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Original Research Article

An Evaluation of Complications and Outcome of Endoscopic Dacryocystorhinostomy without Stenting

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Abstract

Introduction: The lacrimal system is composed of fluid channels and canalicular system. There are several diseases that occurs in these fluid channels and canalicular system and one of the most common is chronic dacryocystitis which occurs due to the blockage of nasolacrimal duct which in turn occurs due to the infection of the lacrimal sac. Trauma and iatrogenic causes are the most frequent mechanism of injury to the nasolacrimal duct. In this cases, endoscopic dacryocystorhinostomy (DCR) is performed. In this, usually, stent is used which later, in some cases, proved to bring complications like scarring and granulation and retaining the clinical features of chronic dacryocystitis.

Aims and Objectives: This study is intended to evaluate whether DCR is possible without using stent and its clinical significance as compared to the DCR by using stent.

Methods: This is a prospective study which has included the patients who underwent DCR due to chronic dacryocystitis. In some cases, stent is used as usual (control) and in some cases, stent is not used which is the objective of this study (intervention). DCR is performed and the clinical improvements and complications are evaluated.

Results: The study found that the clinical features improved as observed during the follow up after the surgery but it is not significantly higher in intervention group than control group. The study has also found that the complications of the patients in Intervention group was significantly lower than the control group ($p<0.05$).

Conclusion: The study has statistically shown that the endonasal DCR can be done effectively without using stent for epiphora and nasolacrimal duct obstruction. Operating without stents improves the clinical features but it is not significant from that of using stent. However, the complications in DCR without stent is significantly lower than DCR with stent. Therefore, it is better to choose DCR without stent although, more studies are advised.

Keywords: stent, DCR, dacryocystitis, dacryocystorhinostomy, nasolacrimal duct

Introduction

The lacrimal system is essentially a network of fluid channels and pools. The lacrimal sac is one pool, the eye is another pool, and the nose is the third pool [1]. The canalicular system, a network of channels that transports tears from the eye pool to the

lacrimal sac pool, receives the lacrimal secretion first. The tears are transported from the lacrimal sac to the nose, where they are swallowed, via a second pathway known as the nasolacrimal duct (NLD) [1]. The most frequent cause of epiphora is chronic dacryocystitis. It is a persistent, low-grade infection of the lacrimal sac that eventually obstructs the nasolacrimal duct (NLDO). The disease's symptoms include watery eyes or purulent discharge from the eyes along with visual problems brought on by a persistent tear film. In females, it occurs 4-5 times more frequently [1]. Chronic inflammation is the most typical cause of the condition [2]. Local trauma and iatrogenic injury are possible additional causes [2].

Nasolacrimal drainage system inflammation is a common condition that finally obstructs the drainage tract. Endoscopic dacryocystorhinostomy (DCR) has become a well-liked and established technique for patients with obstruction of the lacrimal system as a result of the development of nasal endoscopes and better illumination sources [3]. The key benefits of endoscopic DCR are the preservation of the orbicularis muscle's pump function and the absence of scarring [4].

According to the literature, this operation has success rates between 50% to 97%, and the use of silicone stents and good technique both affect the outcomes [5, 6]. The main reason for endoscopic DCR failure is neoostium stenosis, which is brought on by fibrosis or scarring at the mucosal/submucosal level. Many intraoperative adjuncts have been used to increase the DCR success rate. To maintain the patency of canaliculi and neoostium by preventing postoperative synechiae, these techniques included the intraoperative use of nasolacrimal silastic stents [7, 8]. However, debate surrounds the use of silicone stents. According to several researchers, these stents may cause granulations, postoperative infections, and surgical failure [9–11].

Due to issues with proper visualizing, the intranasal approach was mainly abandoned. But during the past ten years, the operation has recovered a great deal of popularity because of sophisticated endoscopes and rhinology tools. In 1989, McDonough and Meiring and Massaro et al. [12,13] described the first endonasal Dacryocystorhinostomy operation. RICE performed the initial endoscopic dacryocystorhinostomy procedure in 1998. The inverse pathway is used in the endoscopy-assisted endonasal method. Endoscopic Dacryocystorhinostomy success rates range from 82% to 95%. The endoscopic method has the benefits of less traumatization, maintenance of lacrimal pump function, and shorter surgery duration.

