (11.1%; p=0.196) and hypertrophic scar in 4 Group B patients (22.2%; p=0.033). No hypertrophic scarring was observed in Group A. At POD 90, hypertrophic scar persisted in the same 4 Group B patients (22.2%; p=0.033). No new complications emerged between POD 30 and POD 90. Figure 1 presents the complication trajectory across all timepoints.

Table 3. Postoperative complications across follow up by procedure group (n=40).

Timepoint	Complication	Overall n (%)	Group A n (%)	Group B n (%)	p value
POD 1	Lid oedema	26 (65.0)	14 (63.6)	12 (66.7)	1.000
	Incisional oedema	34 (85.0)	17 (77.3)	17 (94.4)	0.197
	Nasal haemorrhage	8 (20.0)	4 (18.2)	4 (22.2)	1.000
	Wound gap	2 (5.0)	0 (0.0)	2 (11.1)	0.196
POD 7	Lid oedema	13 (32.5)	4 (18.2)	9 (50.0)	0.046*
	Incisional oedema	15 (37.5)	8 (36.4)	7 (38.9)	1.000
	Nasal haemorrhage	5 (12.5)	1 (4.5)	4 (22.2)	0.155
	Wound gap	5 (12.5)	2 (9.1)	3 (16.7)	0.642
	Sac infection	3 (7.5)	1 (4.5)	2 (11.1)	0.579
POD 30	Sac infection	2 (5.0)	0 (0.0)	2 (11.1)	0.196
	Hypertrophic scar	4 (10.0)	0 (0.0)	4 (22.2)	0.033*
POD 90	Hypertrophic scar	4 (10.0)	0 (0.0)	4 (22.2)	0.033*

**Statistically significant (p<0.05, Fisher's exact test). All acute complications (lid oedema, incisional oedema, nasal haemorrhage, wound gap) had resolved by POD 30 in both groups.*

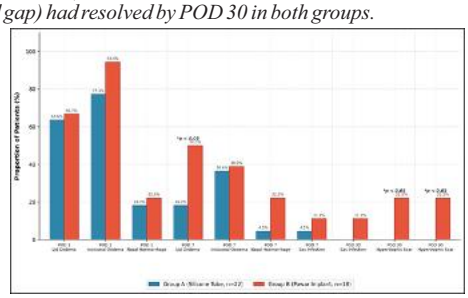

Figure 1. Postoperative complications at POD 1, 7, 30 and 90 by procedure group (n=40). Group A: intracanalicular silicone tube implant (n=22); Group B: intracystic Pawar implant (n=18). Only complications with at least one occurrence are shown. *p<0.05, Fisher's exact test.

Implant Stability and Syringing Patency

The silicone tube remained in situ in all 22 Group A patients across all follow up visits. In Group B, the Pawar implant was in place in all 18 patients at POD 1. At POD 7, displacement was noted in 3 patients (16.7%); all underwent re-exploration and successful repositioning. At POD 30 and 90, all implants were confirmed in position (Table 4).

Syringing was not assessable in Group A at POD 1, 7 and 30 because the silicone tube was in situ. In Group B, syringing was patent in all 18 patients at POD 1. At POD 7, patency decreased to 83.3% (15 of 18), corresponding to the 3 patients with implant displacement. Full patency was restored at POD 30 and maintained at POD 90.

At POD 90, after removal of both implant types, lacrimal passage patency was 100% in both groups (22 of 22 in Group A; 18 of 18 in Group B). No treatment failures were recorded (Table 4; Figure 2).

Table 4. Syringing patency and implant stability across follow up (n=40).

Visit	Group A Syringing	Group B Syringing Patent n (%)	Pawar Implant In Situ n (%)	Re-exploration n
POD 1	NA (tube in situ)	18 (100.0)	18 (100.0)	0
POD 7	NA (tube in situ)	15 (83.3)	15 (83.3)	3
POD 30	NA (tube in situ)	18 (100.0)	18 (100.0)	0
POD 90	22 (100.0) Patent	18 (100.0)	Removed	0

NA = not assessable (silicone tube in situ precluded syringing). Both implant types were removed at POD 90.

