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Comparative Study of Single Flap Versus Double Flap External Dacryocystorhinostomy

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Abstract

Chronic dacryocystitis is an inflammatory process of the lacrimal sac associated with total or partial occlusion of the Nasolacrimal duct and is the most common cause of ocular morbidity accounting for 87.1% of epihora. Dacryocystitis is having a higher incidence among lower socioeconomic status and causes ocular morbidity. Ever since the description of this procedure by Toti in 1905, External dacryocystorhinostomy (DCR) became the gold standard and economical surgical procedure with excellent results compared to other surgical procedures. Whether to do a single flap or double flap technique during external DCR for chronic dacryocystitis depended on patho-anatomy and the surgeon preferences aiming the best outcome. There is a limited number of studies on this clinical problem in Andhra Pradesh and other states of India in Government institutions. Ambiguity still remains, regarding repair of anterior flap alone or double flap technique of external DCR. In view of that, we have taken up the studies at a tertiary eye care center in Andhra Pradesh. *Aims:* To assess and compare the outcome of the single flap and double flap techniques of External Dacrocystorhinostomy (DCR) in chronic dacryocystitis. *Settings and Design:* A prospective interventional study has been done at the Department of Ophthalmology Sri Ram Narayan Ruia Government General Hospital (SVRRGGH) attached to Sri Venkateswara Medical College (SVMC), Tirupati between October 2015 and October 2018 to evaluate the results of external DCR for chronic dacryocystitis. A comparative study between two methods of performing external DCR is also included in this study, i.e. single flap technique and double flap technique. The outcome is considered as surgical success when there is anatomical and functional patency of the lacrimal drainage system until the end of the follow-up period, i.e. six months. The study was approved by the ethics committee of the Institution. *Methods and material:* A prospective randomized interventional study conducted. A total of 50 cases with chronic dacryocystitis were undergone. External DCR in this study, fulfilling the inclusion criteria. Patients who underwent single flap surgery were placed in Group A, and those with double flap in Group B and results were analyzed. *Statistical analysis used:* SPSS 13. *Results:* A total of 50 cases of External DCR were performed in this study. Patients who underwent single flap surgery were placed in Group A, and those with double flap in Group B Age of patients was in the range of 21–70 years with a mean age of 43.15 years and 43.13 years respectively with a female preponderance. Anatomical patency is tested by syringing. Functional patency is assessed by Munk's score. As per the criteria of surgical success, 24 operations in Group 'A' which were done by a single flap technique, were successful with a success rate of 96%. And in 'B', the double flap surgery group all 25 operations were successful, giving a 100% success rate. Bleeding of more than usually expected occurred in 6 patients during surgery. Peri-orbital ecchymosis was seen in 5 patients in total, 2 in single flap and 3 in the double flap. Epistaxis observed in one case each in group A and B. *Conclusions:* Our study compared single flap vs double flap surgery in external DCR among patients with chronic dacryocystitis. Both single flap and double flap techniques of External DCR are effective methods of treating epiphora due to chronic dacryocystitis. The single flap technique is easier to perform and resulted in functional outcome. There is no statistical significance between surgical outcomes of the single flap and double flap techniques of external DCR. The double flap technique showed a higher success rate. Results of both single flap technique and double flap technique in this study are comparable with other studies.

Keywords: Dacryocystitis; Dacryocystorhinostomy (DCR); Munk's Score; Nasolacrimal duct obstruction (NLDO); Fluoresceine dye disappearance test (FDDT).

