



## Efficacy of Endo Nasal DCR in Primary Nasolacrimal Duct Obstruction

Authors

**Dr Sukhada Mishra<sup>1</sup>, Dr Debabrata Panigrahi<sup>2</sup>**

<sup>1</sup>Senior Consultant Cornea & Micro Surgery, JPM Rotary Club Eye Hospital, Cuttack, Odisha

<sup>2</sup>Professor, ENT, IMS & SUM Hospital, Bhubaneswar, SOA University, Odisha

Corresponding Author

**Dr Debabrata Panigrahi**

Professor, Dept. of ENT, Institute of Medical sciences and Sum Hospital  
Siksha 'O' Anusandhan University, K-8, Kalinga nagar, Bhubaneswar-751003, Odisha

Email: [drdbpent@gmail.com](mailto:drdbpent@gmail.com); Tel: 09937406635

### ABSTRACT

**Background & Objectives:** Primary acquired nasolacrimal duct obstruction is the commonest cause of chronic dacryocystitis presenting with symptoms like epiphora, discharge, irritation and pain. Untreated cases leads to formation of dacryocele & fistula. External dacryocystorhinostomy (DCR) is the mainstay of treatment for this problem with a reasonable good success rate. But the external scar over the face, disruption of the lacrimal pump mechanism, injury to the medial canthal anatomy are the few pitfalls of the external DCR for which the endonasal DCR has been gaining popularity for last few decades. This study is undertaken to evaluate the efficacy of endonasal DCR in terms of successful outcome, intraoperative and postoperative complications.

**Method:** A prospective study was conducted on 84 patients of nasolacrimal duct obstruction with chronic dacryocystitis. All the patients were subjected to endoscopic endonasal DCR and followup was done for 6 months. Outcome of the surgery was measured by findings of the lacrimal passage irrigation & nasal endoscopy.

**Result:** The successful outcome noticed in 76 (90.4%) cases. Out of the 8 cases (9.6%) of failures 4 cases (4.8%) found to have granulations around the stoma, 2 cases (2.4%) had mucosal overgrowth and another 2 cases (2.4%) had restenosis. Except injury to the lamina papyracea and prolapse of orbital fat in few cases (4.7%) no other major intraoperative complications were noticed in this series. Among the disadvantages adjunct procedures like septoplasty and conchoplasty were required in 27.3% & 13.1% of cases respectively.

**Conclusion:** Endoscopic Endonasal DCR is a valid alternative to external DCR. The success rate is similar and at the same time it avoids the pitfalls of external DCR. Intra operative complications are less. Learning curve is stiff due to requirement of few adjunct procedures.

**Keywords:** chronic dacryocystitis, nasolacrimal duct obstruction, dacryocystorhinostomy, endonasal dacryocystorhinostomy, DCR, endo DCR.

### Introduction

Chronic dacryocystitis with epiphora, discharge, pain and irritation is a commonly encountered problem by the clinicians in their day to day

practice. Primary acquired nasolacrimal duct obstruction (PANDO) is the commonest cause leading to chronic Dacryocystitis<sup>1</sup>. Pathological studies of the nasolacrimal passage have shown

that Primary acquired nasolacrimal duct obstruction (PANDO) is caused by fibrous obstruction secondary to chronic inflammation<sup>1&2</sup>. Chronic dacryocystitis if not addressed properly may lead to formation of dacryocele (fig-2) & fistula (fig-1) along with the persistence of annoying symptoms like continuous epiphora with blurring of vision, discharge, irritation and pain. Dacryocystorhinostomy (DCR) is the surgical procedure commonly used to treat naso lacrimal duct obstruction by creating a bypass pathway from the lacrimal sac to the nasal cavity to restore the normal tear flow. External DCR is the commonly performed surgery till today with reasonably good outcomes. In early 20<sup>th</sup> century (1904) Toti originally described the traditional External DCR<sup>3</sup>. Toti's External DCR which remains largely unchanged with a very few modifications is followed till today<sup>4</sup>. In the hands of properly trained surgeons the success rates of the external DCR are between 90-95%<sup>5</sup>. The external scar over the face, the morbidity, the disruption of the lacrimal pump mechanism, the intra & post operative bleeding, disruption of the medial canthal anatomy are the major pit falls of the External DCR.

