

**A STUDY OF ENDOSCOPIC ENDONASAL DACRYOCYSTORHINOSTOMY WITH MUCOSAL FLAP TECHNIQUE**Rahul Telang<sup>1</sup>, Mehak Maheshwary<sup>2</sup>, Samir Joshi<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: INTRODUCTION:** Tearing and recurrent or chronic conjunctival discharges are the most frequent symptoms of lacrimal pathway obstruction. Endoscopic endonasal dacryocystorhinostomy (DCR) surgery with mucosal flap technique used in our study involves creation of a large rhinostomy and mucosal flaps with use of diamond burr attached to a powered microdebrider. With creation of a well healed marsupialised ostium, the lacrimal sac is made a part of lateral nasal wall. **MATERIALS AND METHODS:** The study involved a prospective non-randomized interventional case series of 50 patients operated with endoscopic endonasal DCR with mucosal flap technique with use of powered instruments. Data based on the symptomatic relief, nasal endoscopy and syringing after the management were recorded after duration of one week, one month and six months for each patient. **OBSERVATIONS AND RESULTS:** Success rate at 6 months considering the anatomical patency and operative site was 96% i.e. 48/50 patients showed desirable outcome of the procedure. Also the success rate in terms of symptomatic relief after 6 months was 96% i.e. 48/50 patients showed complete resolution of epiphora after 6 months. **CONCLUSION:** Our study concluded that this technique involves creation of a large rhinostomy and the preservation of lacrimal sac and nasal mucosa leads to marsupialization of lacrimal sac onto the lateral nasal wall. The extensive drilling of frontonasal process of maxilla helps in creation of a stable opening of about 1cm x 1cm. No post-operative nasal packing given or stent was used, hence minimal discomfort to the patient

**KEYWORDS:** Endoscopic Dacryocystorhinostomy, Mucosal flaps, Chronic Dacryocystitis.

**INTRODUCTION:** Tearing and recurrent or chronic conjunctival discharges are the most frequent symptoms of lacrimal pathway obstruction. An endoscopic endonasal DCR procedure involves removal of bone adjacent to the nasolacrimal sac and incorporating the lacrimal sac with the lateral nasal mucosa in order to bypass the nasolacrimal duct obstruction. This allows tears to drain directly into the nasal cavity from the canaliculi via a new low-resistance pathway.<sup>1</sup>

The endoscopic DCR has distinct advantage over the external DCR as there is no facial scar. Besides, the endoscopic DCR also maintains the pump action. It can be done in acute cases and both the sides can be operated simultaneously in the same sitting. The mucosal flap technique used in our study involves creation of a large rhinostomy and mucosal flaps with use of diamond burr attached to a powered microdebrider. With creation of a well healed marsupialised ostium, the lacrimal sac is made a part of lateral nasal wall<sup>2</sup> and stability of the ostium was found to be approximately 1cm x 1cm in size at 6 months post operatively. The gel foam patch used to secure the flap prevented the need of nasal packing and hence minimal discomfort to the patient. Furthermore, no stents were used in any of our patients. Hence stent related problems such as

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tube prolapse, postoperative discomfort, corneal abrasion and canaliculi erosion were also avoided.

### OBJECTIVES:

- To evaluate the outcome of endoscopic endonasal DCR without stent by mucosal flap technique with respect to the symptomatic relief, anatomic and functional patency, recurrence and complications.
- To achieve a wide, stable and well healed marsupialised ostium with use of powered instruments.
- To compare the success rate of our technique in terms of symptomatic relief and patency with similar and other techniques in literature.

**MATERIAL AND METHODS:** A prospective series of 50 patients referred by the Dept. of Ophthalmology to the Dept. of E.N.T with symptoms of epiphora due to dacryocystitis were evaluated, operated by endoscopic endonasal DCR with mucosal flap technique and followed up for a period of six months from January 2011 to December 2013. Patients were diagnosed by detailed clinical history, lacrimal syringing, complete nasal and ophthalmologic examination, routine investigations and pre anesthetic fitness.

