Malaysian Journal of Ophthalmology

© Malaysian Journal of Ophthalmology 2024; 6:20-27
Original article
https://doi.org/10.35119/myjo.v6i1.346

Ten-year review of traumatic nasolacrimal duct obstruction: clinical profile, management, and outcomes

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Abstract

Purpose: To evaluate the clinical profile, management, and outcome in cases of traumatic nasolacrimal duct obstruction (NLDO).
Methods: Retrospective analysis of 40 patients during a 10-year period in one of oculoplastic centre in Malaysia.
Results: Forty patients were included in this study, in which 31 patients were male (77.5%) and 9 were female (22.5%). Age ranged from 19 to 72 years, with a mean of 36.7 years of age. The most common aetiology was motor vehicle accident, accounting for 95%, while the remaining 5% was due to blunt trauma. A total of 32 patients underwent external dacryocystorhinostomy (DCR) with bicanaliculi intubation, 6 patients underwent DCR and another 2 were planned for external DCR but abandoned intraoperatively due to the presence of extensive scar tissue involving lacrimal sac and severe disruption of anatomical site. The surgical outcomes, anatomical success seen in 87% (n = 28) of cases. However anatomical success can be divided into anatomical and functional success seen in 82% (n = 26), while anatomical success with functional failure seen in 5% (n = 2) of cases.
Conclusion: The majority of traumatic NLDO occurred in males who were involved in motor vehicle accidents. External DCR with bicanalicular intubation provided anatomical and functional success of 82% in cases of traumatic NLDO.

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Keywords: bicanalicular intubation, epiphora, external dacryocystorhinostomy, traumatic nasolacrimal duct obstruction

Semakan sepuluh tahun kes penyumbatan saluran nasolacrimal akibat trauma: profil, pengurusan dan hasilan klinikal

Abstrak

Objektif: Menilai profil, pengurusan dan hasilan klinikal dalam kes penyumbatan saluran nasolacrimal akibat trauma.
Kaedah: Kaedah kajian retrospektif ke atas 40 orang pesakit selama 10 tahun di hospital utama memberi perkhidmatan okuloplastik di Malaysia.
Keputusan: Seramai 40 orang pesakit, di mana 31 pesakit adalah lelaki (77.5%) dan 9 perempuan (22.5%). Julat umur dari 17–72 tahun, purata umur 36.7. Punca utama adalah kemalangan melibatkan 95%, baki 5% adalah disebabkan trauma akibat objek tumpul. Seramai 32 pesakit menjalani pembedahan dakriosistorinostomi luaran dengan intubasi kedua-dua kanalikuli, 6 pesakit menjalani dakriosistektomi dan baki 2 pesakit dirancang untuk pembedahan namun di hentikan semasa pembedahan kerana parut yang besar melibatkan kantung lakrimal dan kerosakan teruk kawasan tersebut. Hasil pembedahan menunjukkan 87% berjaya secara anatomi. Kejayaan anatomi dibahagikan kepada kejayaan dan kegagalan fungsian, di mana kejayaan anatomi dan fungsian adalah 82%, manakala kegagalan fungsian melibatkan 5%.
Kesimpulan: Kebanyakan kes penyumbatan salur lakrimal akibat trauma melibatkan kaum lelaki yang terlibat dengan kemalangan. Pembedahan dakriosistorinostomi luaran dengan intubasi kedua-dua kanalikuli menghasilkan kejayaan anatomi dan fungsian dalam 82% kes penyumbatan salur lakrimal akibat trauma.

Kata kunci: dakriosistorinostomi luaran dengan intubasi kedua-dua kanalikuli,epifora, penyumbatan salur lakrimal akibat trauma

Introduction

Traumatic nasolacrimal duct obstruction (NLDO) is one of the causes of secondary nasolacrimal duct obstruction. Traumatic NLDO causes can be divided into iatrogenic and non-iatrogenic. Iatrogenic causes include injury during lacrimal probing, rhinoplastic surgeries, and any orbital and craniofacial procedures. Non-iatrogenic causes are mainly due trauma, especially motor vehicle accidents, which result in naso-orbital-ethmoidal (NOE) fracture.[1] NOE fracture is an important cause of traumatic NLDO.[1,2] Management of traumatic NLDO can be challenging, as the nasolacrimal anatomy is altered following trauma and fracture. Given that presence of oedema and fibrosis post-trauma may affect surgery outcomes, proper assessment should be done after resolution of oedema and soft tissue injuries. The aim of this study is to evaluate the clinical profile, management, and outcomes for post-traumatic NLDO in a main oculoplastic centre in Malaysia.