To avoid the above described complications there is now a growing body of literature validating the nasal endoscopic approach with reported success rates comparable to the external technique<sup>7,4</sup>. The Endoscopic –Nasal-DCR was initially described by Caldwell in 19<sup>th</sup> century (1893) well before the External DCR came into the lime light<sup>8</sup>. However it fell into disrepute due to lack of proper visualization, limited understanding of the intra nasal anatomy and sub optimal instrumentation at that time. The modern endo nasal endoscopic technique was first described in 1989 by McDonogh and Meiring<sup>9</sup>. This approach is gaining popularity largely due to technological advances in nasal endoscopic surgery.

This study was under taken to know the efficacy of nasal endoscopic DCR in terms of success rates and complications. Careful attempts have been made to observe whether it can be a valid

alternative to avoid the problems encountered in External DCR or not.

### Aim of the Study

1. To evaluate the success rates of Endoscopic Endo-Nasal DCR.
2. To observe the complications and advantages of this procedure over External DCR.

### Materials & Methods

A prospective study was conducted on 84 patients of Primary Naso- Lacrimal Duct Obstruction (PANDO) between Jan 2007- Jan 2012 at IMS and SUM Hospital jointly by the Department of Ophthalmology and ENT. All the patients were subjected to complete ENT & Ophthalmic examinations. The patients were selected on the basis of the following 3 tests to know the level of obstruction.

1. Regurgitation of fluid, mucous or mucopus on pressure over the lacrimal sac area (ROPLAS).
2. Lacrimal passage irrigation (to know the patency)
3. Diagnostic probing to feel for hard stop or soft stop( to know the level of obstruction)

Only the cases having nasolacrimal duct obstructions were included in this study. Epiphora due to other causes like common canalicular block, punctual stenosis, lagophthalmos were excluded from the study. Cases with bleeding disorders, nasal polyposis, rhinosporidiosis, nasal & nasopharyngeal tumors and other granulomatous conditions of the nose were also excluded from the study. Patients with uncontrolled medical diseases like diabetes mellitus & Hypertension etc. are also not included in the study group.



**Fig-1** NLD block with fistula



**Fig-2** NLD block with dacryoceale

All the patients had undergone Endoscopic Endo Nasal DCR either by local or general anaesthesia. The lacrimal sac was exposed intra nasally by removing the bone cover and a stoma was created over the sac to facilitate the normal flow of tear into the nasal cavity.

Lacrimal sac syringing was done at the end of 1<sup>st</sup> week, 1<sup>st</sup> month, 3<sup>rd</sup> month & 6<sup>th</sup> month of the surgery. Post operative nasal endoscopy was done in all cases at the end of 3<sup>rd</sup> month and 6<sup>th</sup> month to observe the DCR stoma and intra nasal complication if any. The final outcome of the surgery was measured after 6 months of the surgery by doing syringing for patency of the opening and nasal endoscopic examination. Both functional and anatomical patency along with partially patent LPI with mild regurgitation of clear fluid without pus or mucopus were considered to be a successful outcome. Complete or partially blockage with regurgitation of pus or mucopus were considered to be a failure.

### **Surgical Technique**

Leaving a few apprehensive and young patients where surgery was done under general anaesthesia in most of the patients surgery was performed under local anaesthesia. Nasal cavity was packed with 4% xylocaine with 1: 40,000 adrenaline 10 minutes prior to the surgery. The mucosa of the lateral wall of the nose just anterior to the anterior margin of the middle turbinate was infiltrated with 2% lignocaine with adrenaline (1:100,000). With a 15 number blade the first incision is made horizontally 8-10 mm above the axilla and brought forward 10mm on to the frontal process

of maxilla. The incision is then turned vertically down to the insertion of the inferior turbinate on to the lateral nasal wall and finally turned slightly horizontally to meet the uncinat process.