The orbicularis oculi muscle's pumping activity is preserved, and the associated nasal pathology is corrected, making endoscopic DCR (Endo DCR) the preferable method over external DCR. The primary goal of all these procedures is to create a fistula from lacrimal sac and nasal cavity to facilitate the drainage of tear. In order to avoid the nasolacrimal duct obstruction, a DCR treatment entails removing bone next to the nasolacrimal sac and fusing the lacrimal sac with the lateral nasal mucosa. This creates a unique low-resistance channel that permits tears to immediately drain from the canaliculi into the nasal cavity [15].

The oculoplastic surgeon makes an incision from the lacrimal sac to the nasal cavity during an external DCR. DCR near the nose and region inferior to the eyes, the surgeon makes a small incision in the skin. The surgeon makes a tiny opening in the bone below through this incision. The nasal cavity and lacrimal sac are then connected by this aperture. To aid in maintaining the new tear duct's opening, the surgeon leaves a tiny tube in place [14].

Endoscopic DCR (Minimally Invasive), in an endoscopic DCR, the sinus surgeon and the eye surgeon collaborate to create a new passage from the lacrimal sac to the nasal cavity, bypassing the tear duct. The sinus surgeon cuts a hole in the bone that covers the lacrimal sac while operating with endoscopes through the nose cavity. After then, the lacrimal sac and the nasal cavity become connected. To assist keep the new tear duct open, the ophthalmic plastic surgeon typically inserts a tiny tube there. As a result, numerous investigations were carried out to assess and contrast the effects of Endo DCR without silicone stent [14].

Materials and Methods

Research Design

This prospective study was conducted from January 2022 to August 2022. The patients who came to Otorhinolaryngology department of our hospital were considered for this study. The patients with epiphora underwent endoscopic dacryocystorhinostomy (DCR) with or without using stent. All of these patients had nasolacrimal duct obstruction due to chronic dacryocystitis. For each patient, medical history, physical examinations, regurgitation test, syringing and probing were obtained or performed. The patients were divided based on the usage of stent in dacryocystorhinostomy. The patients were studied and analyzed as groups based on those who had dacryocystorhinostomy with stents (control) and those who had dacryocystorhinostomy without stent (intervention). The patients were included and excluded according to the criteria set by the study authors. Out of total included patients of 70, 35 patients underwent dacryocystorhinostomy without stent and another 35 underwent dacryocystorhinostomy with stent. After the endoscopic dacryocystorhinostomy, the outcome of the surgery was evaluated in terms of the success rate of the surgery and complications.

Inclusion and Exclusion Criteria

The patients of more than 15 years of age, who underwent endoscopic dacryocystorhinostomy with or without using stent in our hospital were only included. Moreover, the patients who gave consent for this study and visit the follow up were only included. The study considered 100 such patients.

The patients who did not complete the study protocol or did not visit the follow up were excluded. Few patients did not have upper and lower punctum, and/or canalicular obstruction, and/or lid laxity were also excluded. The patients with previous lacrimal surgery and bony deformity were also excluded. The study considered exclusion of such 30 patients.

Finally, applying inclusion and exclusion criteria, 70 patients were included for this current study.

Ethical Approval

The authors have explained each detail of the study to the patients. The consents from the patients have been obtained. The study process have been approved by the Ethical Approval Committee of the hospital.

Statistical Analysis

The study used SPSS and excel software for effective statistical analysis. The descriptive measurements are expressed as mean±standard deviation. The catergorical measurements were analyzed by employing chi-square test while outcomes and complications were evaluated by employing ANOVA. The level of significance was considered to be $\alpha=0.05$.

Results

The study has shown the baseline characteristics between two groups (intervention and control).