Methods

This retrospective study reviewed the medical records of 40 patients with post-traumatic NLDO managed at Hospital Serdang, one of the main oculoplastic centres in Malaysia. The study period encompassed 10 years from January 2011 to December 2020.

All patients who presented with persistent post-traumatic epiphora 3-6 months after initial trauma to Hospital Sedang during the study period were included in the study. Exclusion criteria were persistent epiphora secondary to primary NLDO including inflammation, tumour, or other causes of secondary NLDO.

The medical records were reviewed for a detailed history of duration of symptoms, mode of injury, and primary surgical repair. Assessment included lacrimal syringing to evaluate the patency of the nasolacrimal duct, where presence of regurgitation or any reflux during syringing was observed. Computed tomography (CT) scans of the brain, orbit and paranasal sinuses were reviewed to view the anatomical structure post-trauma and to identify the presence of any screws or plates used during primary surgical repair post-trauma.

Of the 40 patients included, 32 patients underwent external DCR with bicanaliculi intubation, 6 patients underwent dacryocystectomy, and surgery could not be completed in 2 patients due to intraoperative complications. All patients underwent surgery under general anaesthesia performed by 4 senior oculoplastic surgeons in Hospital Serdang. All patients who underwent external DCR had bicanaliculi intubation with a Crawford stent, as well as anterior and posterior flaps created and sutured. All patients were given antibiotics postoperatively. Postoperative follow-up was conducted at 2 weeks, 3 months, and 6 months. Syringing and stent removal was performed at 3–6 months. At each follow-up visit, patients

were questioned about symptoms of epiphora and discharge. Syringing was also performed postoperatively with normal saline irrigation of the lacrimal pathway to check the patency of the rhinostomy site.

The patency of the nasolacrimal duct pathway was defined as anatomically successful if syringing was patent and the patient was able to feel the presence of fluid in their throat. However, anatomical success was further categorised into those with functional success and functional failure. Anatomical success with functional success is defined by patent lacrimal syringing and no more symptoms. Anatomical success with functional failure is defined by patent lacrimal syringing but persisting symptoms, such as epiphora.

Results

A total of 40 patients were included in this study, of which 31 (77.5%) were male and 9 (22.5%) were female. The mean age of the patients was 36.7 years within a range from 16 to 72 years old. The main presenting complaints were epiphora 65% (n = 26), dacryocystitis 30% (n = 12), and medial canthal swelling 5% (n = 2). Patients with dacryocystitis mainly presented with recurrent dacryocystitis requiring antibiotics. The most common ocular feature was traumatic telecanthus, found in 70% of patients. Others presented with only scarring due to previous lacerations in the naso-orbital region. Thirty patients (75%) had intact both upper and lower canaliculi post-trauma. The remaining 10 patients (25%) had either one of the canaliculi blocked due to severe scarring.

Motor vehicle accident accounted for injuries in 38 patients (95%). The remaining 2 patients (5%) had injuries due to blunt trauma, which included work-related injuries involving hit by hammer and fish bomb injury causing panfacial fractures. Most patients underwent primary surgical repair at their respective hospitals, including laceration wound repair and maxillofacial fracture repair by the maxillofacial team, before they were referred to our centre. Table 1 presents the pattern of injuries.

Table 1. Pattern of injuries

Pattern on injury	**Number of cases (%)**
Pure NOE	14 (35%)
NOE with panfacial fractures	18 (45%)
Le Fort 3	3 (8%)
Le Fort 2	5 (12%)

NOE: naso-orbital-ethmoidal fracture

All 40 patients underwent surgical intervention. Thirty-two (80%) patients underwent external DCR with bicanaliculi intubation, 6 (15%) underwent dacryocystectomy (of which 4 had sac injury and 2 had mucocele), and surgery could not be completed in 2 patients (5%) due to intraoperative complications. Intraoperative complications included presence of extensive fibrosis and presence of plates obscuring surgical site. All surgeries were performed within 5 years of the initial trauma.