Mucosal flap was elevated and excised to expose the underlying bone. The junction of the soft lacrimal bone with hard bone of frontal process of maxilla is identified. A 2 mm Kerrison's punch is engaged in the junction to remove the lower portion of the frontal process of maxilla. The punch is now engaged in the bony gap to remove the upper part of the frontal process of maxilla. In quite a few cases the upper thick part of the bone is removed either by a millet hammer or by diamond DCR burr of microdebrider. The bone is removed until the entire sac is exposed.

The medial wall of the lacrimal sac was tented with the Bowman's lacrimal probe and a vertical incision was given on the medial wall of the sac from top to bottom so that the common canalicular opening is seen. By two horizontal incision above and below two flaps (anterior & posterior) are created so that the medial wall of the sac gets opened like a book. Now the nasal mucosa is refashioned and placed in the lateral wall in such a way that it will cover the raw bony lateral wall without blocking the opening of the sac. Finally abgel pieces are carefully placed to keep all the flaps in position.

### **Observation**

Out of the total 84 patients of this case series 65 were females (77.4%) and 19 were males (22.6%). Majority of the patients were in 3<sup>rd</sup> & 4<sup>th</sup> decades of life (table-1). The commonest presenting features noticed in this series was epiphora with discharge (34.5%). The next common presenting feature was only epiphora. Quite a good number of patients (15.4%) were asymptomatic and found to have naso lacrimal duct obstruction during evaluation before cataract surgery (table-2)

**Table=1** Age incidence,( n=84).

10-20	7	8.3%
21-30	17	20.23%
31-40	27	32.1%
41-50	11	13.1%
51-60	10	11.9%
61-70	8	9.5%
71-80	4	4.7%

**Table-2** presenting features ( n=84)

Only watering	16	19.04%
Watering + discharge	29	34.5%
Fistula	11	13.1%
Dacryoceale	15	17.8%
Asymptomatic( diagnosed before cattract surgery)	13	15.4%

Among the intra operative complications bleeding is the commonest which was present in 17 cases (20.2%). Besides injury into lamina papyracea and accidental entry into the orbital fat in 4 cases (4.7%) no other major intra operative complications were noticed in this series.

It has been observed that quite a good number of patients required some additional intra nasal procedure to get a good access for the endo nasal DCR surgery. Out of the total 84 patients 23 patients (27.3%) required septoplasty for correction of deviated nasal septum and 11 patients (13.1%) required conchoplasty for pneumatized middle turbinate.

**Table-3** Nasal endoscopy findings( n=84), 3<sup>rd</sup> month & 6 month post operatively)

Endoscopy finding	Post op. 3 <sup>rd</sup> month	Post op. 6 <sup>th</sup> month
Healthy stoma	71	76
Granulations	6	4
Synechia	3	0
Restenosis	2	2
Mucosal overgrowth completely blocking the ostium	2	2

Among the post operative complications 3 patients developed synechia (table-3) between nasal septum and lateral nasal wall (resulting in difficulty of breathing but the DCR opening remained patent. The synechia was released subsequently followed by merocel nasal packing for 48 hours which brought a complete solution to this problem. Similarly 6 patients developed granulations in and around the DCR stoma (table-3) resulting in complete blockage of the stoma and

failure of the surgery in 4 cases. The remaining 2 cases granulations were away from the stoma which were managed with application mitomycin. Restenosis of the neo stoma with complete blockage and over growth of nasal mucosa completely blocking the stoma noticed in 2 cases each resulting in failure of 4 cases (table-3). Considering the failure in 4 cases due to granulations over the stoma and 2 cases each for restenosis and mucosal over growth the total failure in this series is 8 out of 84 (9.6%). The successful outcome noticed in 76 cases i.e 90.4%.

**Fig-3** synechia, post.op.3month**Fig-4** granulations, post op. 3 months)

The nasal endoscopy findings was correlating with the findings of lacrimal passage irrigation done at 6 month to evaluate the overall patency of the stoma (table-4). In 70 cases (83.3%) the LPI was freely patent without any symptoms where as in 2 cases (2.2%) even though the LPI was freely patent but the patients were complaining of mild watering ( anatomical patency), which might be due to lacrimal pump failure. In another 4 cases

LPI was partially patent, but as because there was regurgitation of clear fluid during LPI and the patients did not have any symptoms they are included in the group of successful outcome. Total successful outcome based on LPI also noticed in 76 cases (70+2+4). Out of the 8 failure cases 2 cases (2.2%) had partial blockage and 6 cases (6.7%) had complete blockage. The partially blockage cases which had symptoms and regurgitation of mucopus on LPI found to have granulations at the stoma on nasal endoscopy and the other 6 cases which had complete blockage on LPI on nasal endoscopy revealed restenosis, mucosal over growth & granulations in 2 cases each.