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Introduction

Chronic dacryocystitis is an inflammatory process of the lacrimal sac associated with total or partial occlusion of the lacrimal duct and is the most common cause of ocular morbidity accounting for 87.1% of epiphora, more common in American white people compared to African Americans and Indians as being tropical country with a higher number of population with low socioeconomic status.[1] Frequently caused by bacteria. Obstruction of nasolacrimal duct converts the lacrimal sac a reservoir of infection. It is a constant threat to cornea and orbital soft tissue. Moreover, it causes social embarrassment due to chronic watering from the eye. This study was conducted to find out the current clinicobacteriological profile of chronic dacryocystitis in adults. A total of 56 adult patients were selected from ophthalmology OPD. Detail history and clinical examinations were carried out. All patients underwent either dacryocystorhinostomy or dacryocystectomy. A part of the sac was collected for culture and sensitivity. This study revealed that chronic dacryocystitis is more common in females and left eye is more frequently involved than right eye. It is common among lower socioeconomic strata with habit of pond-bathing. Some form of nasal pathology like hypertrophied inferior turbinate, deviated nasal septum, nasal polyp and allergic rhinitis were found in 19.6% of the patients. Complications of chronic dacryocystitis like conjunctivitis, corneal ulcer, acute on chronic dacryocystitis, lacrimal abscess and fistula were seen in 25.0% of these patients; 53.6% of the culture samples were positive for bacterial growth. Gram-positive organisms were most common isolate. Unlike other studies, *Staphylococcus aureus* (40.0%). It has a higher incidence among lower socioeconomic status. Epiphora or watering of the eye is a common complaint among outpatient consultations in ophthalmology. Obstruction to nasolacrimal flow contributes to a significant proportion of patients with epiphora. The most common cause of nasolacrimal obstruction is chronic dacryocystitis. Delayed and inadequate treatment of acute dacryocystitis leads to chronicity with acute exacerbations. Patients do come with such complaints spanning over a period of one to two years. This situation is menace, a constant irritation to eye and disturbance to the patient because of pain, swelling of the lacrimal sac, pus discharge, and watering. It also poses a threat to the function of the eye.

External Dacryocystorhinostomy (DCR) is a type of mid-facial surgical procedure that is used to recreate and establish a gravity-dependent, low-resistance drainage pathway between the lacrimal sac and the nasal cavity.[2] This is achieved by creating a patency between lacrimal sac and the lateral nasalwall mucosa via a bony ostium in middle meatus area. The earliest operation that resembles a modern external DCR was attempted by Woolhouse in England in the 18th century.[3]

Toti in 1904, published what is considered the first modern description of external DCR. Depuy-Dutemps and Bourguet in France and Ohm in Germany independently published what became the basis of truly modern DCR in the 1920s.

Even after various procedures came, external Dacryocystorhinostomy remains the gold standard surgical treatment for nasolacrimal duct obstruction beyond common canaliculus.[4] Whether to do a single flap or double flap technique for repair of the lacrimal sac depended on patho-anatomy and the surgeon preferences aiming the best outcome.

Single flap and double flap techniques of External Dacryocystorhinostomy were studied and compared by various authors in the past, worldwide.[5-7] There was a limited number of studies on this clinical problem in Andhra Pradesh and other states of India in Government institutions. Ambiguity remains, regarding anterior flap alone or double flap technique of external DCR in chronic dacryocystitis. In view of that, we have taken up the studies at a tertiary eye care center in Andhra Pradesh.

Aims and Objectives

To assess and compare the outcome of the single flap and double flap techniques of External Dacrocystorhinostomy (DCR) in epiphora due to NLD obstruction.

Materials and Methods

This was a prospective randomized interventional and comparative study of a total of 50 patients who underwent external dacryocystorhinostomy by a single surgeon over a period of 3 years. The follow-up period was 6 months. Only adult patients (of age more than 20 years) with chronic dacryocystitis with nasolacrimal duct obstruction included in the study. All patients underwent a comprehensive examination, including diagnostic irrigation and probing, to establish the diagnosis of chronic dacryocystitis. A thorough ENT examination was also conducted to rule out nasal pathology. Patients with lower eyelid deformities, Chronic dacryocystitis with Acute exaggerbation, Canalicular block, Tumors of the lacrimal sac, Atrophic rhinitis, Bleeding diatheses and Patients not willing to participate in the study excluded from the study. Opaque sealed envelopes were used to conceal the sequence of random allocation for the single flap and double flap DCR. The envelopes opened after recruitment of the participant into the study. Single flap patients grouped as A group, and double flap as Group B. Follow-up was done at the end of 1st week, 4th week, 3rd month and 6th months. During each visit, the patient evaluated with syringing, history of epiphora and functional evaluation by Munk's score and Fluoresceine dye disappearance test (FDDT).