Table 1: Baseline characteristics of the study patients in both the groups

Characteristics	Intervention Group N=35	Control Group N=35	*p*-value
Age (years), mean±sd	44.52±10.25	45.14±9.55	$p>0.05$
Gender Male, n (%) Female, n (%)	 22 (62.85) 13 (37.14)	 24 (68.57) 11 (31.42)	$p>0.05$
Clinical Features			
pain in the canthus (medial or lateral), n (%)	31 (88.57)	33 (94.28)	$p>0.05$
redness and swelling of the canthus (medial or lateral), n (%)	22 (62.85)	23 (65.71)	$p>0.05$
epiphora, n (%)	35 (100)	35 (100)	$p>0.05$
pus or mucus secretion from canthus, n (%)	15 (42.85)	12 (34.28)	$p>0.05$
fever, n (%)	3 (8.57)	4 (11.42)	$p>0.05$
Duration since chronic dacryocystitis present (months, mean±sd)	5.25±1.2	5.36±1.1	$p>0.05$
Duration of the surgery (minutes, mean±sd)	41.55±21.36	43.25±19.69	$p>0.05$

The study recorded the improvement of clinical features as outcome of the surgery in intervention and control group. The study found that the clinical features improved as observed during the follow up after the surgery. Although, the number of patients in intervention group was lesser than control group, it is not significantly different ($p>0.05$).

Table 2: Clinical features found in each group

Clinical Features	Intervention Group N=35	Control Group N=35	*p*-value
pain in the canthus (medial or lateral), n (%)	1 (2.85)	2 (5.71)	$p>0.05$
redness and swelling of the canthus (medial or lateral), n (%)	3 (8.57)	4 (11.42)	$p>0.05$
epiphora, n (%)	0	0	$p>0.05$
pus or mucus secretion from canthus, n (%)	2 (5.71)	1 (2.85)	$p>0.05$
fever, n (%)	0	0	$p>0.05$

The study has also evaluated the complications of the patients in each group. Each of the complications in the follow up was found to be significantly lower ($p<0.05$) in Intervention group than Control group.

Table 3: Complications post-surgery as found in each group

Complications	Intervention Group N=35	Control Group N=35	*p*-value
Eyelid edema, n (%)	1 (2.85)	6 (17.14)	$p<0.05$
Mild nasal bleeding, n (%)	0	4 (11.42)	$p<0.05$
Granuloma formation, n (%)	0	12 (34.28)	$p<0.05$
Fibrosis at the site of neo-ostium, n (%)	0	6 (17.14)	$p<0.05$
Hypertrophied middle turbinate, n (%)	1 (2.85)	8 (22.85)	$p<0.05$

Discussion

According to a study by Prasad et al., [15] 40 participants were chosen for the study who had chronic dacryocystitis and nasolacrimal duct obstruction. Twenty patients underwent Endoscopic Dacryocystorhinostomy in Group A without stents, and the other twenty underwent the procedure with silicone stents. Subjective alleviation from epiphora, endoscopic visibility of the rhinostomy aperture, granulation tissues/synechiae at the rhinostomy site, and the outcome of sac syringing were used to establish success rates.

Complete symptom relief was accomplished in 75% of the patients in Group A, significant symptom relief in 10%, and no symptom relief in 15% of the patients, yielding an overall success rate of 85%; in contrast, complete symptom relief was achieved in 70% of the patients in Group B, significant symptom relief in 10%, and no symptom relief in 20% of the patients, yielding an overall success rate of 80%. Persistent epiphora (17.5%), ostium stenosis (25%), granulation (35%), and synechia (37.5%) were also discovered in cases in Group B.

Endo DCR may have issues like hemorrhage, infection, granulation, synechia, damage to the orbital contents, and surgical failure, just like any other nasal endoscopic surgery. In our study, other issues included stent extrusion, pain, orbital ecchymosis, and a sense of a foreign body where the surgery was performed. Stenting does not significantly improve the success of endoscopic dacryocystorhinostomy and is associated with extra issues. EDR that is carried out without stenting is more beneficial and preferred [15].