**Table-4** Lacrimal passage irrigation(LPI) at 6 month post op. ( n=84)

Patency	Symptoms	Number of cases	Success/failure
Freely patent	No symptoms	70	Success
Freely patent	Mild watering	2	Success
Partially patent with regurgitation of clear fluid	No symptoms	4	Success
Partially blocked with regurgitation of mucoid discharge.	Watering, discharge	2	Failure
Completely blocked	watering, discharge	6	Failure

## Discussion

Chronic dacryocystitis is a disease which is more common in females. Incidence of the disease among males and females in this case series found to be 77.4% & 22.6% respectively. Sprekelson et al. (1996)<sup>10</sup> observed the incidence of chronic dacryocystitis in male and females as 20% & 80% respectively. Similar observations were also made by Heike (1994)<sup>11</sup>, Yung & Hudman( 1998)<sup>12</sup>. The highest incidence of the disease in this series noticed in 3<sup>rd</sup> and 4<sup>th</sup> decades of life.45% cases belong to these age group which co relates with the observation made by GC Sahu et al ( 2005)<sup>13</sup>. 90.4% successful outcome has been recorded in this study which is comparable to the study of Harugop et al<sup>14</sup> (93.3%), GC Sahu<sup>13</sup> et al (90%), N Moran et al<sup>15</sup> (85.7%) & GC Gyen et al<sup>16</sup> (87.5%). Review of literature shows that the success rate of endo nasal DCR varies between

82-95%. The success rate depends upon the removal of adequate bone around the sac especially around the common canalicular area which is situated anterior to the middle turbinate and about 8 mm above the axilla of the middle turbinate.<sup>17</sup> Literature review shows that the success rate of external DCR, which is the still the gold standard procedure for nasolacrimal duct obstruction, varies between 80-95%. The success rate of endo nasal DCR is similar to external DCR. Quite a few studies revealed even better result in endo nasal DCR than external DCR. Khan et al<sup>18</sup> in 2011 observed a success rate of external and endo nasal DCR, 80% and 73.3% respectively. Karim et al<sup>19</sup> in another study in 2011 reported equal success rate in both the procedure. Asim Dey et al<sup>20</sup> in a comparative study between external and endo nasal DCR observed success in 100% and 93.33% respectively.

Among the complications except mild to moderate amount of bleeding and on rare occasion injury to the lamina papyracea (4.7%) no other major intra operative complications were noticed in this series. Besides few cases of restenosis, granulations & synechia post operative complications were also minimal. GC Sahu et al made a similar observation in his study. Durvasual et al<sup>21</sup> opined that complication rates in endonasal DCR is less than the external DCR.

As the success rate is comparable to external DCR and the complications are less, the endo nasal DCR can be a valid alternative to the external DCR. The endonasal DCR also avoids scar over the face, the lacrimal pump failure, injury to the orbicularis oculi muscles and injury to the angular vessels which are the usual pitfalls of the external DCR. The only disadvantage of endo nasal DCR noticed in this study was the adjunct intra nasal procedures like septoplasty and conchoplasty which was required in 27.3% and 13.1% of cases respectively. This makes the learning curve stiff for the surgeon to start this procedure.

### Conclusion

Endo nasal DCR in expert hand is a valid alternative to external DCR in the management of primary nasolacrimal duct obstruction. It is less invasive, cosmetically superior and produces similar results. It also avoids the pitfalls of external DCR. The intra operative and post operative complications are less. The learning curve is stiff as because the surgeon has to get himself trained not only on the endonasal DCR procedure but also few adjunct intra nasal procedure like septoplasty and conchoplasty.

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