The technique involved creation of mucosal flaps and use of powered instruments to result in the formation of a well marsupialised cavity which becomes a part of lateral nasal wall. Data based on the symptomatic relief, nasal endoscopy and syringing after the management were recorded after duration of 1 week, 1 month and 6 months for each patient.

### Inclusion Criteria:

1. Patients diagnosed as Acute or Chronic Dacryocystitis due to acquired nasolacrimal duct obstruction.
2. Patients between age group of 15-60 years.

### Exclusion Criteria:

1. Patients having Congenital Nasolacrimal duct blockage.
2. Patients having symptoms of Nasolacrimal Duct blockage due to traumatic causes or having trauma to lacrimal apparatus, facial bones.
3. Patients having Lacrimal Canalicular Blockage.
4. Patients requiring Revision Dacryocystorhinostomy.
5. Patients aged <15 years and >60 years.
6. Patients lost to follow up at 6 months were also excluded from the study.

### Technique of Surgery:

**Endoscopic Endonasal Dacryocystorhinostomy with Mucosal Flap Technique:** Under general anesthesia, decongestion is achieved by patties soaked in 4% Xylocaine with Adrenaline. Lignocaine with Adrenaline (1:200000) is used for infiltration. Postal stamp incision is taken 1 cm anterior and above the axilla of middle turbinate. Since approximately two thirds of the lacrimal

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sac is above the axilla of the middle turbinate, therefore in order to accomplish complete sac exposure during DCR surgery, a large amount of thick bone over the axilla of the middle turbinate and the lateral wall of the agger nasi has to be removed<sup>3</sup>. Extensive drilling of fronto-nasal process of maxilla with diamond burr 3.2 is done to expose the fundus and common cannicular area of lacrimal sac. Drilling is also done to saucerize the edge of maxillary process so as to evert the anterior flap of the lacrimal sac to approximate with nasal mucosa. Lacrimal sac is opened with open book incision so as to create anterior and posterior mucosal flaps (Fig. 1).

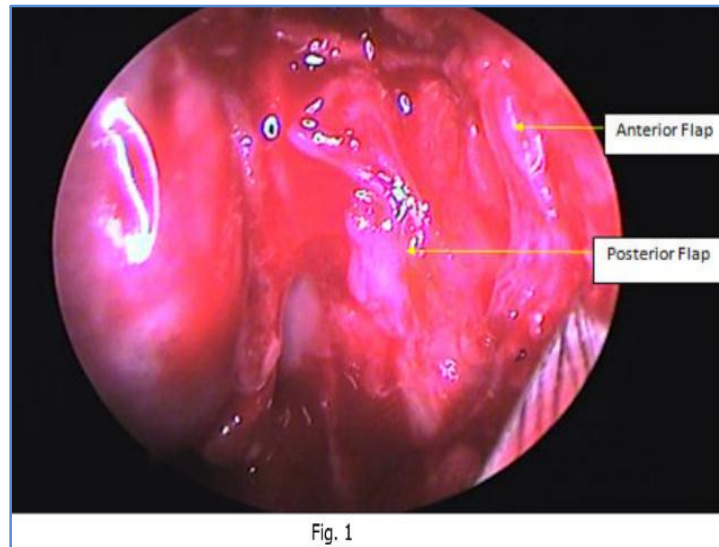


Figure 1: Elevation of Anterior and Posterior Flap after exposure of lacrimal sac.

The common canaliculus should be identified as a landmark for adequate sac exposure once the lacrimal sac is opened, because at least two thirds of the sac is below this opening. It is important to achieve primary intention healing between the edges of the sac and the nasal mucosa covering the exposed osteotomy edges.

The mucosal flap fashioned at the end of allows for primary intention healing to occur. In the posterior superior region of the lacrimal sac, apposition with the nasal mucosa is difficult so the exposed agger nasi cell mucosa is routinely opened and apposed with the lacrimal mucosa in this area.<sup>4</sup> These flaps are further stabilized by positioning two small cut stripes of absorbable gelatin sponge along edges of the junction between the sac mucosa and nasal mucosa. This apposition of sac mucosa to nasal mucosa is similar to what is achieved in external DCR by suturing of the anterior and posterior sac flaps to the nasal mucosa. At the end of the procedure, no stents were left behind. No nasal packing is done.