Surgical technique: Preoperative preparation: Patients encouraged to use Nasal decongest oxymetazoline (Nasivion-Merck pharma) drops one drop three times a day for 5 days prior to the surgical procedure. On the day of surgery, Nasal decongest oxymetazoline (Nasivion-Merck pharma) drops and 4% lignocaine hydrochloride (LOX 4%, Neon Laboratories, Mumbai) drops are instilled into the nostril of the operating side 10 mts before nasal packing. High nasal packing was done with ribbon gauze soaked in 2% lignocaine HCL gel (SYNCOM health care Limited, Mumbai) with adrenaline tartrate 1 in 100,000 IU dilution (SYSTOCHEM laboratories, Loni) under direct visualization.

Anesthesia: All patients were operated under local anesthesia. 1:1 mixture of 2% lignocaine hydrochloride (Neon lab) with hyaluronidase 30 IU/ml (HYNIDASE 1500 IU, Shreya life sciences pvt. Ltd, Waluj) and 0.5% Bupivacaine (Anwin Neon Laboratories, Mumbai), is used for infraorbital and nasociliary nerve block. Adrenaline is used cautiously in patients with hypertension and other cardiovascular risk factors. Nasociliary nerve block, Infraorbital nerve block, and Tissue infiltration Along anterior lacrimal crest, tissues are infiltrated subcutaneously. Further deeper tissues about 3 mm medial to the medial canthus up to periosteum are infiltrated both superiorly and inferiorly. Firm pressure is applied for 5–10 min for the anesthetic to act.

Steps of Operation

The operative site is cleaned draped with all aseptic precautions. Curvilinear incision of about 10–12 mm in length is made in the skin, 3–4 mm medial to the medial canthus along the anterior lacrimal crest. Orbicularis oculi is split in the direction of its fibers with artery forceps in the region of MPL. MPL insertion is reached by blunt dissection of Subcutaneous tissue. The anterior lacrimal crest is reached. During this dissection, medial canthal tendon is preserved. Disinsertion (not dividing) of MPL is done at the anterior lacrimal crest by cutting on the bone at insertion with 11 number blade.

With a Freer elevator, the periosteum is elevated from the anterior lacrimal crest, towards lacrimal fossa posteriorly till the lamina papyracea and reflected laterally along with lacrimal sac. The periosteum is also elevated anteriorly, inferiorly and superiorly to expose lacrimal fossa as much as needed to create optimally wide bony ostium. The Kerrison bone punch is used to create a bony ostium in the lacrimal fossa into the middle meatus of the nose. Punching of bone is started at the junction of lamina papyracea of the ethmoid and lacrimal bone. Initially, an ostium is made with small diameter punch and punches of gradually increasing size are used to widen the ostium. Bone punch is always held perpendicular to the punching surface. The bone is crushed properly and then removed by gentle rocking movements. Bone pieces are cleared off the punch with 20G needle for next punch. The bone punch is gently inserted between the bone and the nasal mucosa, and the ostium is sequentially enlarged to the limits in four directions. Anteriorly till a line from where punch cannot be inserted between the bone and the nasal mucosa. Posteriorly till the removal of the aerated ethmoid. Superiorly

till medial canthal tendon. Inferiorly till the bony opening of the nasolacrimal duct is de-roofed.

Depending on the randomization protocol, either a single flap or double flaps created.

In case of single flap technique external DCR, a U shaped anterior flap is created from the lacrimal sac, and rectangular nasal mucosa flap created, excising the posterior flaps. In the case of the double flap technique, an H shaped incision with large anterior and small posterior lacrimal sac flaps created. The nasal mucosa fashioned into a small anterior and large posterior flaps created to prevent synechiae.

Bowman's probe is passed through the lower punctum and bent in such a way to tent the sac at the posterior part. A long vertical incision over the angle of tenting is given with 11 number blade and spring scissors. A vertical incision with an 11 number blade is made on nasal mucosa a little nearer to posterior margin of the bony ostium. A smaller anterior flap of the nasal mucosa is left behind for anastomosis with the respective sac flap. Small horizontal cuts are made at both ends of the vertical incision on the posterior nasal mucosal flap which helps it to swing easily across the posterior edge of the bony ostium and appose well with posterior lacrimal sac flap. This, in turn, utilizes the available size of bony ostium posteriorly to form a wider epithelized opening.

Flap Anastomosis

Double flap technique

Posterior flaps of the nasal mucosa and lacrimal sac are opposed and sutured with 6–0 Vicryl (Ethicon pharmaceuticals), such that the posterior sac flap does not block common canalicular ostium in sac. Care is also taken to avoid nasal pack in the suture.

