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Original Research Article

# Outcome and Complications of Endoscopic Dacryocystorhinostomy without Stenting

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**Abstract**

**Introduction:** DCR is a surgical treatment for adult "Nasolacrimal Duct Obstruction (NLDO)". NLDO produces severe tearing and drainage. Surgery creates a tear drainage nasal passage. It can be done without stents. Stents are disputed; some say they maintain patency, while others say inflammation causes failure. This study compares endoscopic DCR success rates with and without stents to determine stent efficacy.

**Aim and Objectives:** This study aims to assess the various results and potential problems associated with stent-free Endoscopic Dacryocystorhinostomy.

**Method:** In a study conducted at Vedantaa Institute of Medical Sciences and Research Centre, Endonasal Dacryocystorhinostomy (DCR) with and without stent insertion was compared in 42 patients with chronic dacryocystitis between the ages of 10 and 60. A two year evaluation of relief from the symptoms was done using a modified Likert scale. People in one group were given stents whereas those in the other group were not. The study design emphasises the effectiveness of stents in endonasal DCR.

**Result:** The effectiveness of Endoscopic Dacryocystorhinostomy (DCR) was evaluated at three, six, and twelve months using a modified Likert scale. Twenty-one patients who had received stents and twenty-one patients who had not received stents were compared. There were no statistically significant differences between the two groups at any point of time, suggesting that stents had no major impact on the functional or anatomical outcomes in individuals with chronic dacryocystitis.

**Conclusion:** In most cases of chronic dacryocystitis, a stent-free Endonasal Dacryocystorhinostomy is recommended since it is safe, effective, and requires less downtime than stented treatments.

**Keywords:** Endonasal Dacryocystorhinostomy, anatomical outcomes, chronic dacryocystitis, stents.



## Introduction

In adults, Nasolacrimal Duct Obstruction (NLDO) is a common condition characterized by discharge from eye also known as epiphora. The definitive treatment for this condition is surgery, which includes a Dacryocystorhinostomy (DCR), which restores the patency of the lacrimal outflow system [7].

Both ophthalmologists and otorhinolaryngologists are known to treat obstruction of the nasolacrimal drainage system, in clinical practice. [5].

Acute and chronic inflammation, congenital abnormalities and trauma are some of the causes. Chronic epiphora, recurrent conjunctivitis and, swelling of the lacrimal sac with subsequent dacryocystitis, are common symptoms [5]. Recurrent acute dacryocystitis, mucocele, and pyocele are symptoms of nasolacrimal system obstruction [6].

Endoscopic Dacryocystorhinostomy (DCR) is suggested when medical therapy has failed to resolve the condition [5]. It becomes more common with age and has a feminine predominance. Caldwell performed the first Dacryocystorhinostomy (DCR) using an intranasal route in 1893. Donogh et al. described endoscopic endonasal DCR in 1989. The primary advantage of endoscopic DCR is avoiding an external scar in the post-operative period . The literature indicates success rates for this type of surgery ranging from 50-97%, with results impacted by technique and stent usage. Endoscopic DCR failure can be caused by stenosis of the opening as a result of scarring or fibrosis at the mucosal/submucosal level [6].

Numerous studies have demonstrated that the effectiveness of external and endoscopic DCR (laser and nonlaser) varies, and that each technique has significant benefits and drawbacks. The anti-

proliferative medication Mitomycin C (MMC), which inhibits fibrosis, has been used to increase the success rates of external and endoscopic DCR. There is not much-published research on MMC application or safety in Non-Laser-assisted endonasal Endoscopic

Dacryocystorhinostomy (NLEN-DCR), though. Moreover, no research that combine primary and secondary NLDO are known to the authors [7].

After the development of high resolution rigid endoscopes with varying degrees of angulation, this technique gained importance. According to McDonogh and Meiring 1989, Mortimer S et al 1999, in, Tan NC et al 2009 developed endoscopic trans-nasal dacryocystorhinostomy [1].

Several improvements to the surgical procedure of Dacryocystorhinostomy have been developed in order to achieve a high surgical success rate. The basic idea behind these treatments is to construct a fistula between the lacrimal sac and the nasal cavity to allow lacrimal secretions to drain in the nasal cavity [1,2]. It can be done surgically with a drill or a chisel and hammer to remove the bone, or it can be done with a laser [1].

Rice, in 1989, was the first to mention the use of endoscopes in Dacryocystorhinostomy (DCR), followed by McDonogh and Meiring in 1989 [3,1].