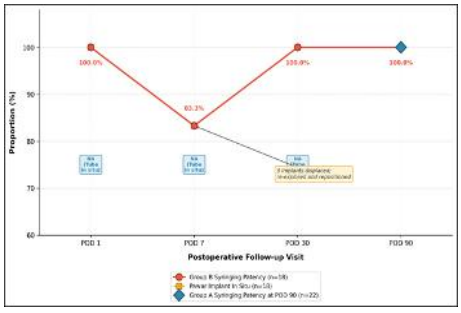

Figure 2. Syringing patency and implant stability over the follow up period. Group A: intracanalicular silicone tube implant (n=22); Group B: intracystic Pawar implant (n=18). Syringing was not assessable in Group A at POD 1, 7 and 30 because the silicone tube was in situ. The transient dip at POD 7 in Group B corresponds to 3 cases of Pawar implant displacement, all successfully repositioned.

DISCUSSION

The present study compared intracanalicular silicone tube implant and intracystic Pawar implant as adjuncts to external DCR in 40 patients with chronic dacryocystitis. Both techniques achieved 100% anatomical patency at three months. The groups differed in their early postoperative course. Group A (silicone tube) showed complete implant stability across all timepoints, faster resolution of periocular oedema and no hypertrophic scarring. Group B (Pawar implant) had a 16.7% displacement rate at POD 7 that required re-exploration, significantly more persistent lid oedema (p=0.046) and exclusive occurrence of hypertrophic scar formation (22.2%; p=0.033).

The demographic profile of this cohort is consistent with established epidemiological patterns. Female patients constituted 82.5% of cases, with a peak incidence in the sixth decade. Chandravanshi et al. (2019) reported a comparable female proportion of 80% in their prospective study of 50 patients with primary acquired nasolacrimal duct obstruction.[11] Mishra et al. (2019) documented a 3:2 female to male

ratio with a younger mean age of 41.4 years.[10] Patel and Parikh (2024) reported an unusual male predominance (64%) in their cohort of 100 patients, a finding that contrasts with the broader literature.[14]

The 100% success rate observed in both groups compares favourably with published data. Mishra et al. (2019) reported 91% initial anatomical success with the Pawar implant, rising to 94% after managing failures; conventional DCR achieved 90%, rising to 97%.[10] Chandravanshi et al. (2019) documented 83.3% initial success with Pawar implant DCR, improving to 96.7% after re-intervention, versus 80% (rising to 85%) with conventional DCR.[11] Patel and Parikh (2024) reported re-obstruction rates of 10% in implant DCR and 8% in conventional DCR.[14] The meta-analysis by Ing et al. (2018), pooling eight randomised trials, found that silicone intubation conferred a modest 4 to 5% advantage in external DCR success rates (p=0.002).[9] Parven et al. (2025), in a large randomised study of 200 patients, reported 96% success with silicone intubation versus 88% without (p=0.024).[15] The present study's superior outcome likely reflects the short follow up period; late failures beyond three months are well documented and may not have been captured.[9,15]

The complication profiles observed in this study show important distinctions between the two techniques. Hypertrophic scar formation occurred exclusively in Group B (22.2%; p=0.033). This finding diverges from Chandravanshi et al. (2019), who reported a 40% hypertrophic scar rate in conventional DCR and none in Pawar implant DCR.[11] Patel and Parikh (2024) reported 14% scarring in conventional DCR and 4% with the implant.[14] The discrepancy may stem from differences in patient tissue response, surgical technique or wound closure methods. The significantly slower resolution of lid oedema in Group B at POD 7 (50.0% vs 18.2%; p=0.046) is plausibly related to the more invasive nature of intracystic implant placement within the lacrimal sac, which involves greater tissue handling at the sac to nasal interface than canalicular intubation.

Implant stability was a key differentiator. The silicone tube remained in position at all follow up visits without displacement, prolapse or cheese wiring. The Pawar implant was displaced in 3 patients (16.7%) at POD 7, all of whom required re-exploration. This rate exceeds the 3.33% extrusion rate reported by Chandravanshi et al. (2019) and the 0% rate reported by Mishra et al. (2019).[10,11] Das et al. (2021) reported a rare but serious case of orbital misdirection with the Pawar implant, producing diplopia and persistent epiphora.[12] Sikdar et al. (2025) described two cases of migrated Pawar implants that obstructed the ostium and required endoscopic revision.[13] These reports underscore the importance of meticulous implant fixation and early postoperative surveillance when using the Pawar device.

The distinct anatomical sites of action may explain the differential complication patterns. The silicone tube traverses the canalicular system, a physiological pathway lined by stratified epithelium that tolerates foreign material with relative ease. The Pawar implant occupies the sac lumen and sac to nasal interface, where it contacts respiratory type mucosa that is more reactive and where tissue handling during placement is greater. This anatomical difference plausibly accounts for the higher oedema persistence, greater scar formation and higher displacement risk observed in the Pawar group.

