

## Endonasal Endoscopic Non Laser Assisted Dacryocystorhinostomy “A Comparison of Two Different Techniques”

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### ABSTRACT

**Background:** The occlusion of the lacrimal stoma by granulation tissue or synechia is the most common cause of surgical failure in Endonasal Endoscopic Dacryocystorhinostomy (EEDCR), several lacrimal and nasal mucosal flaps for stoma reconstruction were created, with the goal of reducing peristomal granulation tissue and thereby stomal stenosis.

**Aim of The Work:** To see how effective flapless techniques in EEDCR and maintained nasal and lacrimal mucosal flaps are at reducing stomal stenosis in EEDCR.

**Patients and Methods:** Thirty patients with primary acquired nasolacrimal duct obstruction (PANLDO) were divided into two groups: Group (A): included 15 patients who underwent EEDCR with preserved posteriorly based mucosal flap and Group (B): included 15 patients who underwent EEDCR with removal of the nasal mucosal flap. The occurrences of granulation tissue, synechia and success rate of EEDCR were compared.

**Results:** The overall success rate of EEDCR was 93.3% (14/15) for group (A) and 86.7% (13/15) for group (B) (P = 0.543) with no statistically significant difference. Granulation tissue at the ostium borders was seen in 6.7 % (1/15) of the cases in group A and % (3/15) of the cases in group B (P = 0.283), Synechia were seen in 13.3% (2/15) of group A patients compared to 20% (3/15) of group B patients (P = 0.624).

**Conclusion:** The adoption of a posteriorly based nasal mucosal flap will cover bare bone of ostium and reduce granulation tissue, scar tissue and ostium closure, and increase the EEDCR success rate.

**Keywords:** Endoscopic; Mucosal flap; Flapless; Dacryocystorhinostomy.

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### INTRODUCTION

Watering of the eyes is caused by a disturbance in the balance of tear production and tear drainage. Epiphora can be due to a functional or anatomical anomaly, Every part of the lacrimal track might be blocked by an anatomical impediment. (panctal, canalicular, common canalicular saccul, NLD and nasal) and may be inherited or acquired. Acquired NLDO could be primary or secondary (inflammatory, traumatic, tumor). PANLDO is thought to be caused by a persistent inflammatory process that results in fibrosis, stenosis, and duct ostium closure <sup>1</sup>.

Dacryocystorhinostomy (DCR), is an operation that create a passage that passes the nasolacrimal duct obstruction, restoring the tear flow in anatomical obstruction and creation of a shorter, wider passage to decrease outflow resistance in functional abnormality. DCR routes are either external, endonasal (endoscopic, non-endoscopic) or transcanalicular. Caldwell <sup>2</sup> originally reported the endonasal (non-endoscopic) technique in 1893, while Toti <sup>3</sup> first detailed the external route in 1904. Throughout the twentieth century, the external method was the preferred treatment, while the endonasal technique was neglected due to inadequate visibility.

The evolution of current endonasal endoscopic DCR (EEDCR) operation was described with the rigid fiberoptic endoscope development and installation of suitable instruments <sup>4</sup>. Since then, EDCR has been more common in the treatment of PANLDO, with positive results. Despite the fact that many ways for performing endonasal endoscopic surgery were described from 1990 to 1997, the endonasal approach's success rate was poor and not comparable to that of the exterior approach <sup>5</sup>.

The most common cause of surgical failing in EEDCR is stomal obstruction by granulation tissue or synechia. Various surgical procedures utilising various lacrimal and nasal mucosal flaps were developed in the recent ten years, to assure the primary mucosal healing, hence reducing peristomal granulation tissue and the danger of synechia development and stomal obstruction <sup>6</sup>.

In comparison to previous studies, a recent set of EEDCR studies reported success rates of up to 95%. <sup>7</sup> This is most likely due to lacrimal surgeons' enhanced understanding with endoscopic equipment and anatomy, as well as good management of postoperative mucosal healing <sup>8</sup>.

The purpose of this research has been compare the success and complication rates of EEDCRs that preserved the mucosal flap vs those that did not.

