

PREVALENCE OF SEPTAL DEVIATION IN CASES WITH EPIPHORA SUBJECTED TO
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ABSTRACT

Background: Endoscopic dacryocysto-rhinostomy (DCR) is a surgical procedure commonly used to treat nasolacrimal duct obstruction (NLDO). If significant septal deviation is found during the procedure, the surgeon may also perform septoplasty to correct the deviated nasal septum and improve surgical access and nasal function. The aim of this study is to investigate the prevalence and association of nasal septal deviation among patients presenting with epiphora. **Method:** From January, 2022 to March 2023, a case-control study was conducted at Kirkuk Teaching Hospital. The study included 87 individuals with epiphora and a 100 healthy control. All cases referred to us by ophthalmologists after excluding ophthalmological causes of epiphora. The severity of septal deviation was assessed using Maurice Cottle's classification system. **Results:** The mean duration of epiphora was 20.2 ± 13.7 months. The left side was the most common site of epiphora (62.1%), and primary surgery was performed in 93.1% of cases, with only 6.9% requiring revision surgery. Septal deviation was prevalent in 95.4% of the cases, and 82% in healthy controls with a significant association between epiphora and septal deviation ($p=0.02$). The cases having a moderate form of septal deviation were 60.2%, having a severe form were 22.9%, and having a mild form were 16.9%. It was observed that all individuals with septal deviation experienced epiphora on the same side as the deviation. **Conclusion:** This study concluded that there is a possible link between septal deviation and the development of nasolacrimal duct obstruction.

KEYWORDS: Septal deviation, nasolacrimal duct, endoscopic, dacryocysto-rhinostomy.

INTRODUCTION

In general, epiphora is a prevalent symptom among patients referred to oculoplastic clinics. The tearing process involves multiple stages, including production in the lacrimal gland, vaporization from the ocular surface, spreading by eye blinking, and draining through the nasolacrimal duct. Epiphora may result from abnormalities in any of these processes^[1,2], it can result from an imbalance between tear formations and tear loss caused by a variety of etiologies. The majority of tear quantity imbalances are brought on by obstruction at a different level of the lacrimal outflow system and nasolacrimal duct stenosis.^[3] Although unilateral or bilateral epiphora is possible, local circumstances such as foreign bodies and nasolacrimal duct occlusion are more likely to cause unilateral epiphora. Additionally, local circumstances may result in bilateral epiphora, with one side experiencing greater epiphora than the other.^[4]

Both unilateral and bilateral epiphora are possible, however unilateral epiphora is more likely to be brought on by local factors including foreign bodies and

nasolacrimal duct occlusion. Additionally, local factors may result in greater epiphora on one side, causing bilateral epiphora.^[5] In the nose, the palatine and inferior turbinate bones form the medial border, while the maxillary bone forms the lateral border. The lacrimal sac empties inferiorly into the nasolacrimal duct. At the inferior meatus, which is situated beneath the inferior nasal turbinate, the nasolacrimal duct opens.^[6] A complicated osseo-cartilaginous structure; the nasal septum separates the nose into two nasal channels. A nasal cavity symmetrical is often uncommon, and a certain amount of deviation is regarded as a typical anatomical variation.^[7] On the other hand, nasal septum deviation (NSD) can cause trauma, which is typically more displaced and irregular, or it can be developmental, which is typically a smooth C-shaped or S-shaped malformation.^[8] When it comes to nasal obstruction symptoms, nose aesthetics, nasal resistance, and occasionally snoring, nasal septal deviations are crucial.^[9] According to Maurice Cottle's classification, NSD can be divided into three degrees of septal deviation: The patient complains of nasal obstruction

despite simple deviation (degree I), which is consistent with normal nasal function; unilateral deviation (degree II), which is consistent with moderate nasal obstruction; and unilateral or bilateral deviation in contact with lateral nasal wall (degree III), which is consistent with severe nasal obstruction.^[10] Furthermore, obstructive sleep apnea, a sleep disease characterized by a stop or severe decrease in airflow in the midst of breathing exertion, can result from nasal obstruction brought on by septal deviation.^[11-13] Chronic otitis media and rhinosinusitis are additional conditions to look for when evaluating a patient with NSD.^[14] Endoscopy has revolutionized surgery in modern times and has proven its effectiveness in diagnosing and treating difficult and rare cases in various surgical branches^[15-18], relying on the skill of surgeons and the modern technologies available.^[19-21] A less invasive surgery, endoscopic dacryocystorhinostomy (EN-DCR) is currently possible with enhanced endoscopic equipment. There are three types of endonasal approaches: cold steel DCR with or without drills, powered instrumentation endonasal DCR, and endonasal laser-assisted DCR.^[22] The majority of operations, whether carried out externally or endoscopically, have high success rates, especially for highly qualified and experienced surgeons. In order to ascertain whether there is a meaningful correlation between epiphora and nasal septum deviation, this study was created to look into the prevalence of this problem in patients with epiphora.