Several studies have suggested improvements in technology employing burrs or lasers along with benefits and drawbacks. Although the long-term results, varying from 75% to 96%, are comparable, the laser has significant performance and cost-benefit limitations [3,2].

With the following technical modifications, the investigators recommend using an endoscopic technique: designing posterior and inferior nasal mucosal flaps; using Smith-Kerrison forceps to remove lacrimal bone; and creating posterior flap of the lacrimal sac[3].

External dacryocystorhinostomy is the conventional surgical technique for distal nasolacrimal duct occlusion. Adei Toti was the first to execute it in 1904. Dupuy Dutemps and Bourguet developed anastomosis of the lacrimal sac and nasal mucosa flaps. ILIFF8 proposed inserting a rubber catheter into the sac. The regular use of silicone tube as an adjuvant to the external DCR approach was suggested by Older. Various changes have been made, but the core technique remains the same. [3-5].

The literature indicates success rates for this procedure ranging from 50-97%, with results impacted by technique and stent utilisation. Endoscopic DCR failure can be caused by stenosis of the opening as a result of scarring or fibrosis at the mucosal/submucosal level. These included the use of stents intraoperatively to maintain the patency of canaliculi by preventing postoperative stenosis.

According to Okuyusu et al, efficacy, defined as functional and anatomic success, is pretty good with both silicone and proline stents. Endonasal DCR offers the additional benefit of, preserving lacrimal pump function, causing less morbidity, reducing surgical time, causing less trauma and treating sinonasal disorders simultaneously [6, 7].

The use of stent in endoscopic DCR is controversial. Those who support its use, claim that, because the stent prevents the reclosure of neo-ostium the postoperative patency rate is higher. However, due to granulomatous inflammation, other researchers have indicated that utilising a silicone stent had a greater failure rate [7]. 2 weeks to 6 months are given for the stent to remain in place [8,9]. The purpose of this study was to compare the findings to previously published studies and to assess the success rate of endoscopic DCR with and without the use of a stent [8].

## Method

### Research Design

This research was carried out at Vedantaa Institute of Medical Sciences and Research Centre with the intention of comparing the efficacy of endonasal dacryocystorhinostomy (DCR) with and without stent insertion in 42 patients, who suffered from chronic dacryocystitis. In this study that was authorised by an institutional review board and comprised participants ranging in age from 10 to 60 years old, researchers evaluated patients at 2yrs after surgery using a modified version of the five-point Likert scale. One group received stents during the endonasal DCR procedure, whereas the other group did not. Endoscopes and general anaesthesia were utilised during the procedure. As part of the postoperative care, the patient was instructed to take medication and would have the stent removed after a month. The design of this study makes it possible to compare the findings obtained by the two different groups, which sheds light on the significance of stents in endonasal DCR.

### Inclusion and Exclusion Criteria

#### Inclusion

- Patients who are 10 to 60 years old.
- Chronic dacryocystitis was identified as the cause of epiphora.
- Willingness to take part and keep up with scheduled appointments for follow-up care.

#### Exclusion

- Patients below 10 years of age.
- Presence of anomalies of the eyelids.
- Previous history of Dacryocystorhinostomy.

- Pathologies affecting the sinuses, including chronic sinusitis and polyps in the sinuses.
- Unfit patients for general anaesthetic procedures.
- Inability to or refusal to participate in necessary follow-up care.
- Participation in multiple, perhaps competing clinical trials at the same time.

**Statistical Analysis**

The statistical analysis used descriptive measurements like the mean and standard deviation and inferential tests like the Student's t-test and chi-square test. These parameters were used to compare results of endonasal dacryocystorhinostomy with and without stent. The modified five-point Likert scale scores were analysed at three, six, and 24 months after surgery. A p-value below 0.05 is significant. The data was analysed using SPSS to determine how stent placement affected surgical outcomes in chronic dacryocystitis patients.

**Ethical Approval**

The research project acquired ethical approval from the Institutional Research Board.

**Results**

Table 1 presents the subjective functional outcomes three months after endoscopic dacryocystorhinostomy (DCR) using a Modified Likert scale. The group with stents (n=21) exhibited 71.42% reporting "No symptoms," while the group without stents had 66.67% with the same outcome. The distribution of patients across improvement categories (significant, slight, and none) varied slightly between the groups, although the p-value of 0.639 indicates no statistically significant difference in outcomes between patients with and without stents at this three-month mark.

