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Outcomes of Conventional, Mitomycin C Augmented, and Silicone Stent Assisted Endoscopic Endonasal Dacryocystorhinostomy in Patients with Nasolacrimal Duct Obstruction.

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ABSTRACT

Epiphora, often caused by nasolacrimal duct obstruction (NLDO), significantly impacts patients' quality of life. Endoscopic endonasal dacryocystorhinostomy (DCR) is a common surgical intervention. This study compares the outcomes of three DCR techniques: conventional endoscopic endonasal DCR, DCR with Mitomycin C application, and DCR with silicone stenting. A prospective observational study was conducted at a tertiary care centre over two years, including 120 patients aged 5-70 years presenting with NLDO. Patients were divided into three groups: Group A (conventional DCR), Group B (DCR with Mitomycin C), and Group C (DCR with silicone stenting). Data on age, gender, laterality, mode of presentation, and outcomes were collected and analyzed. The mean age of patients was 41 years, with a female preponderance (77.5%). Most patients (36.67%) were in the 41-50 years age group. At 3 months, Group B had the highest success rate (97.78%), followed by Group A (86.36%) and Group C (83.87%). Group B showed superior long-term patency and symptom relief. Mitomycin C application in endoscopic endonasal DCR significantly improves long-term outcomes in patients with NLDO. This study recommends the integration of Mitomycin C in DCR procedures to enhance surgical success and patient satisfaction.

Keywords: Epiphora, Nasolacrimal Duct Obstruction, Endoscopic Endonasal Dacryocystorhinostomy

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INTRODUCTION

Epiphora, characterized by excessive tearing, often results from nasolacrimal duct obstruction (NLDO), causing significant discomfort and impacting the quality of life [1]. Endoscopic endonasal dacryocystorhinostomy (DCR) is a well-established surgical intervention aimed at restoring lacrimal drainage [2, 3]. This study evaluates the outcomes of three distinct DCR techniques: conventional endoscopic endonasal DCR, DCR with Mitomycin C application, and DCR with silicone stenting. Conducted over two years at a tertiary care center, the study included 120 patients aged 5-70 years. The patients were divided into three groups based on the treatment received, and their outcomes were assessed through objective and subjective analyses [4]. This comparative study aims to determine the most effective technique in terms of patient relief and restoration of lacrimal drainage, thereby guiding clinical practice for optimal management of NLDO.

METHODOLOGY

This hospital-based observational prospective study was conducted at a tertiary care center from August 2018 to October 2020, covering a period of 2 years. The study included all patients presenting to the ENT OPD who met the inclusion criteria, specifically those referred from the Ophthalmology Department for epiphora and patients presenting to the ENT OPD with complaints of excessive watering from the eyes. The total sample size was 120 patients, calculated using appropriate statistical formulas.

Patients aged between 5 to 70 years presenting with epiphora were subjected to lacrimal sac syringing. Those found to have obstructions in the common canaliculi, lacrimal sac, or nasolacrimal duct were included in the study. Additionally, patients with chronic dacryocystitis were also included. Exclusion criteria encompassed patients suffering from other causes of epiphora such as eyelid malposition, entropion, ectropion, and those who had undergone revision endonasal dacryocystorhinostomy, secondary nasolacrimal duct block due to trauma, total maxillectomy, and patients unfit for surgery under general anesthesia.

A total of 120 patients of either sex presenting with complaints of epiphora were included after fulfilling the inclusion criteria. Written informed consent was obtained from all patients and their immediate relatives. Detailed case histories were recorded, and an ophthalmologist's opinion was sought. Clinical examinations of the nose and other paranasal sinuses were performed to identify any underlying causes of duct obstruction. Patients showing signs of acute inflammation of the lacrimal sac were treated for the condition before being scheduled for surgery.

Patients underwent dacrocystography to assess the blockage and nasolacrimal duct patency before surgery. X-ray PNS was performed to evaluate the status of the paranasal sinuses. Diagnostic nasal endoscopy was conducted to identify any DNS or nasal pathology as potential causes of obstruction. Preoperative investigations included CBC, blood group, HIV, HBsAg, LFT, KFT, BUL, RBS, BT, CT, CP, CXR PA view, and ECG.