Horizontal cuts are made at both ends of the vertical incision on the anterior nasal mucosal flap to create a smaller anterior flap. The anterior nasal mucosal flap is then apposed and sutured to anterior sac flap using 6-0 vicryl. While suturing the anterior flaps, a third bite is taken in the periosteum on the nasal side to prevent 'sump syndrome'.

Single flap technique

Posterior flaps of the nasal mucosa and lacrimal sac are excised. The anterior nasal mucosal flap is opposed to the anterior sac flap and sutured using 6–0 vicryl. While suturing the anterior flaps, a third bite is taken in the periosteum to prevent 'sump syndrome'.

1. Wound closure: Orbicularis oculi fibers approximated and sutured with 6–0 vicryl. Skin suturing done with 6–0 Silk by 4 to 6 interrupted sutures.

2. Wound dressing: Betadine gauze dressing for the sutured wound and pad and bandage for the eye are applied.

Postoperative care

Oral antibiotic Tab Amoxycillin and potassium clavulanate tablets 625 mg (Augmentin 625 duo Glaxo Smithkline pharmaceuticals ltd), Oral analgesic antiinflammatory medication Tab. Diclofenac sodium 50 mg BD and SOS injection were given along with oral T. Cetrizine hydrochloride 10 mg and Oxymetazoline 0.05% w/v nasal drops (Nasivion nasal, Merck Pharmaceuticals ltd). On 1st postoperative day, dressings are removed and wound inspected. Syringing is done to confirm the patency. The patient discharged on 3rd postoperative day with instructions to continue oral medication and to review at the end of the first postoperative week. Follow-up was done at the end of 1st week, 4th week and 3rd month. Surgical success is being considered to be achieved if there is anatomical and functional patency maintained at the end of 6 months follow-up. Anatomical patency was assessed by syringing and fluorescein dye disappearance test (FDDT), functional patency by Munk's score during each visit. No regurgitation of fluid from punctum during syringing in the postoperative follow along with 0 to 1 score on FDDT considered as a surgical success (Table 1). The study received institution ethical committee approval and informed and written consent obtained from all patients. The results were analyzed statistically. Data were analyzed using SPSS version 13 software, and $p < 0.05$ was considered significant.

Results

In our study, 84% of patients were between 31 and 50 years of age. 68% of patients were between 31 and 50 years of age. The mean age of patients in Group 'A' and 'B' were 43.15, 43.13 years, respectively (Fig. 1). There were a total of 16 male patients and 34 female patients distributed among both Groups 'A'(Single flap) and Group 'B' (Double flap), with Male to Female ratio of 1:2.13. There were 3 male patients and 22 female patients in Group 'A', with Male to Female ratio of 1:7.33. There were 13 male

patients and 12 female patients in Group 'B', with the Male to Female ratio of 1.08:1 (Fig. 2). The right eye was involved in 30 patients and left eye in 20 patients in this study. During the operative procedure bleeding slightly more than regularly expected quantities was noted: In 2 patients of Group 'A' and 4 patients of Group 'B'. During the first week of the postoperative period, periorbital ecchymosis was observed in 2 patients of Group 'A' and 3 patients of Group 'B'. One patient in each group developed epistaxis during the post-op period, managed conservatively (Table 1).

The mean Surgical time in Group 'A' procedure was 45.83 ± 6 minutes and in Group 'B' is 55.55 ± 7.2 minutes. The outcome is considered as surgical success when there is anatomical and functional patency of lacrimal drainage system till the end of the follow-up period, i.e. 6 months.

Anatomical patency is tested by syringing. No regurgitation of fluid from punctum during syringing during the entire follow-up period was considered as a success. Functional patency is assessed by Munk's score and fluoresceine dye disappearance test (FDDT) (Tables 2 and 3). Munk's score of 0, 1 and FDDT Grades 0,1 implies excellent functional patency, considered as a success.