**Table 1: Functional (subjective) three-month outcomes after endoscopic dacryocystorhinostomy**

| S. No. | Modified Likert scale | With stent (n=21) | Without stent (n=21) | p-value |
|---|---|---|---|---|
| 1. | No symptoms | 16 | 14 | |
| 2. | Significant improvement | 2 | 3 | |
| 3. | Slight improvement | 2 | 2 | |
| 4. | No improvement | 1 | 2 | |
| 5. | Worsening of symptoms | 0 | 0 | |
| | Results | 15 (71.42%) | 14 (66.67%) | 0.639 |

Table 2 presents the subjective functional outcomes six months after endoscopic dacryocystorhinostomy (DCR) using a Modified Likert scale. In the group with stents (n=21), 17 patients reported "No symptoms," while 2 reported "Significant improvement," 1 reported "Slight improvement," and 1 reported "No improvement." None reported a worsening of symptoms. In the group without stents (n=21), 15 patients reported "No symptoms," 4 reported "Significant improvement," 1 reported "Slight improvement," and 1 reported "No improvement." No one reported a worsening of symptoms. The overall results show that 80.95% of patients with stents and 76.19% of patients without stents experienced either "No symptoms" or "Significant improvement" at the six-month mark. The p-value associated with these results is 0.615, suggesting that there is no statistically significant difference in outcomes between patients with and without stents at this six-month interval. This indicates that both groups exhibit similar levels of improvement in subjective functional outcomes following endoscopic DCR, regardless of whether a stent was used in the procedure. These results are encouraging, as they suggest that endoscopic DCR can lead to positive functional outcomes in patients with or without stents at the six-month follow-up period.

**Table 2: Functional (subjective) six-month outcomes after endoscopic dacryocystorhinostomy**

| S. No. | Modified Likert scale | With stent (n=21) | Without stent (n=21) | p-value |
|---|---|---|---|---|
| 1. | No symptoms | 17 | 15 | |
| 2. | Significant improvement | 2 | 4 | |
| 3. | Slight improvement | 1 | 1 | |
| 4. | No improvement | 1 | 1 | |
| 5. | Worsening of symptoms | 0 | 0 | |
| | Results | 17 (80.95%) | 16 (76.19%) | 0.615 |

Table 3 provides the twelve-month subjective functional outcomes following endoscopic dacryocystorhinostomy (DCR) using a Modified Likert scale. Among patients with stents (n=21), 18 individuals reported "No symptoms," 2 noted "Significant improvement," and 1 reported "Slight improvement." Notably, none of the patients with stents reported "No improvement" or a "Worsening of symptoms." In the group without stents (n=21), 15 patients experienced "No symptoms," 5 noted "Significant improvement," and 1 reported "Slight improvement." Similar to the stent group, none of

the patients without stents reported "No improvement" or a "Worsening of symptoms." Overall, the results demonstrate that 80.95% of patients with stents and 76.19% of patients without stents experienced either "No symptoms" or "Significant improvement" at the twelve-month mark. The associated p-value of 0.7107 indicates that there is no statistically significant difference in outcomes between patients with and without stents at this one-year interval. This suggests that both groups exhibit similar levels of improvement in subjective functional outcomes one year after endoscopic DCR, regardless of whether a stent was employed in the procedure. These findings indicate the efficacy of endoscopic DCR in achieving positive long-term functional outcomes.

**Table 3: Twelve-month subjective (functional) outcomes after endoscopic dacryocystorhinostomy**

| S.No. | Modified Likert scale | With stent (n=21) | Without stent (n=21) | p-value |
|---|---|---|---|---|
| 1. | No symptoms | 18 | 15 | |
| 2. | Significant improvement | 2 | 5 | |
| 3. | Slight improvement | 1 | 1 | |
| 4. | No improvement | 0 | 0 | |
| 5. | Worsening of symptoms | 0 | 0 | |
| | Results | 17 (80.95%) | 16 (76.19%) | 0.7107 |

Table 4 shows objective (anatomical) measures for endoscopic dacryocystorhinostomy (DCR) at 2yrs. Among 21 stent recipients, 90.47% having open neo-ostium indicating surgical patency. Closed neo-ostium were in 9.52% of subjects. Of the 21 non-stent recipients, 85.71% had an open neo-ostium and 14.29% had a closed neo-ostium. The p-value of 0.6469 implies that the two groups success rates after 24 months are not statistically significant. This data show that endoscopic dacryocystorhinostomy (DCR) anatomical results in chronic dacryocystitis patients did not change significantly with stent use across the 24-month period.