By this technique, a large and marsupialised ostium is created and the lacrimal sac is made a part of the lateral nasal wall. This prevents the formation of granulations at follow up.

The powered endoscopic DCR accomplishes three principles namely, achieving full lacrimal sac exposure, marsupialization of the entire sac into the lateral nasal wall and primary intention healing between the sac and nasal mucosa.<sup>3</sup>

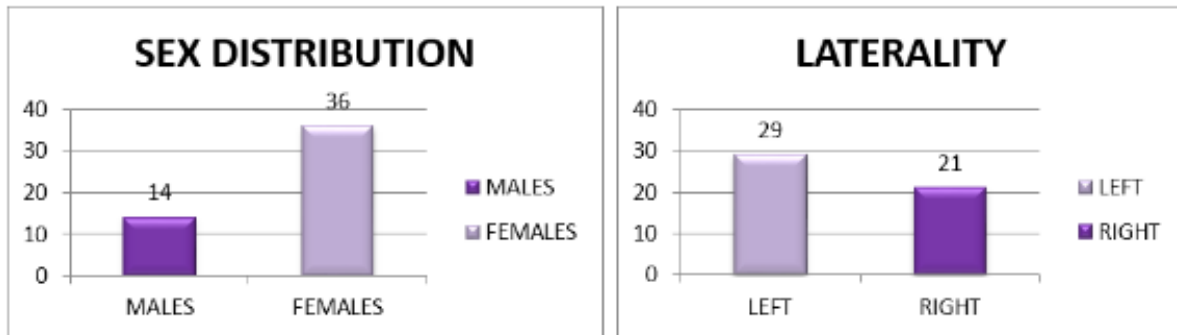
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The surgical technique used in this study is the same as described by Dr. P. J. Wormald with minor modifications such as non-usage of stents.<sup>5,6</sup>

### OBSERVATIONS AND RESULTS:

In our study 28/50 (56%) patients are of age group 45 - 60 with mean age of presentation being 44.42.

**Graph 1:** Sex Distribution of Patients and Laterality.



Graph: 1

In the study, the male: female ratio is 14:36 i.e. the disease was almost 2.5 times more common in females as compared to males. The female preponderance of alterations in the lacrimal pathways may be related to the long-term use of cosmetics, especially on the rim of the lower lid. Out of the 50 cases, in 29 (58%) cases, the left eye was affected and in 21(42%) cases the right eye was affected (Graph 1).

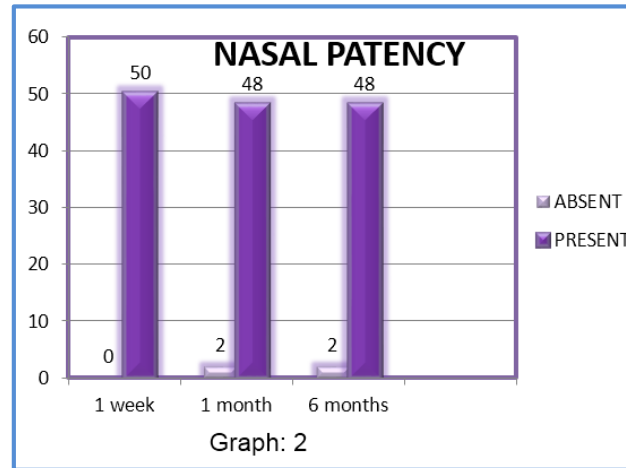
Follow up	Patency		Rhinostomy site	
	Absent	Present	Well mucosalized	Granulations
1 Week	0	50	42	8
1 Month	2	48	46	4
6 Months	2	48	48	2

Table 1: Follow up at 1 week, 1 month and 6 months for patency and rhinostomy site