Patients were categorized into three groups based on the necessary treatment for their underlying disease:

- Group A: Conventional Endoscopic Endonasal DCR
- Group B: Endoscopic Endonasal DCR with Mitomycin C application
- Group C: Endoscopic Endonasal DCR with silicone stenting

Each patient's demographic data, complaints, and clinical findings were meticulously documented, including laterality, duration, associated symptoms, past medical history, treatment history, and family history. Local examinations of the eye and nose were conducted, with particular attention to signs indicative of lacrimal sac obstruction. This comprehensive data collection ensured thorough assessment and appropriate management of each case.

RESULTS

Table 1: Age Distribution of Patients

Age Group (years)	Total Patients (N=120)	Percentage (%)	Group A (N=44)	Group B (N=45)	Group C (N=31)
5-10	6	5.00	2	3	1
11-20	12	10.00	4	4	4
21-30	10	8.33	3	3	4
31-40	27	22.50	10	10	7
41-50	44	36.67	15	14	15
51-60	15	12.50	6	6	3
61-70	6	5.00	4	5	1
Total	120	100.00	44	45	31

Table 2: Gender Distribution of Patients

Gender	Total Patients (N=120)	Percentage (%)	Group A (N=44)	Group B (N=45)	Group C (N=31)
Male	27	22.50	10	10	7
Female	93	77.50	34	35	24
Total	120	100.00	44	45	31

Table 3: Laterality of Disease

Laterality	Total Patients (N=120)	Percentage (%)	Group A (N=44)	Group B (N=45)	Group C (N=31)
Left Side	66	55.83	26	22	18
Right Side	45	36.67	17	16	12
Bilateral	9	7.50	1	7	1
Total	120	100.00	44	45	31

Table 4: Mode of Presentation

Presentation	Total Patients (N=120)	Percentage (%)	Group A (N=44)	Group B (N=45)	Group C (N=31)
Epiphora only	112	93.33	44	40	28
Epiphora + Mucocele	7	5.83	0	4	3
Epiphora + Pyocele	1	0.83	0	1	0
Total	120	100.00	44	45	31

Table 5: Objective Analysis of Syringing Results

Time Point	Group A (N=44)	Percentage (%)	Group B (N=45)	Percentage (%)	Group C (N=31)	Percentage (%)
1st Week	44 (100%)	100.00	45 (100%)	100.00	Not Applicable	Not Applicable
6th Week	43 (97.72%)	97.72	44 (97.78%)	97.78	31 (100%)	100.00
10th Week	40 (90.91%)	90.91	44 (97.78%)	97.78	27 (87.09%)	87.09

Table 6: Subjective Analysis of Patient Relief

Time Point	Group A (N=44)	Percentage (%)	Group B (N=45)	Percentage (%)	Group C (N=31)	Percentage (%)
1st Week	44 (100%)	100.00	45 (100%)	100.00	31 (100%)	100.00
6th Week	43 (97.72%)	97.72	44 (97.78%)	97.78	31 (100%)	100.00
10th Week	40 (90.91%)	90.91	44 (97.78%)	97.78	27 (87.09%)	87.09

Table 7: Success Rates at End of 3 Months

Group	Total Patients	Success Rate (%)	Relieved of Epiphora (N)	Free Flow on Syringing (N)	Closure of Rhinostomal Opening (N)
Group A (Conventional)	44	86.36	38	38	6
Group B (Mitomycin C)	45	97.78	44	44	1
Group C (Silicone)	31	83.87	26	26	5

DISCUSSION

The study focused on comparing the outcomes of three different techniques of endoscopic endonasal dacryocystorhinostomy (DCR) in patients with nasolacrimal duct obstruction (NLDO). The three techniques included conventional endoscopic endonasal DCR (Group A), DCR with Mitomycin C application (Group B), and DCR with silicone stenting (Group C). The study involved 120 patients and spanned two years, offering a comprehensive analysis of the effectiveness of these treatments [5, 6].

Age Distribution

The age distribution of patients revealed a predominance of middle-aged individuals, particularly those in the 41-50 years age group, which constituted 36.67% of the total patients. This finding aligns with existing literature that suggests NLDO is more prevalent in middle-aged to older adults. Group-specific analysis showed a similar trend, with the highest number of patients in each group falling within the 41-50 years range (34.09% in Group A, 31.11% in Group B, and 48.38% in Group C). This consistency across groups underscores the age-related predisposition to NLDO, possibly due to age-related changes in the lacrimal drainage system and surrounding anatomical structures [7].

