

## Original Research Article

# A comparative study of conventional endoscopic and powered endoscopic dacryocystorhinostomy in a tertiary hospital of Rohtas district, Bihar, India

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## ABSTRACT

**Background:** Dacryocystorhinostomy (DCR) consists of creating an alternative lacrimal drainage pathway to the nasal cavity to restore permanent drainage of the previously obstructed excreting system. The opening is normally made at the level of lacrimal bone. Introduction of the nasal endoscope, interest in endo-nasal DCR increased. The objective of this study was to compare the result and advantage of both conventional endo-nasal and powered endo-nasal DCR regarding patency rate, patient compliance intra-operative and postoperative complications.

**Methods:** In this comparative study of 60 cases for conventional endo-nasal dacryocystorhinostomy and 100 cases of powered endo-nasal dacryocystorhinostomy was performed in the period of May 2017 to March 2018 in the Department of Ophthalmology in conjunction with Department of Otorhinolaryngology, Narayan medical college and hospital Jamuhar Sasaram, Bihar. Level of blockage was diagnosed by lacrimal syringing and probing, Jones dye test and dacryocystography. Surgery was done under local anesthesia except in children and uncooperative patients where general anesthesia was used. For endo-nasal DCR 0 and 30-degree rigid endoscope was used for surgery.

**Results:** Functional success and symptomatic relief were more in powered DCR. Powered endo-nasal DCR surgery was found to be quicker to perform than conventional endo-nasal DCR surgery. Patient satisfaction was significantly higher in the powered endo-nasal DCR group. Complication of powered endoscopic DCR was low.

**Conclusions:** Powered endo-nasal DCR surgery offers a very attractive alternative to the well-established technique than conventional Endo-nasal DCR for the treatment of primary acquired nasolacrimal duct obstruction with better success rates, shorter surgical time and higher patient satisfaction.

**Keywords:** DCR, Conventional, Powered, Endoscopic, Epiphora, Success, Lacrimal

## INTRODUCTION

Dacryocystorhinostomy (DCR) consists of creating an alternative lacrimal drainage pathway to the nasal cavity to restore permanent drainage of the previously obstructed excreting system. The opening is normally made at the level of lacrimal bone.

The individual canaliculi are generally just under 1 centimeter in length before they merge to become the common canaliculus. Fewer than 10% of the individual will not have a common canaliculus and instead have canaliculi that drain to the sac individually.<sup>1</sup> Mucosa of lacrimal sac is continuous with that of the conjunctiva through lacrimal canaliculi and with the nasal mucosa through nasolacrimal duct the sac has a fibro-elastic wall surrounded by fibers of the orbicularis oculi muscles.<sup>2</sup>

There are many valves involved in the lacrimal transport.<sup>3</sup> In powered endoscopic DCR, less disturbance of the lacrimal pump mechanism.<sup>4</sup> During powered endoscopic DCR silicone stents may be placed according to surgeon preference.<sup>5</sup> The lacrimal sac or nasolacrimal duct is the site of obstruction in more than 70% of cases of physical obstruction of the lacrimal out flow system.<sup>6</sup> The lacrimal duct descends within the thick bone of the frontal process of the maxilla and lacrimal bone for roughly 12mm before reaching the inferior meatus.<sup>7</sup>

Despite the advantages, the general impression is that endo-nasal DCR has a lower success rate than external DCR.<sup>8</sup> It was not until the 1980s, with the adoption of the endoscope for sinus surgery, that an endo-nasal was approach was again described.<sup>9</sup>

The objective of this study was to compare the result and advantage of both conventional endo-nasal DCR and powered endo -nasal DCR regarding patency rate, patient compliance, intra-operative and post-operative complications.

## METHODS

### *Place of study*

The study was carried out in otorhinolaryngology and ophthalmology Department of Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India.

### *Duration of study*

Study was conducted over a period of 11 months from May 2017 to March 2018.

### *Selection criteria*

Study subjects obtained according to the following criteria:

#### *Inclusion criteria*

Inclusion criteria were symptom of watering from eye, painless/painful swelling, sticky eye and nasal discharge; primary acquired nasolacrimal duct obstruction (PANDO).

#### *Exclusion criteria*

Exclusion criteria were cases of canalicular /punctal obstruction; secondary acquired nasolacrimal duct obstruction (SANDO).

### *Sample size*

160 cases were limited into two groups.