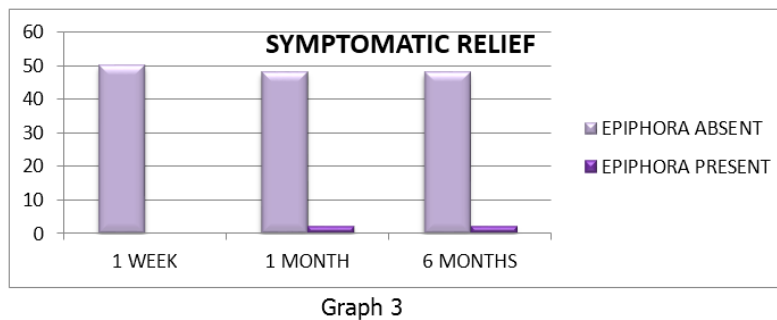
Data based on the symptomatic relief, nasal endoscopy for rhinostomy site and syringing to check patency were recorded after duration of 1 week, 1 month and 6 months for each of the 50 patients after the surgery (Table 1).

The success rate of our study was 96% in terms of anatomical patency (Graph 2) and 96% in terms of symptomatic relief (Graph 3).

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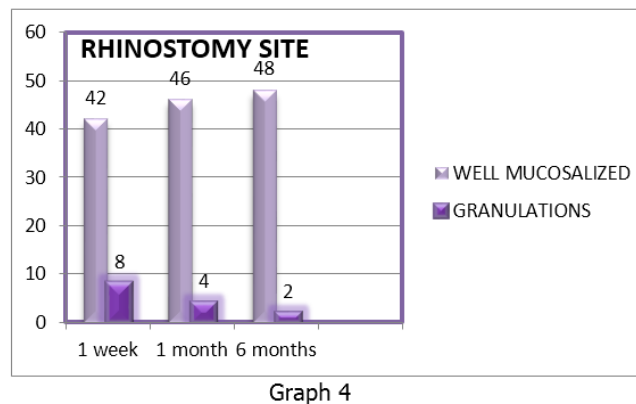


**Graph 2:** Nasal Patency at 1 week, 1 month and 6 months.



**Graph 3:** Symptomatic relief at 1 week, 1 month and 6 months.

In 2 patients, there were granulations and scarring at the end of 1 week and 1 month and the site was closed due to fibrosis of the lacrimal sac at 6-month follow up. In addition, these patients had regurgitation on syringing and persistence of epiphora at 6 months follow up. These complications could be attributed to excessive granulation formation and scarring resulting from underlying bare bone at rhinostomy site due to inadequate mucosal approximation (Graph 4).



**Graph 4:** Rhinostomy Site at 1 week, 1 month and 6 months.

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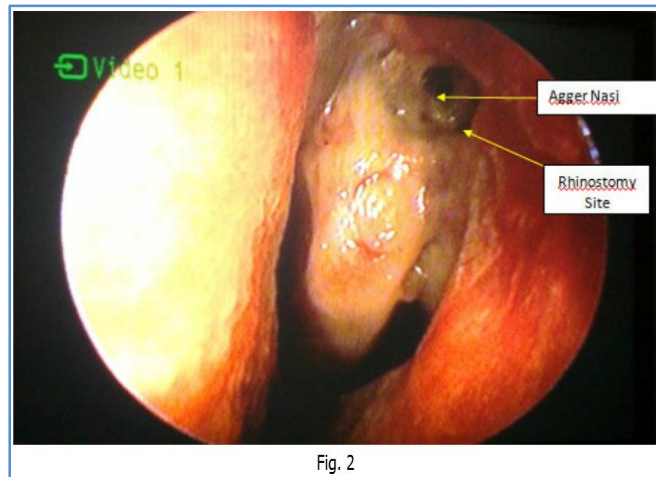


Figure 2: Healing, Healthy, open rhinostomy site (left) at 1 month.

Endoscopic examination at 1 month showed healthy rhinostomy site which showed free flow of saline on syringing (Figure 2).