The surgical outcomes were calculated from those who underwent external DCR with bicanaliculi intubation, in which anatomical success was seen in 20 cases (87%). Anatomical success was further divided into anatomical and functional success, achieved in 26 patients (82%), and anatomical success with functional failure, seen in 2 (5%) cases.

The surgical outcomes of 6 patients underwent dacryocystectomy showed 5 patients (83%) with anatomical and functional success with no more tearing post-procedure, while 1 patient still complained of tearing. This patient was planned for revision of dacryocystectomy but later defaulted follow-up.

Discussion

In our study, the majority of patients who presented with post-traumatic NLDO were males involved in motor vehicle accidents. The predominant injury was NOE fracture with panfacial fractures. NOE fracture is an important cause of nasolacrimal duct obstruction.[1,2] As previously reported in other studies, post-traumatic NLDO can be observed in 5–21% of NOE trauma cases due to direct injury to the lacrimal sac and nasolacrimal duct or canaliculi.[2-4] Bony fractures also initiate an inflammatory and cicatricial reaction that leads to stenosis of the nasolacrimal duct. The distorted anatomy in the region as a result of traumatic fractures also contributes to stenosis, leading to epiphora and other symptoms.

The success rate of external DCR with bicanaliculi intubation in our study is comparable to those found in other studies, which range from 90% to 96%.[2,3,5,6] Challenges in managing traumatic NLDO include extensive fibrosis and severe anatomical disruption. Presence of screws and plates used by maxillofacial team to reconstruct the anatomical structure also may hinder the surgical site thus lead to failure of surgery.

One strategy used in our centre for managing traumatic NLDO is employing a larger incision during DCR for adequate exposure.[2,7] However, caution is advised to prevent injury to surrounding structures, including the angular vessel and cribiform fossa, which may lead to cerebrospinal fluid leak. Another strategy involves larger rhinostomies_of at least 12 mm to avoid scar formation at the osteotomy site,[8-11] provided there are no screws or plates that might interfere with the surgical site.

In our study, 2 cases achieved anatomical success but with functional failure, still presenting with persistent epiphora post-external DCR. Both cases had patent lacrimal syringing during follow-up. This might have been due to dry eyes and eyelid abnormalities, including ectropion and post wound laceration scarring.

In addition to external DCR, patients underwent dacryocystectomy with complete removal of the lacrimal sac. Of these 6 patients, 5 (83%) had anatomical and functional success with no more tearing post-procedure. The remaining patient still complained of epiphora during follow-up. He was planned for revision of dacryocystectomy but later defaulted. These patients underwent dacrycystectomy instead of DCR due to the presence of multiple bony fractures with screw and plates causing difficulty for the surgeon to perform DCR.

Presence of oedema and fibrosis post-trauma may affect surgery outcomes; thus, proper assessment should be conducted 1 to 3 months after the initial trauma, when oedema and soft tissue injuries have resolved, permitting a more accurate evaluation.[1] A study by Adenis *et al.* suggested surgery should be performed 6 months post-trauma due to risk of increased fibrosis. This study showed that success rate increased from 66% to 100% if done after 6 months.[12]

CT scans of the brain, orbit, and paranasal sinuses are highly suggested before surgical intervention to view the anatomical structures post-trauma, which may reveal orbital rim or maxillary fractures compressing the sac or duct.[13,14] CT scans can also identify the presence of any screws or plates used during primary surgical repair.

The main limitations of the present study were its retrospective nature and the fact that it was conducted in a single centre. There was no long-term data available, as patients usually were referred to their own hospital after surgery. Further research may benefit from conducting a multicentre, prospective study with longer follow-up duration to evaluate long-term surgical outcomes.

Conclusion

Most cases of traumatic NLDO in our study occurred among adult males involved in motor vehicle accidents. NOE fracture was the most common fracture seen in traumatic NLDO. External DCR with bicanaliculi intubation is the surgery of choice, although in certain cases dacryocystectomy may be necessary.

Declarations

Ethics approval and consent to participate
Not required, as this was a retrospective review of medical records.

Competing interests
None to declare.

Funding
None to declare.

Acknowledgements
None to declare.

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