

## ORIGINAL ARTICLE

## Improving Results in Endonasal DCR by Double Posterior Based Flap Technique – Our Experience

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**Abstract:**

**Background:** Endonasal DCR surgery is the most common surgical treatment of choice in chronic dacryocystitis. Different surgical techniques with new instruments have been evolved in past to ensure adequate epithelization at the lacrimal stoma site. Different nasal and lacrimal flaps have been designed for successful outcome in primary Endonasal DCR surgery. **Aim:** The aim of this study is to evaluate outcomes of double posterior - based flap technique in primary Endonasal endoscopic dacryocystorhinostomy (EEDCR) with and without the use of powered instrument. **Material and Methods:** Forty eight patients of nasolacrimal duct obstruction were included in this clinical observational study from Jan 2019 to June 2020. All patients underwent EEDCR with double posterior based nasal and lacrimal flap technique. In group A (24 patients) bone removal was done with Smith-Kerrison punch forceps and in group B (24 patients) powered drill was used for lacrimal bone removal. **Results:** Out of 48 patients, 45 (93.50%) were found free of symptoms at the end of 1, 3 and 6 months. At the end of 12 months, 7 (14.58%) were found to have recurrence of symptoms of which 2 (4.16%) patients were from group A and 5 (10.41%) from group B. Postoperative complications were more with powered instruments (drill) compared to cold instrument. Double posterior – based flap technique without use of powered drill could be effective surgical option ensuring adequate early epithelization for successful outcome.

**Keywords:** Chronic dacryocystitis, DCR, Endonasal endoscopic dacryocystorhinostomy (EEDCR), posterior flaps (Nasal and Lacrimal)

**Introduction:**

Chronic dacryocystitis is a condition characterized by constant tearing of eyes due to permanent nasolacrimal duct obstruction at the junction between lacrimal sac and nasolacrimal duct [1]. Use of magnifying video endoscopes, has facilitated the recognition of surgical landmarks in EEDCR. But the success rate of

endoscopic DCR reported in many earlier studies was found to be lower than that of external DCR [2]. Variations in the surgical techniques were proved to be helpful in improving the results in endoscopic endonasal dacryocystorhinostomy [3]. The most common cause of surgical failure is peristomal granulation tissue and the synechia between middle turbinate and lateral nasal wall. Different surgical techniques with new instruments have evolved in the past decade to promote and ensure mucosal healing by decreasing the peristomal granulation tissue formation [4]. Different nasal mucosal flaps and lacrimal flaps have been designed for maintaining the contour and patency of stoma in endonasal endoscopic DCR surgery [5]. Surgical success rate of procedure depends on the extent of exposure of lacrimal sac, by removing the anterior thick maxillary bone using powered drill, maintaining surgical contour and patency of stoma. Powered drill can cause more mechanical and thermal injury to nasal mucosa and lacrimal apparatus as compared to conventional instrument (Smith Kerrison punch forceps), resulting in the formation of granulation tissue in and around surgically created stoma causing recurrence and failure. Mucosal sparing techniques have less complication rates in EEDCR [5]. In this study, we have performed EEDCR surgery with double posteriorly based lacrimal and nasal mucosal flap technique and compared, long term results and complications between patients with and without use of powered instrument.

**Material and Methods:**

Forty eight patients (20 male and 28 female) with chronic nasolacrimal duct obstruction were included

in this prospective study during Jan. 2019 to June 2020.

#### **Inclusion Criteria –**

All patients presenting with recurrent epiphora or dacryocystitis with nasolacrimal duct obstruction.

#### **Exclusion Criteria –**

1. Watering due to causes other than nasolacrimal duct obstruction.
2. Patients with lacrimal trauma or lacrimal sac tumour.
3. Unwillingness for endoscopic surgery and those not fit for anesthesia.
4. Revision cases and failed external DCR cases.
5. Patients with common Canaliculus obstruction.

Informed consent was obtained. Routine diagnostic nasal endoscopy was performed in all selected patients to rule out local nasal pathology.

Thorough clinical history examination, routine hematological workup and radiological assessment (CT scan of Nose, PNS) was performed.

In all patients for Endonasal endoscopic DCR surgery was performed using double posterior based lacrimal and nasal mucosal flap for reconstruction of stoma.