Table 1: Complications of external DCR in the study

	Complications in the present study		
	Parameter	**Single flap**	**Double flap**
Intraoperative	Hemorrhage	2	4
Postoperative	Periorbital ecchymosis	2	3
	epistaxis	1	1

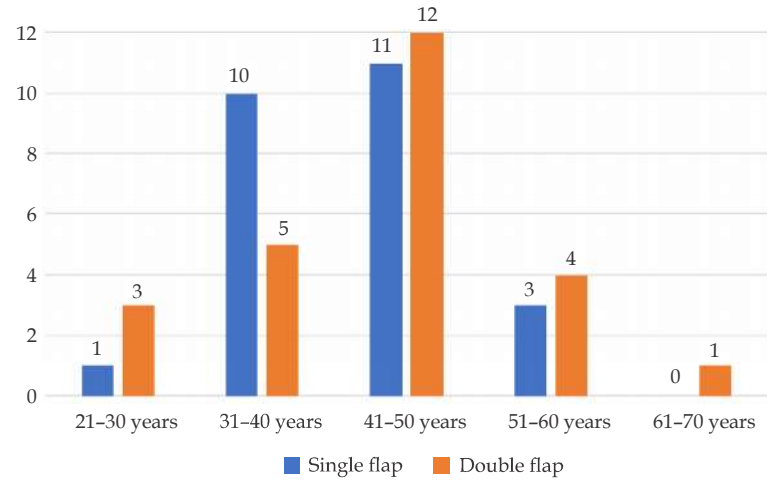


Fig. 1: The age distribution of patients in Group A and B

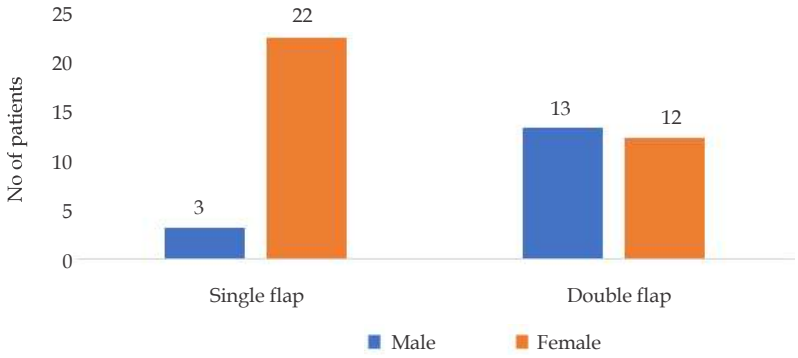


Fig. 2: Gender distribution

Table 2: Munk's score of epiphora

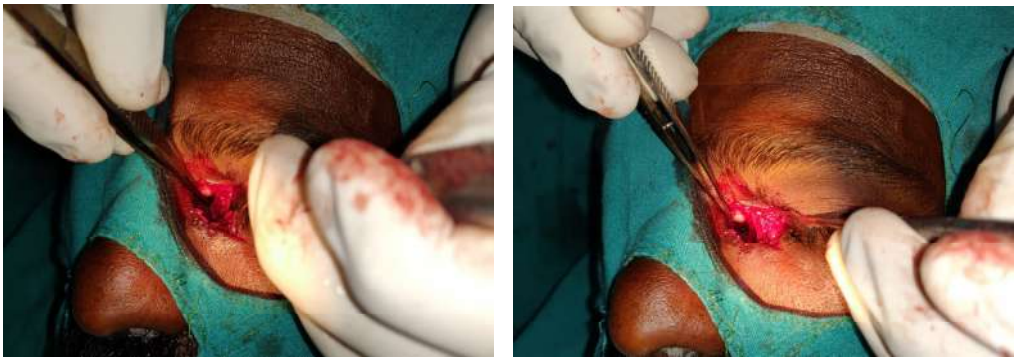
Grade	Description
0	No epiphora
1	Occasional epiphora requiring dabbing less than twice a day
2	Epiphora requiring dabbing 2–4 times per day
3	Epiphora requiring dabbing 5–10 times per day
4	Epiphora requiring dabbing more than 10 times per day
5	Constant tearing

Munk's score of 0 and 1 were considered success

Table 3: Fluorescein dye disappearance test (FDDT)

Grade	Description	Interpretation
Grade 0	No fluorescein remaining in the conjunctival sac	Negative (No obstruction)
Grade 1	Thin fluorescein marginal tear strip only	Negative
Grade 2	Between Grade 1 and Grade 3	Positive (Obstruction present)
Grade 3	Brightly fluorescing tear strip	Positive

Grade 0 &1 – Functional patency and surgical success



A B

Fig. 3(A): Color photograph of the left eye showing the creation of anterior flaps (B) A Color photograph of the left eye showing the creation of posterior flaps.

