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Original Article

Efficacy and Safety of Adjunctive Triamcinolone in Nasal Endoscopic Dacryocystorhinostomy

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ABSTRACT

Objective: To assess safety and long-term efficacy of use of triamcinolone acetonide (TA) soaked absorbable gel foam dressing in Endoscopic Dacryocystorhinostomy in our population.

Study Design: Quasi experimental study

Place and Duration of Study: Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from Jan 2016 to Jan 2019.

Methodology: Endoscopic Dacryocystorhinostomy was performed on 103 eyes of 98 patients for unilateral or bilateral primary acquired nasolacrimal duct obstruction or previously failed Endoscopic Dacryocystorhinostomy without triamcinolone acetonide. Endoscopic Dacryocystorhinostomy was done using a standardized technique employing a 30° nasal endoscope (Karl Storz, Germany). In addition, a gel foam (15x10x5mm) soaked with 1ml of 40mg triamcinolone acetonide was threaded along the silicone tube metallic guide and advanced to ostium at the end of procedure. Anatomical success (patent lacrimal passage on irrigation), functional success (resolution of epiphora) and complications at 6 and 12 months of follow up, were the outcome measures documented and analyzed.

Results: Out of 103 cases, there were 41(39.8%) male and 62(60.2%) female patients. Mean age was 47.10±12.80 years (age range 18–72 years). Anatomical success rate of 90(87.4%) and 89(56.4%) was observed at 6 and 12 months, whereas functional success rate of 88(85.4%) was observed at both 6 and 12 months follow up respectively. No major complications were observed in our study.

Conclusion: Endoscopic Dacryocystorhinostomy with triamcinolone acetonide is a safe and effective procedure for epiphora secondary to previous failed Endoscopic Dacryocystorhinostomy or primary acquired nasolacrimal duct obstruction.

Keywords: Endoscopic dacryocystorhinostomy, Efficacy, Safety, Triamcinolone acetonide.

How to Cite This Article: *Janjua TA, Nafees AUA, Akbar B, Mirza R, Parveen S, Tarrar MS. Efficacy and Safety of Adjunctive Triamcinolone in Nasal Endoscopic Dacryocystorhinostomy. Pak Armed Forces Med J 2023; 73(Suppl-2): S355-359. DOI: https://doi.org/10.51253/pafmj.v73iSUPPL-2.7501*

INTRODUCTION

Endoscopic Dacryocystorhinostomy (ENDO-DCR) is a definitive surgical procedure employed in management of both primary and secondary nasolacrimal duct obstruction with optimal anatomical and functional success in experienced hands.[1] It resolves the symptomatic epiphora by fashioning a fistula between lacrimal sac and nasal cavity.[2] However, the failure rates have been reported from 4-13% in ENDO-DCR,[3,4] as opposed to external dacryocystorhinostomy (EXT-DCR) where the failure rate is <5%.[5] This difference may be attributable to inability to stitch the flaps of nasal mucosa and lacrimal sac in ENDO-DCR. Resultant bare bone at the edges of osteotomy invites more inflammation and granulation leading to scarring,[6,7] and cicatricial closure or stenosis of the mucosa around the ostium leading to its failure. This may also promote adhesion of septum and turbinate to ostium or may induce a proximal obstruction of common canaliculus causing anatomical failure.[8] The Application of agents like mitomycin C (MMC) or steroids raises the success rates as these adjuvants prevent the organization of granulation tissue and scarring by strong wound modulation and anti-inflammatory mechanism. This has been demonstrated by multiple trials conducted in various populations,[8-10] but unfortunately their long-term efficacy and safety has not been studied in our local population yet. Thus, rationale to conduct our study was to assess and validate safety and long-term effectiveness of use of triamcinolone acetonide (TA) soaked absorbable dressing in ENDO DCR in a cohort of Pakistani population.