#### **Operative Technique –**

- ◆ Informed written consent was obtained.
- ◆ All procedures were performed under local anesthesia.
- ◆ Nasal cavity was packed with gauze soaked in 4% lignocaine for topical anesthesia and vasoconstriction. The axilla of middle turbinate and mucosa surrounding lacrimal sac was infiltrated with 2% lidocaine with 1:200,000 epinephrine.
- ◆ Position of patient was supine with head elevated 150 and turned towards the surgeon.
- ◆ A 00, 300, 4mm diameter nasal endoscope inserted.
- ◆ Incision –

- i) A Horizontal incision was given 8-10mm above the axilla of middle turbinate, extended 1cm anteriorly over the frontal process of maxilla.

- ii) Another horizontal incision was given starting from uncinat process to the frontal process of maxilla parallel to the first incision at the level of midpoint of the vertical height of middle turbinate.

Both incisions (i) and (ii) joined anteriorly by vertical incision.

Mucosal flap elevated from lateral nasal wall with freer's suction elevator to expose the frontal process of maxillary bone. The flap was then elevated posteriorly to expose the lacrimal bone, uncinat process and agarnasi cell. The posterior border of frontal process of maxilla was identified by dislocating the fronto lacrimal suture line. The anterior thick bone of frontal process was removed by using straight and curved Smith – Kerrison punch forceps in 24 patients (Group - A) and powered drill used in other 24 patients (Group B). Instrument was inserted between the bone and lacrimal sac to avoid injury to lacrimal sac. Once the lacrimal sac was exposed completely, lacrimal probe was inserted through inferior canaliculus so as to tent medial wall of lacrimal sac.

A vertical incision was made over the anterior one third of tented sac wall to ensure a large posterior lacrimal flap.

The sickle 12 No knife was used to make the inferior and superior releasing incision on posterior lacrimal flap. Both the lacrimal and nasal mucosal flaps were trimmed by pediatric through biting forceps and were spread over the lateral nasal wall, approximating with each other end to end.

Patency of lacrimal apparatus was checked by lacrimal syringing with saline and dexamethasone to reduce the inflammation.

All patients were discharged after 24 hours of post-operative observation.

All patients were put on systemic broad-spectrum antibiotics, analgesics, antihistamines for 1 week and antibiotic eye drop and steroid nasal spray for 4 weeks in the postoperative period.

All patients were followed up post operatively at the interval of 3 weeks for syringing of the eye and endoscopic suction clearance of nasal cavity.

Subsequently all patients were followed up at 1, 3, 6

months and 1 year after the surgery for checking the patency of lacrimal apparatus and detecting any complications.

Surgical success was defined as subjective resolution of epiphora and patent lacrimal system by lacrimal syringing and maintaining wide patent neostoma visualized by nasal endoscopy.