### PATIENTS AND METHODS

Thirty patients complaining of epiphora were picked up from those attending the Ophthalmology outpatient Clinic of El-Hussein Hospital, Cairo from July 2018 to July 2020. We included patients with PANLDO. Patients with a history of lacrimal surgery, lower eyelid malposition, canaliculus or common canaliculus obstruction, dacryocystitis with fistula, suspicion of malignancy, TB of the lacrimal sac, facial fractures, diseases of nose (e.g. polyps, chronic sinusitis, or atrophic rhinitis), and when Endoscopic intervention is required for many sino-nasal anomalies, such as septoplasty, turbinate operations, and sinus surgery.

After a thorough description of the study, all patients signed informed written consents. The Ethics Board of Al-Azhar University in Cairo approved the study.

For all patients, the diagnosis was determined based on a history of epiphora and preoperative assessment. included general examination, local ophthalmic examination (external, anterior segment, posterior segment and function) and specific lacrimal examination (schirmer test, slit lamp, propping irrigation, Jones 1,2 and nasal endoscopy).

#### Surgical technique

Prior to surgery, oxymetazoline (otrivin) was sprayed into the nasal airways and all surgeries were done under loco-general anaesthesia., nose was packed with gauze soaked with adrenaline (1:100,000) for 15 minutes before the operation, Injection of 1 ml 2% xylocaine and 3 ml (1: 200,000) adrenaline in saline solution to submucosa of axilla of middle turbinate.

EEDCR was done on all of the patients by a same surgeon (M S). All patients were randomly split into two groups before surgery by an impartial staff member utilising a closed envelope approach. Patients in group A were subjected to EEDCR with preserved posteriorly based mucosal flap, and those in group B underwent EEDCR with removal of the nasal mucosal flap.

The procedure was performed using 0 degree, 4mm rigid endoscope (KARL STORZ, GERMANY) and led light source (KARL STORZ<sup>R</sup>, xenon nova 175). A sickle knife has been used to make incision the nasal mucosa. Starting approximately 1 cm above the axilla and brought anteriorly for approximately 1 cm. then the incision was passed down anterior to the maxillary line to just above the inferior turbinate, and thereafter a horizontally posterior to the uncinat process insertion. Afterwards, the mucosa separated from the bone by a freer periosteal elevator creating a posterior based flap. The mucosal flap was tucked to the lateral side of the middle turbinate using neurosurgical pledgets to show the underlying bone and allow further dissection. A freer periosteal elevator was used to penetrate the maxillo-lacrimal suture and lacrimal bone. Osteotomy was then carried out 2-mm Kerrison rongeur. The chisel and

osteotome powered drill was sometimes used to remove the part of bone inaccessible with Kerrison. An osteotomy of about 1 cm in diameter was created. After the sac has been completely exposed, including the fundus and the superior portion of the nasolacrimal duct, to tent the medial wall of the lacrimal sac, a Bowman's probe was inserted from one canaliculus into the lacrimal sac, an incision was made vertical with the sickle knife in the anteromedial region of the sac to generate a large aperture in its cavity. Scissors were used to finish the incisions on the superior and inferior sides. In group A, Blackely forceps was used to trim the frontal edge of flap of the nasal mucosal to be co-adapted with the performed ostium and saccal flaps so the flaps rest together without gaps and supported in place by pieces of gelfoam. In group B, Fine-cutting forceps were used to remove the sac's borders and the nasal mucosal flap. Then silicon tube was inserted in all patients in both groups. the middle meatus was packed with gel foam then the operation side was packed with a merocele.

#### Postoperative care:

Patients were asked to attain a semi-setting position as early as possible to reduce bleeding and In the first month after surgery, they are not allowed to blow their nostrils.. Systemic antibiotic for 1 week, alkaline nasal wash was used by the patient for one month, from the 3rd week local steroid nasal spray for one month to decrease edema of nasal mucosa and granulation tissue formation. Follow-up reviews were 1 week, 2 weeks, 1 month, 3 and 6 months after operation. At every follow-up patients were examined endoscopically to remove any dried discharge or granulations at osteotomy site, till complete healing with evaluation of the ostium size and patency which is the key stone in follow up and success. The silicon tubes were removed between 2-3 months.

Functional and anatomical successes were used to determine surgical success. Anatomical success is considered as endoscopic views of a patent bone window, and functional success is considered as a lack of epiphora with no further attacks of dacryocystitis, and objective success is defined as no obstruction to fluorescein flow of the lacrimal puncta during syringing (tertiary Jones) with endoscopic evaluation and valsalva DCR bubble test.