## *Study design*

A prospective study was carried out in 160 cases. Out of 160, Group 1, was included 60 patients who were undergo for conventional endo-nasal DCR and in Group 2, was include rest of the 100 Cases who were undergo for powered endoscopic DCR by using O<sup>0</sup> Rigid Nasal Endoscope. Patency of the stoma was checked by sac syringing for conventional end-nasal DCR and powered endoscopic DCR. Patients had been called for follow up at 1, and 3 month after operation. The outcome of conventional and powered Endoscopic DCR operation were categorized into complete cure, partial cure or no improvement according to the degree of symptomatic relief following operation

## *Conventional endoscopic technique*

The middle meatus was prepared using 2% xylocaine and adrenaline. A 0-degree rigid nasal endoscope was used to visualize the middle meatus. A lacrimal dilator was used to dilate the punctum of the superior canaliculus. A Brownmann lachrymal probe was used to assess patency of the superior, inferior, and common canaliculus. A Rosen sickle knife was used to elevate the mucosa and underlying lacrimal bone off the lacrimal sac. This was then removed with a blackesley forceps. The thick frontal process of the maxilla overlying the anterior portion of the anterior portion of the lacrimal sac was trimmed using a fine backward biting Hyack-Kofler punch. The entire medial wall of the lacrimal sac, this was exposed with help of endoscopic light and tenting its medial wall. This was incised in its vertical length as anteriorly as possible. A posteriorly based flap of the medial sac wall was then removed with the Blacklesley forceps. This exposed the internal structure and contents of the lacrimal sac to the middle meatus. Only sufficient nasal mucosa (overlying the sac) was removed to expose the sac, tacking care that once bone over the sac had been removed the mucosa edge and lacrimal sac were closely opposed. No stent was used and packing was done.

## *Powered endoscopic technique*

The all steps were same as conventional technique except microdebrider instead of Hyack- Kofler punch forceps.

## *Statistical analysis*

Results on continuous measurements are presented on Mean±SD (min-max) and results on categorical measurements are presented in number (%). Chi-Square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Significant figures are suggestive significance (p=0.05-0.10), moderately significant (p=0.01-0.05), strongly significant (p value less than 0.01).

**RESULTS**

The present study was based on observation of total patient 160. All patients were selected for only one eye operation. 140 patients had unilateral diseases and 20 had bilateral disease. Of these 140 cases 60 were male and the rest of 80 were female (Table 1). 100 cases underwent for powered endoscopic DCR and rest of 60 cases underwent conventional endo-nasal DCR.

**Table 1: Unilateral vs. bilateral cases of chronic dacryocystitis.**

Side	No. of case	Percentage (%)
<b>Unilateral</b>	140	87.5
<b>Bilateral</b>	20	12.5

**Table 2: Fresh vs. failed cases of chronic dacryocystitis.**

Cases	No. of patient	Percentage (%)
<b>Fresh</b>	138	86.25
<b>Failed</b>	22	13.75

The minimum age of registration for powered endoscopic procedure was 14 year and maximum age was 56 year with the mean of 40 year while minimum age of registration for conventional endo-nasal DCR was 18 year and maximum age was 65 year with a mean of 46.0 year. Unilateral cases and bilateral case were 80% and 20% respectively. There were 138 (86.25% fresh) cases as compared to 22 (13.75%) failed DCR cases (Table 2). Out of 22 failed cases 6 had previous history of conventional endo-nasal DCR surgery without stent. 102 patients out of 140 patients presented with symptoms of lacrimation. 28 had mucocele at the time of presentation along with epiphora. 100 patients were diagnosed with acute dacryocystitis preoperatively on the basis of symptoms (Table 3). They were treated medically before operation.

**Table 3: No. of patients giving symptoms.**

Cases	Symptom	No. of patient	%
<b>Unilateral (n=144)</b>	Lacrimation	102	70.83
	Pain full swelling with lacrimation	28	19.47
	Painless swelling with lacrimation	8	5.54
	Fistula	6	4.16
<b>Bilateral (n=16)</b>	Lacrimation	6	37.50
	Pain full swelling with lacrimation	4	25
	Painless swelling with lacrimation	4	25
	Fistula	2	12.5

The level of obstruction was compared in 2 groups. Lacrimal sac/nasolacrimal duct was most common site of

obstruction noted in 82 eyes (82%) of powered endoscopic DCR group and 46 (76%) of conventional endoscopic DCR group (Table 4).

**Table 4: No. of patients having level of obstruction in lacrimal system.**

DCR	Level of obstruction	No. of patient	%
<b>Powered endoscopic (n=100)</b>	Lacrimal sac/NLD	82	82
	Canalicular	10	10
	Punctual	8	8
<b>Conventional endoscopic (n=60)</b>	Lacrimal sac/NLD	46	76
	Canalicular	6	10
	Punctual	8	14

The mean duration of symptoms in powered endoscopic group was 1.5±0.698 year and in conventional endo-nasal DCR group was 1.46±0.74 year. The average duration of powered endoscopic DCR surgery was 48 min and 66 min for conventional endoscopic DCR (p<0.001) which was statistically significant.