Figure 1. Kerrison Punch Forces

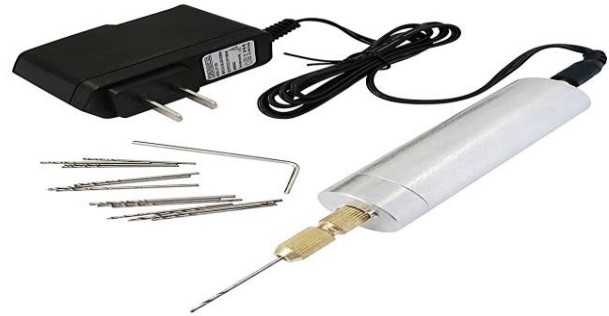


Figure 2. Powered Micro Drill



Figure 3. A

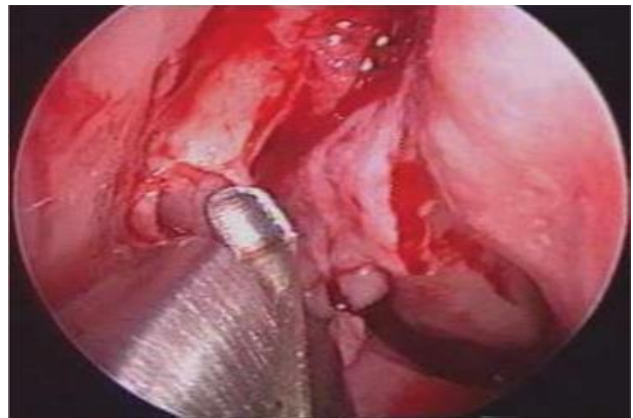


Figure 3. B

Based Nasal flap elevation & Lacrimal Bone Removal using Kerrison Punch Forces

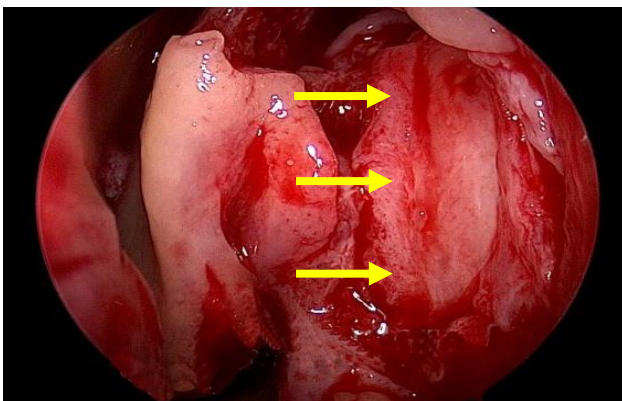


Figure. 4

Posteriorly based lacrimal sac flap elevation



Figure. 5

Neostoma - At the end of 12 months

**Results:**

In this prospective study of 48 patients in the age group 18-50 years 28 were females (58.33%) and 20 were males (41.66%). Out of 48 patients 37 (77.08%) had epiphora due to chronic dacryocystitis. 15 (31.25%) were operated for right eye and 33 (66.75%) were operated for left eye. Nine Patients (18.75%) underwent septoplasty and 11 (22.91%) underwent conchoplasty and turbinoplasty prior to endoasal DCR surgery. All 48 patients had undergone endoscopic DCR using double posteryorbased lacrimal and nasal mucosal flaps technique. Post operative complications associated with EEDCR Table no. 2 (a and b) indicate that 4 (16.66%) patient in group B had anterior nasal bleeding immediate post operative period which required anterior nasal packing for 48 hrs. Two patients from group A had prolapse of orbital fat in nasal cavity in the intra operative period due to

perforation of lamina papyracia. Three patients in group B had asymptomatic lid oedema in the immediate post operative period which resolved within 24 hours after giving injectable steroids. Total 11 (22.91%) patients presented with synechiae between middle turbinate and lateral nasal wall at first follow up visit of 1 month, of which 3 (6.25%) were from group A and 8 (60.66%) were from group B.

Out of 48 Patients included in the study, 45 (93.50%) were free of symptoms at the end of 1 month and maintained at the end of 3 and 6 months.

Recurrence of symptoms was noticed in 7 (14.58%) at the end of 12 months of which 2 (4.16%) were from group A and 5 (10.41%) were from group B. All recurrent cases were found to have peristomal granulation tissue and stomal stenosis on nasal endoscopy.

Table No. 1: Lacrimal bone removal method

Group	No. of Patients	Lacrimal bone removed with
A	24	Kerrison punch forceps
B	24	Powered instrument-drill

Table No. 2a: Complications associated with Endoscopic – DCR

Immediate Post op. complications	Group – A	Group – B	Total
Bleeding	1	4	5
Lower eyelid Oedema	1	3	4
Orbital fat Prolapse	2	3	5

Table No. 2b: Immediate Post op. Complications

	Group ‘A’	Group ‘B’	Total
Complications	4	10	14
Normal	20	14	34
Total	24	24	48

Chi-Square = 2.521 with 1 degree of freedom p = 0.112

Table No. 3a: Late Post op. Complications associated with Endoscopic - DCR

Late Post op. complications	Group – A	Group – B	Total
Granulation tissue	2	5	7
Synachiae	3	8	11
Stomal Stenosis	2	3	5

Table No. 3b: Late Post op. Complications associated with Endoscopic - DCR

	Group – A	Group – B	Total
Complications	7	16	23
Normal	17	08	25
Total	24	24	48

Chi-Square = 5.343 with 1 degree of freedom p = 0.021

Table No. 4: Additional Procedures done in - DCR

Additional Procedures	Group – A	Group – B	Total
Septoplasty	4	5	9
Conchoplasty	5	6	11