METHODOLOGY

The quasi experimental study, with no control group was carried out at Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from January 2016 to January 2019, after approval from Institutional Review 277/ERB/AFIO The sample size was

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Received: 15 Jul 2021; revision received: 25 Aug 2022; accepted: 26 Aug 2022

calculated to be 95 by using formula $n=z^2x(p)(1-p)/\alpha^2$, where prevalence of primary acquired nasola-crimal duct obstruction was considered to be 6.6%.[10] Patients were recruited using non-probability conve-nience sampling technique, where all the consecutive patients diagnosed with nasolacrimal duct obstruction for elective ENDO-DCR surgery during the study period were enrolled. All potential patients were subje-cted to a comprehensive ophthalmic examination that included a slit-lamp examination, dye disappearance test, diagnostic nasolacrimal irrigation and probing, and nasal examination.

Inclusion Criteria: Patients diagnosed with nasola-crimal duct obstruction, aged more than 18 years undergoing endoscopic dacryocystorhinostomy (Endo DCR) for unilateral or bilateral primary acquired nasolacrimal duct obstruction by same orbital and oculoplastic surgeon (T.A), were included.

Exclusion Criteria: Patients with history of previous external DCR or failed DCR, preexisting sinus or nasal pathology, canalicular obstruction or a follow-up dura-tion of <6 months were excluded from the study.

A total of 103 ENDO-DCRs were done in 98 patients for unilateral or bilateral primary acquired nasolacrimal duct obstruction or previously failed ENDO-DCR without TA, by same orbital and oculo-plastic surgeon (T.A). Endoscopic DCR was done under general anesthesia using a standardized techni-que employing a 30° nasal endoscope (Karl Storz, Germany) after achieving optimal preoperative topical mucosal decongestion (soaked ribbon gauze with adrenaline 1.1000). Intraoperative mucosal decon-gestion was achieved via injection of 2.5ml of lidocaine 1% with adrenaline into the middle turbinate axilla and maxillary frontal process. An endolight of 23-gauge vitrectomy was passed through the inferior punctum and canaliculus into the lacrimal sac. Mucosa overlying maxillary frontal process was excised and the lacrimal fossa bone was gently nibbled with a Kerrison rongeurs punch to expose underlying lacri-mal sac. The lacrimal sac was tented using endo light, and a vertical incision was made in lacrimal sac medial wall after tenting it, via a keratome (Alcon, USA). It was widely marsupialized lying flat on the lateral wall nasal mucosa. Bicanalicular intubation was performed using silicone tubes. An absorbable gel foam (Spongostan) of approximately 15mmx10mmx 5mm, soaked with 1ml of 40mg TA was gently threaded along the silicone tube metallic guide. It was advanced to sit securely at ostium under endoscopic guidance. Silicon tube was tied. The gel foam we used is absorbed in 6-8 weeks' time without inducing tissue reaction. Patients were advised oral antibiotic (Tablet coamoxiclav 650mg TDS) and painkillers (Tablet mefenamic acid 500mg TDS) for 1 week in addition to topical antibiotic plus steroid eye drops (Tobramycin and Dexamethasone) and nasal decongestant (Xylo-metazoline) for 2 weeks. After the initial exam on first postoperative day, all patients were followed up fortnightly for 1 month, 3 months, 6 months and 12 months. After 3 months of ENDO DCR, Silicone stents were carefully removed under slit lamp.

Outcome measures analyzed were anatomical and functional success, intra and post-operative complications at 6 and 12 months follow up respec-tively. Anatomical success was defined as patent lacrimal passage on irrigation, while functional success was defined as resolution of epiphora.[6]

The data for this study was entered and analyzed by using SPSS ver 23.0. The descriptive statistics for continuous variables were recorded as mean and standard deviation, while categorical variables were stated as frequency and percentages. Anatomical and function success rate was reported in percentage at 6 and 12-months follow-up. Significant differences betw-een success rate and various types of diagnoses were identified using chi-square test; whereas significant differences in success rates at 6 and 12 months follow up was explored by using McNemar test. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

ENDO-DCR surgeries were performed on 103 eyes of 98 patients during the study duration. There were 41(39.8%) males while 62(60.2%) females with a mean age of 47.10±12.80 years (age range 18–72). Sequential ENDO-DCR were performed for both sides in 5(4.6%) cases, with a total of 49(45.3%) procedures performed on the right side while 54(50.0%) on the left side.