#### Statistical analysis

The data was gathered, edited, coded, and put into IBM SPSS version 23 (Statistical Package for Social Science). When parametric data was provided, it was presented as mean, standard deviations, and ranges. Numbers and percentages were also used to represent qualitative characteristics. The Chi-square test has been used to compare groups of people who had qualitative data. Using quantitative data and a parametric distribution, the Independent test was utilised to compare two groups. P 0.05 was used to determine whether the p-value was significant.

## RESULTS

The research included 30 individuals who had EEDCR procedures performed on them. 15 patients were in Group A (mean age SD 46.3 12.5 years, range 21- 64 years; 10 females 66.7 percent) and 15 patients were in Group B (mean age SD 45.3 11.9 years, range 21- 58 years; 11 females 73.3 percent). In terms of age or gender, between the two research groups, there is no statistically significant difference. Epiphora was the most prevalent appearance in both groups (100 percent in both Groups). Purulent discharge (66.7 percent in Group A against 80 percent in Group B,  $P = 0.409$ ) and mucocele (33.3 percent in Group A versus 20 percent in Group B,  $P = 0.409$ ) were two further manifestations. NLD blockage was more common on the right side (80% in Group A vs. 73.3 percent in Group B,  $P = 0.666$ ) than on the left (20% in Group A vs. 26.6 percent in Group B,  $P = 0.666$ ).

The operative time varied from 40 to 50 minutes in group A, with a mean of 45.3 3.5 minutes, and from 35 to 50 minutes in group B, with a mean of 40.4 5.6 minutes,  $P = 0.008$ . There were no intra-operative complications in studied cases.

Early postoperative complications was lid chemosis (6.7% in both Groups  $P = 1.000$ ) (Table 1).

Early complication	post-operative	Group A	Group B	Test value	P-value	Sig.
		No. = 15	No. = 15			
Lid cheosis	Negative	14 (93.3%)	14 (93.3%)	0.000*	1.000	NS
	Positive	1 (6.7%)	1 (6.7%)			

$P$ -value  $> 0.05$ : Non significant;  $P$ -value  $< 0.05$ : Significant;  $P$ -value  $< 0.01$ : Highly significant

\*: Chi-square test

**Table 1:** Early Postoperative complications in studied cases

Synechia (13.3 % in group A against 20% in group B,  $P = 0.624$ ) and granulations tissue (6.7 % in group A versus 20% in group B,  $P = 0.283$ ) were late postoperative problems (Table 2).

		Group A	Group B	Test value	P-value	Sig.
		No. = 15	No. = 15			
Synechia	Negative	13 (86.7%)	12 (80.0%)	0.240*	0.624	NS
	Positive	2 (13.3%)	3 (20.0%)			
Granulations	Negative	14 (93.3%)	12 (80.0%)	1.154*	0.283	NS
	Positive	1 (6.7%)	3 (20.0%)			

$P$ -value  $> 0.05$ : Non significant;  $P$ -value  $< 0.05$ : Significant;  $P$ -value  $< 0.01$ : Highly significant

\*: Chi-square test

**Table 2:** Late postoperative complications in studied cases

Success was reported in (93.3% in group A versus 86.7% in group B,  $P = 0.543$ ) and failure in (6.7% in group A versus 13.3% in group B,  $P = 0.543$ ).

Outcome		Group A	Group B	Test value	P-value	Sig.
		No. = 15	No. = 15			
	Success	14 (93.3%)	13 (86.7%)	0.370*	0.543	NS
	Failure	1 (6.7%)	2 (13.3%)			

$P$ -value  $> 0.05$ : Non significant;  $P$ -value  $< 0.05$ : Significant;  $P$ -value  $< 0.01$ : Highly significant

\*: Chi-square test

**Table 3:** Outcome in studied cases

## DISCUSSION

With the progress of technology and surgical competence in recent years, the EEDCR has surpassed the traditional external DCR in popularity, despite the fact that the former has a lower proven success rate than the latter<sup>9</sup>.

Granulation tissue or synechia in between middle turbinate and lateral nasal wall occluding the lacrimal stoma is the most common cause of surgical failure<sup>10</sup>.

In the recent decade, several lacrimal and mucosal flap designs for stoma repair have been created to minimize granulation tissue and therefore ostium stenosis<sup>11</sup>.

This study compared the surgical success rates and outcomes for EEDCRs with and without the preservation of the mucosal flap.