PATIENT AND METHODS

This case-control study was conducted at Kirkuk Teaching hospital from 1st of January 2022 to 31st of March 2023. A total of 87 cases with epiphora and a 100 healthy control were included in this study. The study populations were patients diagnosed with epiphora and admitted to Kirkuk teaching hospital for surgical management during the study period. All cases were referred to us by ophthalmologists after exclusion of ophthalmological causes of epiphora. A convenience sampling method was utilized in the current study. Data collection involved data on basic demographics, and duration of the symptoms of epiphora.

Data related to the surgical procedure included the laterality of the condition, side of epiphora, type of surgery (primary or revision), and the prevalence of septal deviation. The Degree of septal (Figure 1) deviation was classified according to the Maurice Cottle's classification. The scientific committee of otorhinolaryngology department, Arab board for medical specialization, provided ethical and scientific permission for the study. Every procedure used in this study involving human subjects complied with the 1964 Declaration of Helsinki and its subsequent amendments, as well as the institutional and/or national research committee's ethical guidelines. All patients gave their verbal agreement prior to the commencement of data collection, following an explanation of the study's objectives and a guarantee of confidentiality.

Statistical analysis

Data were analyzed using the SPSS statistical package, and results were presented as means and standard deviations, and categorical variables were tabulated with frequencies and percentages. One-way analysis of variance was performed to determine the difference in means, and differences between categorical variables were examined using either the χ^2 test with Yates's correction or Fisher's exact test, depending on the context. A P value of less than 0.05 was considered statistically significant.

Steps of surgery

- Patient is placed under general anesthesia to ensure comfort and minimize pain during the procedure.
- Patient's face is prepared by cleansing the area around the eyes and nose with an antiseptic solution. Sterile drapes are used to maintain a sterile field.
- The surgeon inserts an endoscope, a rigid tube (0 degree) with a camera on the end, through the nostril into the nasal cavity.
- The surgeon carefully identifies the lacrimal sac, which is part of tear duct system that is blocked and causing symptoms.
- Using specialized instruments, surgeon creates a small flap of nasal mucosa (lining of nose) adjacent to lacrimal sac. This flap will later be used to line new tear duct pathway.
- A small opening is made in lacrimal sac to access blocked tear duct. This can be done using a scalpel or specialized instruments such as micro-drills or lasers.
- The surgeon then removes a small amount of bone and tissue from lacrimal sac area and nasal bone adjacent to it. This creates a bony passage for new tear duct pathway.
- Using delicate instruments, surgeon creates a passage or connection between the lacrimal sac and nasal cavity. This can involve removing any remaining blockages and ensuring a clear pathway for tears to drain.
- The nasal mucosal flap is repositioned and gelfoam placed to line the new tear duct pathway.
- All surgeries performed in this study done without use of stent.