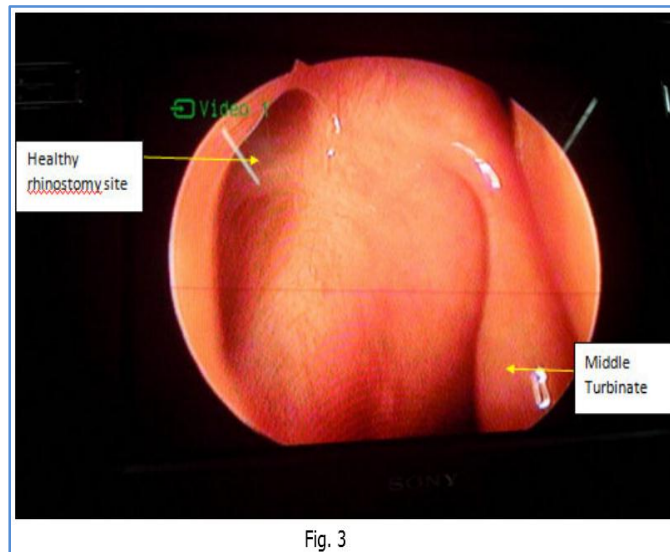


Figure 3: Well-mucosalised open rhinostomy site (right) at 6 months.

Success rate at 6 months considering the anatomical patency and operative site was 96% i.e. 48/50 patients showed desirable outcome of the procedure. Also the success rate in terms of symptomatic relief after 6 months was 96% i.e. 48/50 patients showed complete resolution of epiphora after 6 months (Figure 3). The stable ostium at 6 months was found to be approximately the size of 1cm x 1cm.

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**DISCUSSION:** A growing clinical experience has confirmed the value of the endoscopic DCR technique in the management of nasolacrimal duct obstruction. Refinements in technique and instrumentation coupled with an improved understanding of the endoscopic surgical anatomy are largely responsible for the excellent success rates now reported, paralleling those reported with that of conventional external technique.<sup>7,5</sup> Tsirbas et al., compared 31 powered endoscopic DCRs to 24 external procedures and reported the success rates to be statistically equivalent for the two techniques (93.5% versus 95.8%).<sup>8</sup>

Endonasal DCR offers the added advantages of being an easy procedure, is cosmetically acceptable as it avoids cutaneous incision, blood loss is minimal,<sup>9</sup> can also be performed as a day care surgery,<sup>10</sup> can be carried out in cases of acute dacryocystitis.<sup>9</sup> Direct access to rhinostomy site limits tissue injury to the discrete fistula site without disruption of medial canthal anatomy and function.<sup>11</sup>

It is more physiological because it preserves lacrimal pump mechanism.<sup>10</sup> It has less intra operative Haemorrhage, less operative morbidity, short operative time and enhanced recovery. Nasal, paranasal and sinus abnormalities can be concurrently addressed in the same procedure.<sup>10,12</sup>

The main difference between the presented technique and previous conventional endonasal technique is the creation of a large bony osteotomy by using diamond burr attached to a powered microdebrider and creation of lacrimal flaps and its apposition with the adjacent nasal mucosa, which is similar to suturing technique of both the flaps in external approach.

With creation of a well healed marsupialised ostium, the lacrimal sac is made a part of lateral nasal wall and stability of the ostium was found to be approximately 1cm x 1cm in size at 6 months postoperatively. The gel foam patch used to secure the flap prevented the need of nasal packing and hence minimal discomfort to the patient.

Furthermore, no stents were used in any of our patients. Hence, stent related problems such as tube prolapse, postoperative discomfort, corneal abrasion, canaliculi erosion, spontaneous extrusion and difficulty in removing stents were also avoided.<sup>13</sup>

The procedure used in our study is based on the technique primarily described by P. J. Wormald which emphasizes the creation and preservation of mucosal flaps with primary juxtaposition of mucosal edges, the goal being healing by primary intention<sup>3</sup> and their technique has been shown to present a large and stable ostium with excellent functional outcomes.<sup>6</sup>

### **Successful endoscopic DCR significantly depends on several important factors:**

1. A thorough understanding and knowledge of the endoscopic anatomy and location of the lacrimal sac.
2. Complete removal of the frontal process of the maxilla to expose the medial wall of the lacrimal sac.
3. Precise opening of the lacrimal sac to achieve adequate exposure of the common internal punctum.