According to a study by Bhattacharjee et al., [16], endoscopic DCR was performed on 20 patients or 100% of the population. Although 2 patients (10%) experienced severe intraoperative bleeding, sufficient hemostasis was accomplished by the time the procedure was complete. After surgery, no patient experienced ecchymosis or eyelid cellulitis. Two individuals (12%) developed synechiae between the middle turbinate and the lateral wall, and one patient (5%), who had granulations, had them removed during an endoscopic follow-up. Only one patient (5%) had total regurgitation and no flow of saline into the nasal cavity, indicating surgical failure. The remaining 17 patients (85%) displayed complete cure by displaying a clear flow of saline into the nasal cavity on sac syringing.

Endoscopic DCR has been found to have a very high success rate that is on par with or better than external DCR. In comparison to earlier endonasal investigations and external DCR studies [17, 18], the problems in our study, including hemorrhage, adhesions, stomal stenosis, and ecchymosis, were limited.

When compared to external dacryocystorhinostomy, endonasal dacryocystorhinostomy has several benefits. There is no skin incision, the patient's request, a brief hospital stay, minimal tissue damage that is limited to the fistula site, and quick recuperation [19]. Only 8% (n=4) of procedures failed; one patient developed a granuloma at the neo-ostium site, two patients experienced fibrosis, and one patient had a hypertrophied middle turbinate. Similar to this, Ressionitis et al. discovered that the most typical reason for failure was occlusion of the neo-ostium by granulation tissue or fibrosis [20].

In our investigation, no intraoperative problems were found. According to the research, severe injury to the mucosa of the nasal septum or lacrimal sac might result in bleeding from the nasal cavity. Endonasal DCR risks include orbital damage, particularly when too much soft tissue is taken while removing the medial wall of the lacrimal sac, and recurrent infection of the bone covering the lower half of the lacrimal sac is not entirely removed. Indicators of a successful operation include post-operative

outcomes including the disappearance of epiphora symptoms and a positive Jone's dye test as well as the patency of the ostium opening into the lacrimal sac. Generally speaking, treating nasolacrimal duct obstruction with endonasal DCR without a stent is a successful and secure procedure [19].

In the study by Moreker et al. [21], patients with stents experienced complete symptom relief in 85% of cases, compared to 90% of patients without stents. We advise against using silicone stents during endonasal DCR to treat chronic dacryocystitis because the surgical outcomes are nearly identical whether they are used with or without a stent and because doing so can be uncomfortable for patients, increase their risk of complications, and be more expensive.

According to the study's findings, endoscopic DCR surgery, stent or not, is a safe and successful procedure with positive results. The use of silicone stents was not proven to offer any significant benefits because it prolonged surgery, increased postoperative care, and raised overall surgical costs. According to the study, there was no discernible difference in the two groups' surgical complication rates, indicating that using silicone stents does not raise the risk of synechia, granulation tissue formation, or postoperative hemorrhage. The success rate of the main operation does not appear to be increased by the silicone stent, though, at the same time. Although using silicone stents for primary endoscopic DCR does not affect long-term results, it significantly raises the cost of the treatment [22].

Conclusion

The study has statistically shown that the endonasal DCR can be done effectively without using stent for epiphora and nasolacrimal duct obstruction. The study has shown that the improvement in clinical features are found in both the groups and there is no significant difference between them ($p>0.05$) but the complications found during the follow up, were significantly different between the two groups ($p<0.05$). Therefore, this study has brought forward that DCR can be conducted without using stent. DCR without stent have shown to have significantly lesser complications which translates that DCR without using stent has higher success rate and higher acceptability among the patients. However, the study suggest to conduct more studies with larger and varied population. Regular follow up sessions are advised to track the complications. The study has pointed out DCR without stent is as effective as conventional method with reduced occurrence of complications which would increase the patients' compliance and the cost.

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