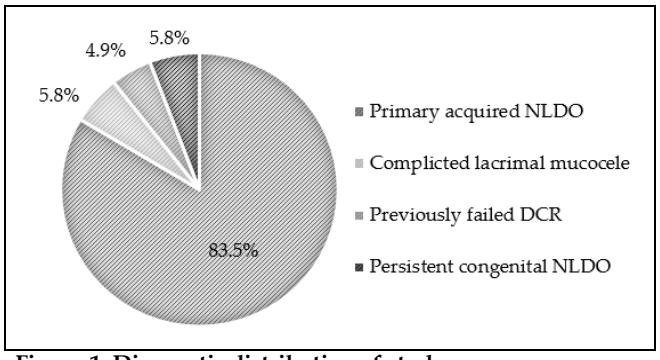

Figure-1: Diagnostic distribution of study group

In terms of diagnosis, 86(83.5%) primary acquired nasolacrimal duct obstruction, 6(5.8%) lacrimal mucocele, 5(4.9%) previously failed dacryocystorhinostomy and remaining 6(5.8%) were diagnosed with persistent congenital nasolacrimal duct obstruction as shown in above mentioned Figure-1.

In 13(12.6%) cases, middle turbinectomy was performed. All patients received bicanalicular intubation which was removed at 3 months. The follow up for anatomical and functional success rate was done at 6 and 12 months after performing the procedure.

At 6-month follow up, anatomical success was observed in 90(87.4%) patients and functional success in 88(85.4%) patients that was maintained at 12 months as shown in Table-I. There was no significant difference found between anatomical success rate at 6 and 12 months (p=1.00), similarly functional success also remained undifferentiated at 6 and 12 months (p=1.00).

Table-I: Post-ENDO DCR procedure Anatomical and Functional success rate among study participants (n=103)

	n(%) n=103	*p*-value
Anatomical success rate		
At 6 months follow up	90(87.4%)	1.00
At 12 months follow up	89(86.4%)	
Functional success rate		
At 6 months follow up	88(85.4%)	1.00
At 12 months follow up	88(85.4%)	

Comparison of anatomical and functional post-procedural success at 6 and 12 months respectively was also not statistically significant as per diagnostic distribution (p=0.752,0.757)as given in Table-II.

Other complications like cerebrospinal fluid leakage, motility defects, visual deterioration, necrosis of mucosa or bone or uncontrolled epistaxis were not observed in our study.

DISCUSSION

Endoscopic DCR was first introduced by Cadwell in 1893 for primary acquired nasolacrimal duct obstruction.[11] This procedure is superior to external DCR due to numerous advantages including absence of cutaneous scar, less surgical time and bleeding, preservation of lacrimal pump, ability to address co existing nasal pathology and early recovery with less down time. However, it took around a century before this surgery became widely accepted by ophthalmologists because the procedure is complex needing expensive equipment. Additionally, the success rates are slightly lower than the standard treatment, which is EXT-DCR. Causes of failure are multifactorial including inability to recognize hyper secretion of tears due to ocular surface diseases, missing upper canalicular obstruction, inadequate size of osteotomy and inability to stitch anterior and posterior nasal mucosal and sac flaps. This last factor leads to healing by secondary intention, associated with exaggerated inflammatory response. This is by far the most frequent reason of failure as it leads to more granulation tissue and scarring as reported by Peng *et al*.[12] In addition, adhesions between the bony ostium and nasal septum or less frequently medial turbinate formed over time also contributes towards failure of Endo DCR.[13]

To overcome this problem, Peng *et al*.[12] advocated utilizing a preserved mucosal flap to cover the underlying bare exposed bone. This technique achieves success rates (92.6%) which is comparable to ours but this approach is time consuming and difficult. A simpler solution to this complex surgical problem is use of TA soaked absorbable dressing over the newly made ostium. Steroids have inherent anti inflam-