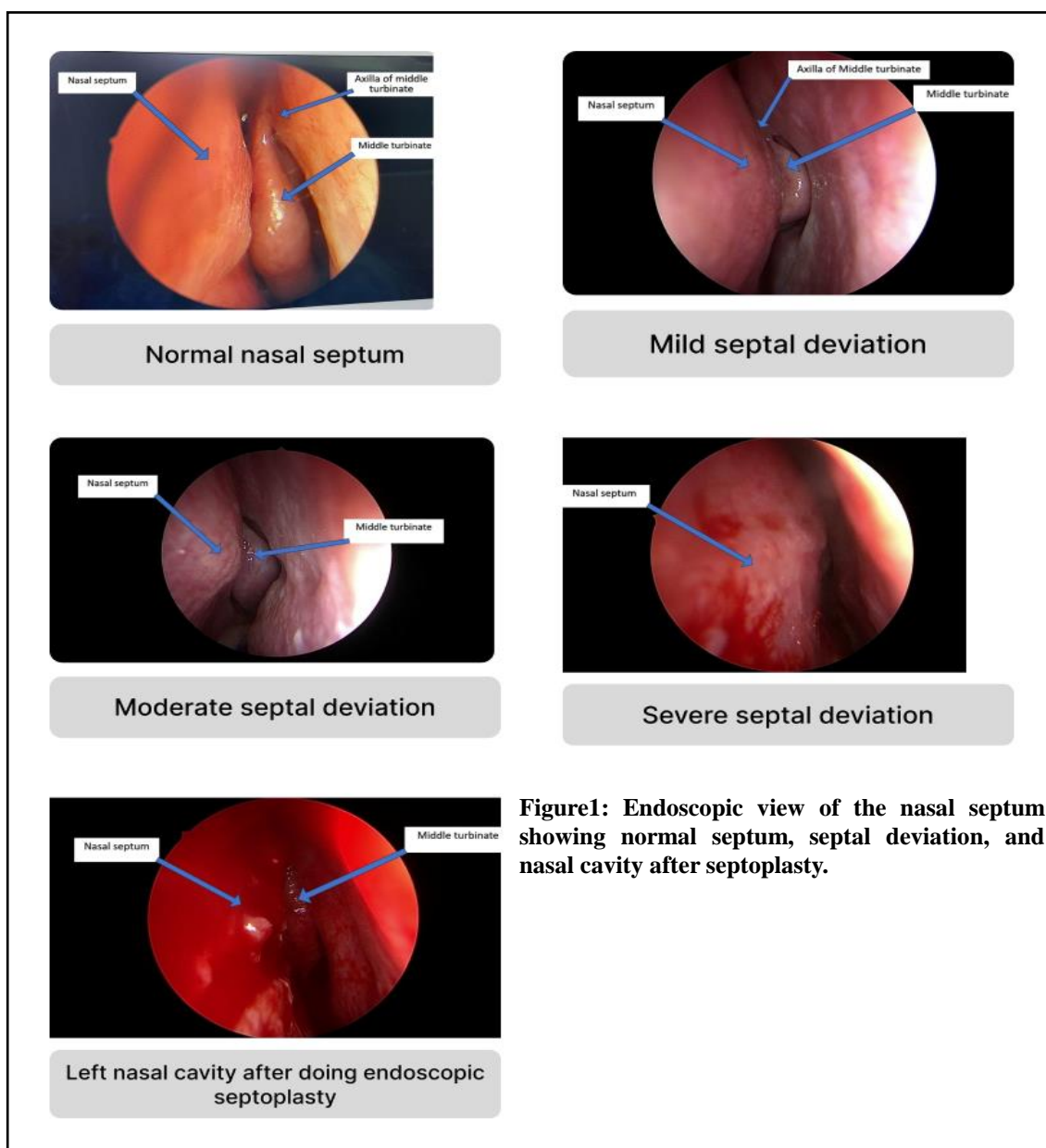


Figure1: Endoscopic view of the nasal septum showing normal septum, septal deviation, and nasal cavity after septoplasty.

RESULTS

Patients' demographics and clinical history

Eighty-seven cases with epiphora undergoing surgical management were included in this study. The mean age of the cases was 40.4 ± 15.4 years old with a range of 10-

75. The majority of the cases were females (70.1%) with a sex ratio of 0.43; the mean duration of epiphora was found to be 20.2 ± 13.7 months (Table 1). There were no significant differences between cases and control in regard to age and gender ($p > 0.05$).

Table 1: Description of study demographics and clinical history.

Characteristics		Cases N = 87	Control N=90	P-value ²
Age, years	Mean \pm SD	40.4 ± 15.4	34.7 ± 14.3	0.23
	Range	10 – 75	18 - 56	
Sex	Females	61 (70.1%)	48 (48%)	0.15
	Males	26 (29.9%)	52 (52%)	
Duration of symptoms (months)		20.2 ± 13.7	/	

Description of surgical parameters

The most common side of epiphora was the left side 62.1%; the surgery was of the primary type in 93.1% of

the cases and only 6 (6.9%) cases had a revision surgical correction. Of particular importance, all cases with septal deviation ($n=83$) had epiphora on the same side of the

deviation.

Table 2: Description of epiphora related parameters, type of surgery, and septal deviation.