A

B

Fig. 4(A): Color photograph of the left eye showing suturing of posterior flaps (B) Color photograph of the left eye showing suturing of anterior flaps.

Fig. 5: Color photograph of the left eye showing the creation of U shaped anterior lacrimal sac flap. (B) Color photograph of the left eye showing suturing of anterior flaps in single flap external DCR.

Table 4: Comparison of success rate between single flap (Group A) and double flap (Group B) external dacryocystorhinostomy

Group (No of patients)	Results and number of patients		Success rate (%)
	Success	Failure	
Group A (25)	24	1	96%
Group B (25)	25	25	100%

Group A: Single flap, Group B: Double flap

As per the criteria of surgical success, 24 operations in Group 'A' which were done by a single flap technique, were successful with a success rate of 96%. And in 'B', the double flap surgery group all 25 operations were successful, giving a 100% success rate which is statistically not significant (Table 4).

Discussion

Chronic dacryocystitis is the most common cause of epiphora in adults secondary to nasolacrimal obstruction. External DCR remains the gold standard surgical treatment for nasolacrimal duct obstruction beyond common canaliculus even after the invention of newer techniques[4] with success rates consistently above 90%. This study reviews the demographics, success, cost, efficiency, and patient satisfaction in external DCR. This information will be useful as comparison criteria for evaluating new surgical techniques.

The success of external DCR depends on good knowledge of anatomy, creating a mucosa lined anastomosis between the lacrimal sac and nasal mucosa and its patency in the postoperative period. Double flap technique of external DCR favours primary healing of new tract and reduces mucosal scarring, complying with the general surgical principle of edge-to-edge approximation of tissues. Thus, the double flap technique of external DCR is technically promising in achieving a durable draining pathway.

Formation of granulation tissue or adhesions between the flaps is the frequent causes of occlusion of the tract and failure. Inadequate ostium size, inadequate sac opening, sagging of anterior flaps, sump syndrome, postoperative infection also contribute to the failure of external DCR.

A Number of patients included were varied in different studies. The number of patients in studies authored by Serin D et al. 62 patients; Deka et al. 96 patients; Bhavesh Chandra et al. 96 patients and Ratandeep Kumar et al. 60 patients.[7-10] The present study included 50 patients in total. Study of Deka et al. with 96 patients with double flap only is taken to compare the results of double flap technique with the present study. The total number of patients constituting the sample size in the present study is less than the studies compared.

The mean age of patients is ranging from 41 years to 53.9 years in various groups in comparison. In the present study, the mean age is 43.13 years, and comparable to the studies of Deka et al. (41 years) and Ratandeep Kumar et al. (42 years).[8,10] But the mean age of the patients in studies conducted by Serin D et al. is 53.9 years and Bhavesh Chandra et al. 37.25 years.[7,9] The mean age falling at 43.13 years in the present study may indicate the common age group affected in this region of Andhra Pradesh (Table 5).

The male to female ratio in the present study is 1:2.13, and comparable to the studies of Bhavesh Chandra et al. (1:3.5), Ratandeep Kumar et al. (1:1.72), Deka et al. (1:1.85).[9,10] But in Serine D et al. male to female gender ratio is around 1:7.85.[7] Narrow lacrimal fossa in females predisposes them to obstruction by sloughed off debris, due to hormonal changes that bring about generalized de-epithelization.[11] In our study, the male to female ratio is 1:2.13, but when it comes to two groups, A group it was 1:7.33 and B group had 1.08:1 (Table 6).

Table 5: Mean age of the patients in various studies

Study Group	Mean age in years
Serin D et al.	53.9
Deka et al.	41
Bhawesh Chandra et al.	37.25
Ratandeep Kumar et al.	42
Present study	43.13

Table 6: Gender ratio comparative study

Study group	Male to Female ratio		
	Single flap	Double flap	Overall
Serin D et al.	1:9	1:7	1:7.85
Deka et al.	–	1:1.86	1:1.86
Bhavesh Chandra et al.	1:3.9	1:3.27	1:3.5
Ratandeep Kumar et al.	1:2.3	1:1.3	1:1.72
Present study	1:7.33	1.08:1	1:2.13

Various studies adopted different durations of Follow-up in evaluating the results and assessing the success. Follow-up periods of Deka et al. 13 months, Ratandeep Kumar et al. 6 months, Bhavesh Chandra et al. 6 months, and Serin D et al. 10 months (Table 7).