### Discussion:

Over the past 20-25 years there has been renewed interest in endoscopic endonasal dacryocystorhinostomy with many variations in surgical techniques to improve the surgical results [3]. Use of endoscope, video magnification has facilitated the easy recognition of surgical land marks. Commonest and frequent cause of surgical failure is formation of granulation tissue in and around the newly created lacrimal stoma and synachiae formation causing stomal obstruction and stenosis [6, 7]. To overcome these complications and for better surgical outcome different nasal and lacrimal sac flaps have been designed for reconstruction of stoma, maintaining the stomal contour and patency [8,9]. Sonkhya N et al, Khalifa et al, conducted a study of Endoscopic DCR with posteriorly based Nasal and Lacrimal flap versus conventional endoscopic DCR, they found that flap technique has comparable success rate, safety profile, healing profile and high mucosal recovery and less

need for debridement suction clearance post operatively [8,9].

Surgical outcome of DCR surgery mainly depends on the quality of surgical technique with sharp punch removal of bone especially the frontal beak of maxilla with minimal laceration of nasal and lacrimal sac flap resulting in large stoma, removal of medial and posterior wall of lacrimal sac which causes healing of flap margins with no scarring, no contracture and no granulation tissue formation [10, 11].

In the present study all 48 patients had undergone endoscopic DCR with double posteriorly based lacrimal and nasal mucosal flap technique where both lacrimal and nasal mucosal flaps got approximated to each other over the lateral nasal wall.

92% of the patients were found to be symptoms free at the end of 1 year surgery which is similar to previous studies done by Kansul, Aydin et al, Jin HR, Yeon JY et al. [12,13].

Success rate in EEDCR with powered instruments was found to be between 82-97% [13].

Powered instrument drill is often used for wide exposure of lacrimal sac and to reduce intraoperative time in EEDCR [14].

Saraziots et al. in their study concluded that success and complication rates of EEDCR are similar to those of external DCR. Successful functional result obtained in 97.8% of patients [15].

Islam Hezallah et al. concluded that Kerrison punch (Non-powered) showed significant reduction in operating time as compared to powered drill in Endoscopic DCR. No significant difference found between both the groups in terms of success rate and complication [16].

Anastomosis of nasal mucosal and lacrimal sac flaps plays important role in Endoscopic DCR with high success rate in primary nasolacrimal obstruction and in revision cases as well [17].

Creating large neosteium minimizes granulation tissue formation at stomal site. Creating large bony neosteium and preservation of nucosal flaps reduces synechia formation. The key aspects in achieving functional and anatomical success are meticulous surgical procedure and precise follow up [18].

Cukurova I et al. reported success rate of 93% using mucosal flap preserving technique [18].

Vaghela et al. in their study found that patients operated with EEDCR did not have any intra operative or post operative complications [19].

To reduce complications like hyperplasia and granulation tissue formation, less traumatic surgical procedure and close approximation of the tissue was needed for promoting primary healing. So, it is the healing process which is more important than larger ostium created by excessive drilling.

In the present study 93.50% of the patients symptomatically improved in group A where Kerrison punch forceps had been used for removal of thick maxillary bone; whereas in group B where powered drill was used success rate was 84.62%. Powered instruments produce thermal and mechanical injuries to nasal and lacrimal sac there by creating complications. Final size of healed ostium is about 2% of the size of the ostium created intraoperatively, because of hyperplasia and granulation tissue formation.

### Conclusion:

Several modalities are used in endoscopic DCR, all aiming to improve success rate, reduce complications, and shorten the operative time.

Powered instruments like drill produces thermal and mechanical trauma to nasal mucosa and lacrimal sac which makes this area prone for formation of granulation tissue and synachiae formation. Conventional cold instruments like Kerrison punch forceps, produces minimal mucosal trauma which promotes better wound healing with minimal post operative complications.

EEDCR with double posteriorly based nasal and lacrimal flaps provides a better alternative to conventional endoscopic DCR in managing acquired primary nasolacrimal duct obstruction in adults. It has a comparable success rate, less operative time, safety profile, healing profile, mucosal recovery, wound healing and less need for debridement and suction clearance.

Meticulous surgical procedure and precise postoperative follow-up play key role in achieving functional and anatomical results in Endoscopic endonasal DCR.

**Conflict of Interest** - Nil

**Sources of Support** - Nil

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