From a clinical perspective, these findings support an individualised approach to implant selection. The silicone tube appears advantageous when implant stability, early postoperative comfort and cosmetic outcome are important considerations. The Pawar implant remains an effective option for achieving anatomical patency, but it demands careful intraoperative positioning and close early monitoring to identify and manage displacement promptly.

Strengths

The study's strengths include its prospective design with systematic assessment at four timepoints, comprehensive documentation of both intraoperative and postoperative complications, direct comparison of two implant techniques within the same surgical setting and complete follow up of all enrolled patients.

Limitations

Several limitations warrant acknowledgement. Allocation was based on preoperative clinical phenotype, not randomisation; the two groups represented entirely different clinical profiles (common canalicular block in Group A versus nasolacrimal duct block with mucocoele in Group B), and this systematic difference limits direct causal comparison. The sample size of 40 patients limits statistical power to detect smaller between group differences. The three month follow up may not capture late failures documented in the literature at 6 to 12 months. Patency was assessed by syringing alone; endoscopic evaluation of the ostium and functional symptom questionnaires were not employed. The study was conducted at a single centre, which limits generalisability.

Future Directions

Larger multicentre randomised controlled trials with minimum 12 month follow up are needed. Future studies should incorporate endoscopic ostium assessment, validated patient reported outcome measures and cost effectiveness analysis to inform evidence based implant selection.

CONCLUSION

The present prospective study demonstrates that both intracanalicular silicone tube implant and intracystic Pawar implant are effective adjuncts in external DCR for chronic dacryocystitis, with 100% lacrimal passage patency at three months in both groups. The silicone tube group demonstrated superior implant stability, with no displacement events across all follow up visits. Resolution of periocular oedema was faster in the silicone tube group, and hypertrophic scar formation occurred exclusively in the Pawar implant group (22.2%; p=0.033). The Pawar implant, while equally effective at achieving anatomical patency, was associated with a 16.7% displacement rate at POD 7 that required re-exploration.

These findings support individualised implant selection. The silicone tube provides a favourable early postoperative course and reliable stability; the Pawar implant requires more careful placement and closer early monitoring. Both techniques achieved the primary aim of restoring lacrimal drainage. Larger randomised trials with extended follow up are warranted to establish definitive comparative efficacy and long term outcomes.