Table 7: Average surgical time comparison

Study group	Average operative time
Bhavesh Chandra et al.	52.14 ± 4.42 min
Ratandeep Kumar et al.	42.83 ± 6.65 min (Single flap) 57.33 ± 8.28 min (Double flap)
Present study	45.83 ± 6 min (Single flap) 55.55 ± 7.2 min (Double flap)

The average surgical time in our study was 50.69 minutes, with single flap 45.83 ± 6 minutes and double flap 55.55 ± 7.2 minutes comparable to Bhawesh et al. and Ratandeep Kumar et al. (Table 8). The increased surgical time in double was due to fashioning of anterior and posterior and suturing of them. The extended surgical time may cause discomfort to the patient with local anesthesia.

The follow-up period of the present study is 6 months with anatomical and functional patency tested at intervals of 1 week, 4 weeks and 3 months and 6 months postoperatively.

The success rate of the single flap and double flap technique in the present study is 96%in Group 'A' and 100% in Group 'B', which is comparable to other studies with success rates of more than 92%

Table 8: Comparison of success rate and its significance

Study group	Success rate		*p*-value (level of significance 0.01)
	Single flap	Double flap	
Serin D et al. (2006)	96.67%	93.75%	0.7224 (non-significant)
Deka et al. (2008)	–	98.90%	–
Bhavesh Chandra et al. (2014)	95.90%	93.62%	0.7612 (non significant)
Ratandeep Kumar et al. (2015)	93.30%	96.67%	0.9949 (non-significant)
Present Study	96.00%	100%	0.92 (non-significant)

(Table 8). The high success rate in the present study can be attributed to good surgical technique and proper preoperative evaluation.

A few known complications were observed in this study during the surgical procedure and the immediate postoperative period. Bleeding of more than usually expected quantity occurred in 6 patients during surgery. Epistaxis is a known occasional complication in external DCR In the immediate postoperative period. It happened in one patient in Group A and one patient in Group B. Periorbital ecchymosis was seen in 5 patients in total with 2 among single flap group and 3 among double flap group. These complications were comparable with other studies (Table 9). These complications did not cause any change in the final surgical outcome.

Both single flap and double flap techniques of External DCR are effective methods of treating epiphora due to chronic dacryocystitis. The single flap technique is more comfortable to perform and resulted in functional outcome. The double flap technique is technically demanding and has given excellent results. The double flap technique showed a higher success rate. Results of both the single flap technique and double flap technique in this study are comparable with other studies. The surgical outcome of a single flap and double flap are statistically non-significant.

Table 9: Complications comparison

Complications in other studies compared	No. of patients (%)		
	Intraop haemorrhage	Postop epistaxis	Periorbital ecchymosis
Serin D et al.	–	2 (3.22%)	–
Deka et al.	1 (1.04%)	2 (2.08)	3 (3.12)
Bhavesh Chandra et al.	4 (5%)	4 (4.16)	4 (4.16)
Ratandeep Kumar et al.	8 (13.3%)	–	–
Present Study	6 (12%)	2 (4%)	5 (10%)

Conclusion

1. Both single flap and double flap techniques of external DCR are effective methods of treating epiphora due to chronic dacryocystitis.
2. The single flap technique is more comfortable to perform and resulted in a good outcome.
3. The double flap technique is technically demanding and has given excellent results
4. Anastomosis by suturing only anterior flaps and excision of the posterior flaps is easier to perform and does not appear to adversely affect the outcome of DCR surgery.
5. Results of both single flap technique and double flap technique in this study are comparable with other studies

Limitations

The sample size in the present study was comparatively small, and the follow-up period was 6 months.

Recommendations

Further study of larger sample size may be done to arrive the conclusive evidence.

Anastomosis by suturing only anterior flaps and excision of the posterior flaps is easier to perform and sufficient to get the successful surgical outcome.

Key messages

The Single flap technique is easier to perform and resulted in functional outcome. The double flap

technique showed a higher success rate. There is no statistical significance between surgical outcomes of the single flap and double flap techniques of external DCR.

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Conflict of interest: Nil

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