Characteristics		Cases N = 87 (%)
Laterality of the condition	Unilateral	82 (94.3%)
	Bilateral	5 (5.7%)
Side of epiphora	Left	54 (62.1%)
	Right	28 (32.2%)
Type of surgery	Primary	81 (93.1%)
	Revision	6 (6.9%)

The prevalence of septal deviation was significantly higher in cases with epiphora (95.4%) compared to the control group (82%), with a P-value of 0.02 indicating statistical significance. Among those with septal deviation, the degree of deviation was also significantly different between the two groups ($P < 0.001$). In the epiphora cases, 16.9% had mild deviation, 60.2% had moderate deviation, and 22.9% had severe deviation. In contrast, the control group showed 57.3% with mild deviation, 34.1% with moderate deviation, and 8.5% with severe deviation. Furthermore, 22.9% of the epiphora cases required septoplasty.

Table Error! No text of specified style in document.: presence of septal deviation and its severity in both cases with epiphora and in healthy control group.

Characteristics		Cases N = 87(%)	Control N=100(%)	P-value ²
Prevalence of septal deviation		83 (95.4%)	82 (82%)	0.02
Degree of septal deviation	Mild	14 (16.9%)	47 (57.3%)	<0.001
	Moderate	50 (60.2%)	28 (34.1%)	
	Severe	19 (22.9%)	7 (8.5%)	
	Total	83(100%)	82(100%)	
Cases required septoplasty		19 (22.9%)	/	

In regard to the prevalence of septal deviation, it was found to be 83 (95.4%) of the total cases. It was observed that 50 (60.2%) out of 83 cases who had septal deviation

had a moderate form, 19 (22.9%) had a severe form and only 14 (16.9%) had a mild form of septal deviation, figure (2).

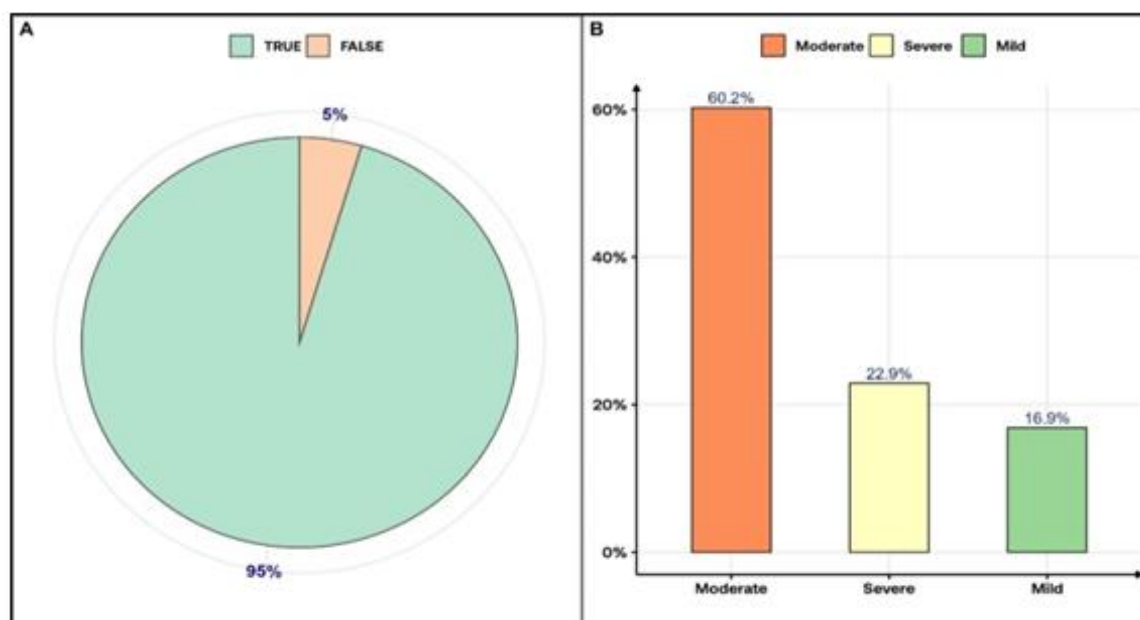


Figure 2: A: Prevalence of Septal deviation; B: Description of the degree of septal deviation in cases with epiphora.