REFERENCES

1. Makselis A, Petroska D, Kadziauskiene A, Jaruseviciene R, Ruzgys A, Cimbalas A, et al. Acquired nasolacrimal duct obstruction: clinical and histological findings of 275 cases. BMC Ophthalmol. 2022;22(1):12.
2. Negm S, Aboelnour A, Saleh T, Yasser M, Mowafy ME. Clinicobacteriological study of chronic dacryocystitis in Egypt. Bull Natl Res Cent. 2019;43:73.
3. Bharathi MJ, Ramakrishnan R, Maneksha V, Shivakumar C, Nithya V, Mittal S. Comparative bacteriology of acute and chronic dacryocystitis. Eye. 2008;22(7):953-960.
4. Aboauf HA, Alawaz RA. Success rate of external dacryocystorhinostomy with and without stent. Cureus. 2024;16(7):e63683.
5. Hartikainen J, Antila J, Varpula M, Puukka P, Seppa H, Grenman R. Prospective randomized comparison of endonasal endoscopic dacryocystorhinostomy and external dacryocystorhinostomy. Laryngoscope. 1998;108(12):1861-1866.
6. Leong S, MacEwen CJ, White PS. A systematic review of outcomes after dacryocystorhinostomy in adults. Am J Rhinol Allergy. 2010;24(1):81-90.
7. Feretis M, Newton J, Ram B, Green F. Comparison of external and endonasal dacryocystorhinostomy. J Laryngol Otol. 2009;123(3):315-319.
8. Kacaniku G, Ajazaj V, Shabani A, Dida E. Assessing the usefulness of different silicone tube implants in external dacryocystorhinostomy. Med Arch. 2018;72(6):414-417.
9. Ing EB, Bedi H, Hussain A, Zakrewski H, Ing R, Nijhawan N, et al. Meta-analysis of randomized controlled trials in dacryocystorhinostomy with and without silicone intubation. Can J Ophthalmol. 2018;53(5):466-470.
10. Mishra D, Bhushan P, Sinha BP, Bhaskar G, Rao R. External dacryocystorhinostomy conventional surgery versus Pawar implant: a comparative study. Indian J Ophthalmol. 2019;67(7):1143-1147.
11. Chandravanshi SL, Shrivastava SK, Shakya DK, Tiwari US. Conventional dacryocystorhinostomy versus Pawar's implant dacryocystorhinostomy: a prospective study. Int J Innov Res Med Sci. 2019;4(1):5-10.
12. Das D, Bajaj MS, Neupane S, Agrawal S, Kaur K, Gupta PC. Diplopia following external dacryocystorhinostomy with intracystic Pawar implantation: the tale of an unheard complication. Delhi J Ophthalmol. 2021;32:65-67.
13. Sikdar A, Wadhwani R, Nivsarkar S, Phatak S, Pai S. Migrated intracystic silicone implant: a missed cause of iatrogenic failure in chronic dacryocystitis therapy. Indian J Otolaryngol Head Neck Surg. 2025;77:2696-2699.
14. Patel KK, Parikh PC. Comparative analysis of conventional DCR versus DCR implant techniques in chronic dacryocystitis. Int J Curr Pharm Rev Res. 2024;16:45-49.
15. Parven S, Shipu ZR, Alauddin-Al-Azad M, Habib MA, Mukta KN. Success rate of dacryocystorhinostomy with and without silicone intubation: a comparative study. Int J Res Med Sci. 2025;14(1):5-9.
16. Massoud OM, Elbakary MA, Shalaby OE, Hashish AA. Evaluation of the role of silicone intubation in non-complicated external dacryocystorhinostomy. Open Ophthalmol J. 2020;14:21-26.
17. Deshmukh M, Wairagade NA, Bhatti R. Indications and outcome of modified implant dacryocystorhinostomy: a longitudinal study. Int J Med Sci Curr Res. 2020;3:4-10.
18. Dogruya S, Kayikcioglu OC, Kayikcioglu O. The impact of nasal pathologies on the success of external dacryocystorhinostomy. Cureus. 2025;17:e90230.
19. Vagge A, Desideri LF, Nucci P, Serafino M, Ferro Desideri L, Traverso CE. Congenital nasolacrimal duct obstruction (CNLDO): a review. Diseases. 2018;6(4):96.
20. Anderson NG, Wojno TH, Grossniklaus HE. Clinicopathologic findings from lacrimal sac biopsy specimens obtained during dacryocystorhinostomy. Ophthalmic Plast Reconstr Surg. 2003;19(3):173-176.
21. Knezevic M, Stojkovic M, Jovanovic M, Stankovic Z, Djordjevic-Jocic J, Bojanovic M. A 7-year prospective study of routine histopathological evaluation of the lacrimal sac

wall incisional biopsy specimens obtained during external dacryocystorhinostomy in adults and a review of the literature. Med Oncol. 2012;29(2):396-400.
22. Huo Y, Li L, Mo Y, Guo S. A case report of chronic dacryocystitis caused by nasal stones. BMC Ophthalmol. 2023;23:452.
23. Lefebvre DR, Dhar S, Lee I, Allard FD, Freitag SK. External dacryocystorhinostomy outcomes in patients with a history of dacryocystitis. Digit J Ophthalmol. 2015;21(1):40-48.
24. Bhat MA, Raja W, Ashraf A. Compare outcome in DCR with and without silicon tube implantation. Int J Contemp Med Res. 2019;6(3):C1-C4.
25. Buttanri IB, Serin D, Karslioglu S, Akbaba M, Fazil K. The outcome of silicone intubation and tube removal in external dacryocystorhinostomy patients with distal canalicular obstruction. Eur J Ophthalmol. 2012;22(6):878-881.
26. Rizvi SAR, Sharma S, Tripathy S, Sharma S. Management of traumatic dacryocystitis and failed dacryocystorhinostomy using silicone lacrimal intubation set. Indian J Otolaryngol Head Neck Surg. 2011;63(3):264-268.
27. Liarakos VS, Boboridis K, Mavrikakis E, Mavrikakis I. Management of canalicular obstructions. Curr Opin Ophthalmol. 2009;20(5):395-400.
28. Kamath KG, Jadhav VS. Cross sectional study of success rate of external dacryocystorhinostomy surgery with and without intubation stent usage in a tertiary care hospital. IJAR. 2021;11-12.