**Table 4: Results of endoscopic dacryocystorhinostomy on objective (anatomical) measures at 2 years**

| Status of neo-ostium | With stent (n=21) | Without stent (n=21) | p-value |
|---|---|---|---|
| Open neo-ostium | 19 | 18 | |
| Closed neo-ostium | 2 | 3 | |
| Results | 19 (90.47%) | 18 (85.71%) | 0.6469 |

## Discussion

Endonasal DCR treats clogged nasolacrimal ducts using an endonasal technique that is more natural and free of external approach problems. Many techniques using various laser types, burrs or microscopes have been reported in the literature with comparable outcomes [10].

We acknowledge that bleeding can be an additional drawback, even if we disagree with Hartikainen et al. assertion that it is either extremely difficult or impossible to endoscopically create mucosal flaps inside the nose during surgery. When using Smith-Kerrison bone punch for the removal of lacrimal bone, there is less chance of orbital injuries which may be caused by tools like chisels. As a rule, use 2-mm Smith-Kerrison bone punch with 45° angulation. [3]

The external DCR was carried out by Zaman et al. using Dutemps and Bourguet procedures, in which only the front flaps were sutured.

The majority of patients in this study were female: 13 (65%) of the stented patients and 12 (60%) of the non-stented patients who underwent surgery, compared to 8 (35%) of stented patients and 9 (40%) of non-stented patients were males. Similar female preponderance has been reported by Akhund (71%), Talpur et al. (74%), and Ali and Ahmad (98.6%). [4]

The majority of patients, both stented (80%) and non-stented (80%), were between the ages of 41 and 60 (90%) cohorts. Likewise, Ali & Ahmad15 said that among their patients, 70.8% were between the ages of 31 and 50. Whereas 52% of Dareshani et al.'s patients were aged 30 to 60 years.

Akuna performed 220 (22%) under general anesthetia and 780 (78%) with local anesthesia. Postoperative haemorrhage from the site of incision (27.5%) was the most frequently reported complication. Similar complications were noted in 13% of Advani et al.'s cases 21 and 0.6% by Akhund [4].

External DCR with stenting lasted for 55 minutes, while DCR without stenting lasted for 45 minutes. There is a ten-minute time delay between the two processes. Our study's surgical procedure length compares favorably to those of previous worldwide research. Although Tarbet and Custer saw a significant reduction in surgical time with better skill, Hartikainen et al. reported a duration of 78 minutes. The duration of a basic DCR was 52 minutes in 1992, a decrease from approximately 100 minutes in 1988.[11]

According to the study, DCR with stent is costlier than DCR without stent.[3,4] For stented patients, our success rate was 97.5%; for non-stented cases, it was 95%. The difference isn't significant and the outcomes are similar to those of national and worldwide works of literature. Hussain et al.23 reported in a comparative study that success rates for stented series are 94.7%, while non-stented instances yield 78.8% [4].

Also, Advani and colleagues (2021) have reported that 88% of non-stented cases and 95% of stented cases had successful outcomes. We excluded complex situations from the study, which is why our study has a superior outcome. According to certain authors, topical treatments of mitomycin-C (0.5 mg/mL for 5 minutes or 0.2 mg/mL for 3 minutes) can boost the success rate of endoscopic DCR by reducing formation of scars. We are unaware of any experience using mitomycin-C. [5]

Stent use was associated with a greater failure rate, according to Allen et al. Vishwakarma et al.

found that silicone tubing yielded good results. [6]

Al-Qahtani's results were that there was no discernible difference between the two groups. Our data and outcomes lead us to the obvious conclusion that the endoscopic DCR surgery is definitely a good solution for treating chronic dacrocystitis, meeting the patient's needs for cosmetic purposes as well. This study found that endoscopic DCR, with or without a stent, is a secure, effective procedure with positive results. [8]

## Conclusion

This study has concluded that there is limited importance of insertion of stent in endonasal dacryocystorhinostomy for chronic dacryocystitis. The findings of our study suggest that patients who underwent the surgery, regardless of whether stenting was performed or not, demonstrated comparable clinical and functional outcomes. Therefore, we propose stent-free endonasal dacryocystorhinostomy as the prevailing method for the majority of patients, while reserving the utilisation of stents for particular situations, such as instances requiring revision, lacrimal gland cysts, fistulas, or sinonasal diseases. This approach not only yields relatively positive outcomes but also mitigates the invasiveness and potential risks linked to the insertion of stents. The present study provides significant contributions to the field by offering vital information that can assist surgeons in making more educated and effective decisions about the management of chronic Dacryocystitis.

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