The degree of septal deviation was compared to demographics, clinical and surgical data in table 3.2. It was found that degree of septal deviation was statistically associated with sex (P -value = 0.04), particularly females had more severe degree of septal deviation (78.9%) compared to males with (21.1%).

Also, the mean duration of symptoms was found to be

lower in severe cases (13.2 ± 7.9) compared to mild or moderate ones (22.6 ± 16.3 , 22.3 ± 14.3 respectively, P -value = 0.036). No differences were observed in regard to age (P -value = 0.052), or side of epiphora (P -value = 0.2).

Table Error! No text of specified style in document.: Description of study parameters in relation to severity of septal deviation.

Characteristic		Mild, N = 14 ¹	Moderate, N = 50	Severe, N = 19	P-value ²
Age (years)		34.1 ± 18.4	43.8 ± 15.7	36.7 ± 9.1	0.052
Gender	Female	8 (57.1%)	34 (68.0%)	15 (78.9%)	0.04
	Male	6 (42.9%)	16 (32.0%)	4 (21.1%)	
Symptoms duration (months)		22.6 ± 16.3	22.3 ± 14.3	13.2 ± 7.9	0.036
Epiphora side	Left	10 (71.4%)	26 (52.0%)	15 (78.9%)	0.2
	Right	4 (28.6%)	20 (40.0%)	4 (21.1%)	
	Both	0 (0.0%)	4 (8.0%)	0 (0.0%)	
Laterality	Unilateral	14 (100.0%)	46 (92.0%)	19 (100.0%)	0.3
	Bilateral	0 (0.0%)	4 (8.0%)	0 (0.0%)	

DISCUSSION

Nasolacrimal duct obstruction refers to blockage or narrowing of nasolacrimal duct, which hinders normal drainage of tears from eye into nasal cavity. It can cause symptoms such as epiphora, recurrent eye infections, and discomfort.^[23] Endoscopic surgery features smaller scars, earlier hospital discharge, less pain, and faster healing.^[24-26] Endoscopic dacryocystorhinostomy (DCR) is a surgical procedure gold standard used to treat nasolacrimal duct obstruction, an endoscope thin tube with a light and a camera is inserted through a small incision near the inner corner of the eye.^[27] Septal deviation is a common finding in patients undergoing endoscopic DCR, and nasal septum is the partition that separates the left and right nasal cavities.^[28] The inverse process is followed by the endoscopy-assisted endonasal technique, which reveal the lacrimal sac and its marsupialization inside the nasal cavity, an endonasal bone osteotomy is performed after a nasal mucosa flap has been constructed. It's just amazing to see the complete lacrimal sac through endoscopic exposure.^[29,30] When performing endoscopic DCR, the surgeon examines the nasal cavity using the endoscope. The presence of septal deviation can be identified during this evaluation. Septal deviation can contribute to nasal obstruction, affecting the surgical access to the nasolacrimal duct and the overall success of the procedure.^[31]

In cases where significant septal deviation is observed during endoscopic DCR, the surgeon may consider addressing it simultaneously. Septoplasty, a surgical procedure aimed at correcting the deviated nasal septum, may be performed in conjunction with endoscopic DCR. This combined approach allows for the restoration of a more normal nasal anatomy, optimizing the surgical outcome and potentially improving nasal airflow. It is important to note that not all cases of NLDO require septal correction. The decision to perform septoplasty alongside endoscopic DCR depends on the severity of the septal deviation and its impact on the surgical access and patient's nasal function.^[32,33] The identification of septal deviation during endoscopic DCR highlights the importance of a comprehensive evaluation of the nasal cavity and associated structures. Surgeons performing

endoscopic DCR should carefully assess the nasal anatomy, including the septum, to tailor the surgical approach and optimize outcomes for patients with NLDO.^[34]

The association between septal deviation and NLDO can be attributed to several factors. First, septal deviation can lead to anatomical changes within the nasal cavity, resulting in altered airflow dynamics. These changes may disrupt the normal tear drainage mechanism, leading to NLDO. Additionally, septal deviation can contribute to nasal congestion and obstruction, which may further impede the drainage of tears through the nasolacrimal duct.^[35]

CONCLUSION

In conclusion, this study highlights a high prevalence of septal deviation in cases with epiphora. The majority of cases exhibited moderate to severe forms of septal deviation. These findings suggest a potential association between septal deviation and the development of NLDO.

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