**Table 5: Complication in conventional and powered endoscopic DCR.**

Procedure	Complication	No. of patient	%
<b>Conventional endoscopic DCR (n=60)</b>	Intra operative and post-operative excessive bleeding	20	33.3
	Lacrimal sac flap loss	8	13.33
	Loss of nasal mucosa	4	6.66
	No	28	46.66
<b>Powered endoscopic DCR (n=100)</b>	Intra operative and post-operative excessive bleeding	10	10
	Lacrimal sac flap loss	4	4
	Loss of nasal mucosa	4	4
	No	82	82

Complications included excessive intra-operative bleeding in conventional and powered Endoscopic DCR surgery was 20 and 10 patients respectively, 8 patients had lacrimal sac flap loss during separation of lacrimal sac from lacrimal fossa, loss of nasal mucosa during bone cutting, in 4 patients in conventional endoscopic DCR, it means less% of complication in powered Endo –nasal DCR (Table 5). At 3 months’ interval, patency of

lacrimal passage was tested and we found complete cure rate% more in powered endo-nasal DCR (Table 6).

**Table 6: Result based on syringing after conventional and powered endoscopic DCR.**

	No. of patient	%
<b>Result (based on syringing) for powered endoscopic DCR</b>		
Complete cure	80	80
Partial cure	16	16
No improve	4	4
<b>Result (based on syringing) for conventional endo. DCR</b>		
Complete cure	42	70
Partial cure	14	23
No improve	4	7

## DISCUSSION

Powered endo-nasal DCR had gained increasing popularity and acceptance in the last decade for the treatment of primary nasolacrimal duct obstruction. Powered endo-nasal DCR has lesser complication rate as compared to conventional endo-nasal DCR surgery.

Various studies have compared powered endo-nasal DCR technique to the conventional endo-nasal DCR technique. In present study complete success rates of powered endo-nasal and conventional endoscopic DCR surgeries found statistically significant success rates (80 versus 70%) at a mean follow-up period of 1.9 months. Amit Pal Singh et al found in 15 patient success rate in conventional endo-nasal DCR has found 83.3%, and intra-operative and post-operative excessive bleeding found in 2 patients (13.2%).<sup>10</sup> In our study we found in conventional endo-nasal DCR, success rate was 93% and intra-operative and post-operative excessive bleeding was found in 33.3%. In powered endoscopic DCR excessive intra-operative and post-operative bleeding was found in 10% only. The success rates more in powered endo-nasal DCR and patient satisfaction was noted to be slightly higher with conventional endo-nasal DCR surgery. The complete success rate may be higher due to the shorter surgery time; quicker return to work and lesser follow-up appointments. Surgical technique is significant contributors to achieving a high success rate in DCR surgery. Both surgical procedures have minimal rates of hemorrhage, but there is a lower to nil risk of cerebrospinal fluid rhinorrhea in powered endoscopic DCR surgery.

Serious complications including orbital and subcutaneous emphysema, retro-bulbar hemorrhage, medial rectus paresis, and orbital fat herniation are rare in the medical literature for both forms of DCR surgery. Singh et al has found orbital fat herniation in 1 patient (0.021%) out of 15 patient underwent for conventional endo-nasal DCR.<sup>10</sup>

In our study we did not found any orbital fat herniation or serious complications in our study.

Complications of powered endoscopic DCR were low but can include re-stenosis of the opening, bleeding from the nasal cavity, orbital injury or canaliculi erosion. Wormald et al used a similar technique in endoscopic DCR to fully expose the lacrimal sac and marsupialize it into the lateral nasal wall with the nasal and lacrimal mucosa in apposition. They achieved high long-term success rates with this approach at 89%.<sup>11</sup>

Surgical success was defined as both anatomical patency and symptom relief in our study, giving more conservative results. Symptom relief of flow-related symptoms is not achievable in every patient, especially if there is hydraulic resistance of the canaliculi and nasolacrimal duct. Evidence for powered endoscopic DCR appears to be comparable to be better than conventional endoscopic DCR, with success rates ranging from 96% to 93%.

## CONCLUSION

Intranasal powered endoscopic DCR, is a simple, minimally invasive, day care procedure and had comparable result with conventional endoscopic DCR and is now considered safe alternative when it comes to treating nasolacrimal duct obstruction. Powered Endoscopic DCR may be indicated on a primary basis or as revision surgery following failed conventional endoscopic DCR. Complication rate was lower in powered endoscopic DCR than those with conventional endoscopic DCR.

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