Gender Distribution

The gender distribution indicated a significant female preponderance, with 77.5% of the patients being female. This finding is consistent with other studies that report a higher incidence of NLDO in females, which may be attributed to anatomical and hormonal differences that predispose women to this condition. The gender distribution was fairly uniform across the three groups, indicating no gender bias in the selection or outcomes of the treatment modalities. Specifically, Group A had 77.27% females, Group B had 77.78% females, and Group C had 77.42% females.

Laterality of Disease

The study revealed that NLDO was more commonly present on the left side, with 55.83% of the cases, followed by the right side at 36.67%, and bilateral involvement in 7.5% of the cases. This left-side predominance could be due to anatomical or environmental factors that preferentially affect the left nasolacrimal duct, though the exact cause remains speculative. The distribution across the three groups was comparable, suggesting that the laterality of the obstruction did not influence the choice of treatment.

Mode of Presentation

The mode of presentation was predominantly epiphora only, accounting for 93.33% of the cases. A smaller fraction of patients presented with additional complications such as mucocele (5.83%) and pyocele (0.83%). This pattern highlights that while epiphora is the primary symptom prompting medical attention, secondary infections or complications are less common but still clinically significant. The distribution of presentation types across the three groups showed that Group A had exclusively epiphora cases, while Groups B and C included some cases with mucocele and pyocele, indicating a slightly higher complexity in these groups [8].

Objective Analysis of Syringing Results

Objective analysis using syringing results demonstrated high initial success rates across all groups. At the first week, both Group A and Group B had a 100% patency rate, while Group C was not applicable due to the presence of stents. By the 6th week, Group C also achieved a 100% patency rate, while Groups A and B maintained patency rates of 97.72% and 97.78%, respectively. At the 10th week, there was a slight decline in patency rates, particularly in Group C, which had a patency rate of 87.09%, compared to 90.91% in Group A and 97.78% in Group B. These findings suggest that while all three techniques are initially effective, the use of Mitomycin C (Group B) offers a more sustained patency over time.

Subjective Analysis of Patient Relief

Subjective analysis of patient relief mirrored the objective findings. At the first week, all patients across the three groups reported relief from symptoms. By the 6th week, the relief rates remained high, with 97.72% in Group A, 97.78% in Group B, and 100% in Group C. However, at the 10th week, there was a notable decrease in relief in Group C (87.09%), compared to Group A (90.91%) and Group B (97.78%). This further reinforces the superior efficacy of Mitomycin C in maintaining long-term symptom relief [9].

Success Rates at End of 3 Months

The success rates at the end of 3 months were highest in Group B (97.78%), followed by Group A (86.36%) and Group C (83.87%). This indicates that Mitomycin C application in endoscopic endonasal DCR significantly enhances the long-term success of the procedure by reducing fibroblast proliferation and scar tissue formation at the surgical site. The lower success rates in Group C suggest that while silicone stenting is effective, it may not provide as robust a long-term solution compared to Mitomycin C. The presence of rhinostomal closure in some patients in Groups A and C also highlights the challenges associated with maintaining patency over time, which Mitomycin C appears to mitigate more effectively [10].

Clinical Implications

The findings from this study have significant clinical implications for the management of NLDO. The high success rate of Mitomycin C application suggests that it should be considered a preferred adjunct in endoscopic endonasal DCR, particularly for patients at higher risk of restenosis. The comparable early success rates across all groups indicate that initial surgical technique proficiency is less of a differentiator, emphasizing the importance of postoperative management in determining long-term outcomes.

Limitations and Future Directions

While the study provides valuable insights, it has certain limitations, including the relatively small sample size and the lack of long-term follow-up beyond 3 months. Future studies with larger cohorts and extended follow-up periods are necessary to validate these findings and refine treatment protocols further. Additionally, exploring the cost-effectiveness and patient quality of life post-intervention would provide a more comprehensive evaluation of these techniques.

CONCLUSION

This study demonstrates that while conventional endoscopic endonasal DCR and DCR with silicone stenting are effective, the addition of Mitomycin C significantly improves long-term outcomes in patients with NLDO. These findings advocate for the integration of Mitomycin C in DCR procedures to enhance surgical success and patient satisfaction, ultimately guiding clinical practice towards more effective management of NLDO.

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