The patient demographics in this study were similar in terms of age, gender, follow-up period, and history of symptoms in both groups with the exception of gender differences within the same group. Gender was not mentioned as a significant factor for the outcome of EEDCR<sup>12</sup>.

Both groups had comparable surgical techniques, with the exception of mucosal flap preservation, operation length, and intraoperative problems. This was in line with the findings of Zloto et al.,<sup>13</sup> who looked at EEDCRs with and without mucosal flap preservation in 107 cases and found no differences in operation time or intraoperative complications.

In this study, success was reported in 27 instances (90%) and failure in three cases (10%); there was no statistically significant difference in the success rate in between groups A and B. (93.3 percent vs 86.6 percent respectively). These findings were in line with those of Zloto et al.,<sup>13</sup> who reported success rates of 86.6 percent in the flap preservation group and 82.1 percent in the non-flap preservation group. Khalifa et al.,<sup>14</sup> stated that the success rate of 92.1 percent in the flap preservation group and 87.4 percent in the non-flap preservation group. Similarly, Ji et al.,<sup>6</sup> stated that the success rate of 98 percent in group A against control group B. (84 percent).

In the present study, an early postoperative complication was two patients, one in each group, had lid edema that resolved after 48 h. in agreement with Pradhan et al.,<sup>15</sup> study, who studied 28 patients, of which one patient had lid edema.

Synechia of ostium were seen in two patients (13%) in group A and three patients (20%) in group B in this study. Granulation tissue at the ostium was observed in four patients, one in group A and three in group B. This was in line with Ji et al 2012.'s study<sup>6</sup>, which found that granulation tissue at the ostium accounted for 15 percent (8/54) in group A and percent (22/57) in group B, and synechia were seen in five patients in group A (9%) versus 18 patients in group B. (31 percent ). These findings were also in line with those of Pradhan et al.<sup>15</sup>, who had six patients with synechia and three with granulation tissue.

In this study, we discovered that group A had a lower rate of granulation tissue and synechia development, as well as a lower failure rate, than group B. These findings imply that preserving the nasal mucosa, which adheres well to the lacrimal sac flap and covers the exposed bone, can minimise the production of granulation tissue, synechia, and ostium closure.

Although many surgical procedures have been used to improve EEDCR success rates, multiple factors can affect these rates. One of these factors was the accurate localization of the lacrimal sac by identifying the middle turbinate axilla and the maxillary line, making a posteriorly based flap, and reliably using the m-lacrimal suture line as a starting point for osteotomy. Another cause was the formation of a wide smooth bony ostium that allowed the sac (fundus and the superior portion of the nasolacrimal duct) to be completely exposed.

As synchia and restenosis are the most prevalent reasons of EEDCR failure, utilising mucosal flaps to cover the margins of the osteotomy reduces this risk and results in high success rates, as documented in the studies Muelle et al.<sup>(16)</sup>. Although Kingdom et al.<sup>17</sup> stated that EDCR without the retention of the mucosal flap produces excellent results. In other research, flap preservation vs non-preservation EEDCRs were evaluated, but no preferred method emerged. The

mucosal flap group showed considerably greater success rates than the non-flap group, according to Ji et al.<sup>6</sup>, but Khalifa et al.<sup>14</sup> and Kansu et al.<sup>5</sup> observed no differences. There were no changes in surgical success or complications rates in between the two techniques, according to Zloto et al.,<sup>13</sup> and there was no advantage to adding flap preservation to traditional EDCRs. Their surgical techniques, on the other hand, differed significantly. Ji et al.<sup>6</sup> used a merocel flap packing with no silicone stents, but Khalifa et al.<sup>14</sup> used tissue adhesive on the mucosal margins and a gelfoam patch, and Zloto et al.<sup>13</sup> employed general anaesthesia with gelfoam covering the nasal flap and silicone stent in his retrospective analysis. We like to keep the mucosal flap in EDCR, thus we shortened the nasal mucosal flap's anterior border to be co-adapted with the ostium and saccal flaps. The flaps lay together without gaps and are held in place by gelfoam apices. To avoid ostium contraction and ensure full epithalization of the osteotomy, we utilise a silicone tube as a stent.

### CONCLUSION

In endoscopic endonasal DCR, covering exposed bone of ostium with a posteriorly based nasal mucosal flap lowers the formation of granulation tissue, minimizes the risk of scar tissue formation, and increases the EEDCR success rate.

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