It is important to recognize that the posterior aspect of the lacrimal sac is adjacent to the uncinata and that this structure requires to be preserved.<sup>14,15</sup> Going posterior to this landmark



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leads to an increased risk of orbital fat prolapse or hematoma in addition to compromising the natural ostium of the maxillary sinus.<sup>15</sup>

The junction of the hard frontal process of the maxilla and the thin lacrimal bone is the first landmark that is sought during the presented technique. The creation of anterior and posterior flaps in the lacrimal sac mucosa allows primary intention healing with the nasal mucosal flaps, thus marsupialising the sac into the lateral nasal wall. Poor or minimal preservation of mucosa may lead to increased granulation and fibrosis.<sup>16</sup>

This approach preserves the general principles of creating a mucosal lined fistula so important in external DCR surgery.<sup>17</sup> An additional advantage was the preservation of lacrimal pump function. Previous studies have shown that successful endonasal DCR patients are more likely to have positive scintillography when compared to successful external DCR patients.<sup>18,19</sup> The attachments of the orbicularis to the lateral wall of the lacrimal sac are not disturbed with this approach and this may help preserve some lacrimal pump function.

Sprekelson<sup>20</sup> (1996) reported a 96% success with endoscopic DCR whereas S. Mortimore<sup>21</sup> (1999) found only 87% success in the study of En DCR without stents.

Tsirbas A, Wormald P J<sup>2</sup> (2003) found success rate of mechanical endoscopic DCR with mucosal flaps to be 95%. In another study, Ramakrishnan V, Hink EM<sup>22</sup> (2007) found anatomic patency 100% and symptomatic relief 93% in EnDCR without stent without mucosal flap preservation. Harvinder S, Rosalind S<sup>23</sup> (2008) in their study of powered EnDCR with mucosal flaps achieved a success rate of 91.66%.

In our study (2013), the success rate was determined by anatomical patency and open well mucosalised rhinostomy site, which was ascertained by syringing and nasal endoscopy respectively. In addition, the relief of symptoms in terms of watering of eyes or epiphora at rest was considered. The success rate of our study was 96% in terms of anatomical patency and 96% in terms of symptomatic relief.

**CONCLUSION:** The study involved a prospective non-randomized interventional case series of 50 patients operated with endoscopic endonasal DCR with mucosal flap technique with use of powered instruments. The patients were examined at the end of 1 week, 1 month and 6 months. Based on the data gathered from the observations and from literature it is concluded:

- Endoscopic endonasal DCR with mucosal flap technique is an excellent technique for management of acquired nasolacrimal duct obstruction with respect to symptomatic relief and achieving an alternate drainage pathway anatomically patent even after 6 months.
- This technique involves creation of a large rhinostomy and the preservation of lacrimal sac and nasal mucosa to create mucosal flaps. This mucosal preservation leads to marsupialization of lacrimal sac onto the lateral nasal wall.
- The extensive drilling of frontonasal process of maxilla helps in creation of a stable opening of about 1cm x 1cm.
- The flaps were secured with gel foam and no post-operative nasal packing was given, hence minimal discomfort to the patient.
- No stents were used, hence no post-operative stent related complications were noted.



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- In addition, very less and minor intra-operative and post-operative complications were encountered with successful creation of a stable low resistance, well-mucosalised alternate drainage pathway in most of the patients.
- Good anatomical knowledge of intranasal structures and endoscopic skills are necessary to allow accurate preservation of mucosa and creation of a wide rhinostomy by drilling.
- The procedure originally described by Dr. P. J. Wormald, achieves healing by primary intention due to approximation of lacrimal flaps with adjacent nasal mucosa making this procedure very similar to external dacryocystorhinostomy.

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