Table II: Comparison of Anatomical and Functional Post-Procedural Success at six and twelve month as per Diagnostic Distribution(n=103)

	Diagnosis				*p*-value
	Primary nasolacrimal duct obstruction (n=86)	Lacrimal mucocele (n=6)	Previously failed DCR (n=4)	Persistent congenital nasolacrimal duct obstruction (n=5)	
Anatomical success rate					
At 6 months follow up	75(87.2%)	6(100%)	4(80.0%)	5(83.3%)	0.752
At 12 months follow up	74(86.0%)	6(100%)	4(80.0%)	5(83.3%)	
Functional success rate					
At 6 months follow up	73(84.9%)	6(100%)	4(80.0%)	5(83.3%)	0.757
At 12 months follow up	73(84.9%)	6(100%)	4(80.0%)	5(83.3%)	

Minor secondary hemorrhage was reported in only 1(0.97%) patient on second post op day, that was successfully controlled with nasal packing. Another 1(0.97%) patient had infection in the retained Spongostan, which resolved with systemic antibiotics after removal of the infected material from the nose.

matory activity, which reduces the granulation tissue formation and increases the success rates. However, their use is not without potential untoward effects like more chances of post op infections, delayed healing and necrosis of surrounding tissues. To the best of our knowledge, the body of national and international literature studying long-term safety and efficacy of application of steroids to the osteotomy is insufficient. This led us to conduct this study.

The success rates we achieved are far superior to the ones achieved without the use of TA but unfortunately, we did not have any control group. However, comparison of our results to the regional studies done without the use of TA shows higher success rates. The reported success rates by Aslam *et al*.[14] of 84% and Ayoob *et al*.[15] of 92% at 6 months but long term results were not studied by both of them. Li *et al*.[16] have reported 92% success rate at 6 months after the surgery with 5 min application of MMC to osteotomy area followed by packing soaked in TA. We achieved similar results with TA alone, proving that application of MMC can well be avoided retaining the same success rate. Jung *et al*.[17] reported use of triamcinolone-soaked packing in their 4 cases of failed endoscopic DCR with 100% success rate. Although their success is well beyond our results but this study is limited by small sample size and shorter follow-up. Both Li *et al*.[16] and Jung *et al*.[17] did not encounter any complications due to steroids which is similar to our observation.

We also considered another possibility that instead of anti-inflammatory effect of steroids the mere presence of the gel foam acting as a mechanical barrier to prevent synechia formation might have led to increased success rate. Coincidentally Chin *et al*.[18] who packed the area with ribbon gauze without soaking in steroids, published their research work online in Jan 2020. Their functional success rates in those receiving packing were not significantly different from those receiving none (85% versus 86%) which rules out the mechanical benefits of sponge.

Although the use of steroids is not without complications including increased chances of infection, delayed healing and tissue necrosis but fortunately we encountered only one complication where the Spongostan acted as a nidus for infection and had to be removed surgically. Another case of secondary hemorrhage was observed. However, we did not observe any steroid related compaction. Therefore, we are strongly convinced that triamcinolone soaked Spongostan is a safe and efficacious way to enhance the success of Endo DCR.

LIMITATION OF STUDY

One of the limitations of our study is absence of control group. Randomized controlled trials should be conducted nationally with longer follow-up to further elaborate and validate the safety and efficacy of TA in Endo DCR.

CONCLUSION

Endoscopic Dacryocystorhinostomy with triamcinolone acetonide is a safe and effective procedure for symptomatic disabling epiphora secondary to previous failed Endoscopic Dacryocystorhinostomy or primary acquired nasolacrimal duct obstruction.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

TAJ & AUAN: Supervision, Conception, Study design, analysis and Interperitation of data, Critically reviewed manuscript & approval for the final version to be published.

BA & RM: Data entry, analysis and interpretation, manuscript writing & approval for the final version to be published.

SP & MST: Critically reviewed, Drafted manuscript & approval for the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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