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Surgical outcomes of canalicular tear repair with self-retaining Mini-Monoka stent in a tertiary care hospital in Kashmir in North India

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ABSTRACT

Background: Canalicular lacerations contribute to approximately 16% of the eye lid injuries. The torn medial end is to be identified, cut end sutured, and then the canaliculus intubated to restore patency. Silicone being inert, flexible, easily available, and cost effective is the material of choice for lacrimal stenting. **Aims and Objectives:** The aim of this study was to determine the surgical outcomes of the canalicular tear repair with the self-retaining Mini-Monoka stent in a tertiary care hospital in North India. **Materials and Methods:** Patients presenting to tertiary care hospital in Kashmir, North India with canalicular tear from August 2019 to December 2020 were included in this prospective study and repaired with self-retaining Mini-Monoka stent under microscope. All the patients were analyzed for demographic data, mode of injury, complications, and outcomes and followed up after a week, 6 weeks, and 3 months and stent removed after 6 weeks. **Results:** The study was conducted on 18 patients. The mean age of the patients was 37.5 years with male: female ratio of 5:1. The lower canaliculus was most commonly involved and road traffic accidents was the most common mode of injury (27.7%). The most common associated injury was lid injury (50%). The mean time of stent removal was 6 weeks ± 2 weeks. Syringing was done in all the patients except children. At last follow-up, 17 out of 18 patients had functional and anatomical success in terms of absence of epiphora and patent syringing and all the patients were cosmetically satisfied. **Conclusion:** Our study concludes that surgical repair of canalicular tear with Mini-Monoka stent is a safe and simple reliable technique, cosmetically satisfying with minimal manipulation giving high functional and anatomical success rate post repair.

Key words: Canalicular tear; Mini-Monoka stent; Functional and anatomical success

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INTRODUCTION

Canalicular lacerations contribute to approximately 16% of the eye lid injuries.[1] The torn medial end is to be identified, cut end sutured, and then the canaliculus intubated to restore patency, which aided by high magnification and by achieving good hemostasis. Silicone being inert, flexible, easily available, and cost effective is the material of choice for lacrimal stenting.[2,3] The role of temporary intracanalicular stents in the repair of canalicular tear is well established.[2]

The Mini-Monoka monocanalicular stent (FCI Ophthalmics, USA) is a silicon rod with inner diameter of 0.64 mm, length of 40 mm, and a collarette at the proximal end which makes it self-retaining. Although canalicular injuries do not pose any visual ophthalmic emergency, the repair of torn canaliculus is very important to restore the patency of lacrimal system for anatomical and functional success.

Reviewing Kashmiri literature on the canalicular lacerations found no case reports or studies done until now on the use of Mini-Monoka for the repair of same. The present study was done to determine the success rate of canalicular repair done with commercially available self-retaining, monocanalicular stent, Mini-Monoka.

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Aims and objectives

The aim of this study was to determine the surgical outcomes of the canalicular tear repair with the self-retaining Mini-Monoka stent in a tertiary care hospital in North India.

MATERIALS AND METHODS

The prospective study was conducted at the tertiary care hospital of Jammu and Kashmir from August 2019 to December 2020. The study was approved by the Ethical Committee of the Institution. Eighteen patients with canalicular tear across all age groups were included in the study. Detailed history of all the patients was taken including mode and time of injury. All the patients were thoroughly examined for vision, associated ocular or systemic injuries, and the detailed anterior segment and fundus examination was done in all patients. All the patients were prepared for canalicular tear repair under local or general anesthesia (in case of children) on same day of presentation and written consent obtained from all. Under all aseptic precautions, the area was properly cleaned with betadine and draped with eye sheet. The lacerated canaliculus was examined under high magnification of operating microscope and attempt was made to locate both the ends of cut canaliculus. The lateral part with punctum was usually easily located. The exigent and challenging part of the surgery was to locate the nasal end of the torn canaliculus, especially when the cut was deeper, that is, more toward the lacrimal sac. Several methods for the localization of the nasal end were made such as using trypan blue dye, fluorescein dye, air, or simple saline. The dye was injected through the opposite uninjured punctum and the outflow noted from the nasal cut end of torn canaliculus. The punctum of the injured canaliculus was dilated using Nettleships punctum dilator. The end of the stem of the Mini-Monoka stent was cut beveled for easy insertion. The Castroviejo needle holder or suture tying forceps were used to hold the Mini-Monoka for good grip and the distal beveled end of stent then passed through the dilated punctum and the lateral end of cut canaliculus. The collarette of the Mini-Monoka stent was then fixed properly at the punctum. The stent was, then, passed securely through the nasal torn end of canaliculus and guided using needle holder until it reached the lacrimal sac and proper position ensured. The pericanalicular torn tissue was repaired with 6–0 vicryl and associated lid injuries sutured with 4–0 silk. The patients were examined on 1st post-operative day and antibiotic steroids started and patients were instructed to be careful and avoid rubbing. The subsequent follow-ups were done after a week, 6 weeks, and 3 months.

The Mini-Monoka stent was removed at 6 weeks under topical anesthesia in all patients. Lacrimal syringing was done in all patients after stent removal. The anatomical success of stenting was confirmed by the patent nasolacrimal drainage on syringing and functional success as absence of epiphora after removal of stent.

RESULTS

The total of 18 patients were included in the study and underwent canalicular tear repair with Mini-Monoka stent.

Out of 18 patients, 15 were male (83.33%) and three were female (16.66%), that is, male: female ratio was 5:1.

The mean age of the patients was 37.5 years (5–65 years age group), the youngest was 5 year old, and the oldest 65 year.

The lower canaliculus was involved in all the patients and one patient, in whom the punctum was injured, was excluded from the study.

All the patients presented to ophthalmology emergency and the different modes of injury were noted. The most common cause of injury was road traffic accident in five patients (27.7%), followed by accidental stone injury in four patients (22.2%) and trauma due to fall in four patients (22.2%). In three patients, the mode of injury was metal rod (16.66%) and door handle in one patient (5.55%) and dog bite in another one (5.55%).

On examination, the most common associated injuries found were lid injuries in nine patients (50%), followed by ocular surface injuries in seven patients (38.8%). Out of seven patients, five had sub conjunctival hemorrhage and two had corneal abrasions. Associated intraocular injuries were seen in two patients (11.11%), one with scleral perforation and another corneal tear. All the patients were repaired within 24 h of injury except one which presented 5 days after injury.

The canalicular tear repair with Mini-Monoka stent was performed in all patients under operating microscope and stent was kept in place for minimum of 6 weeks. All the patients reported to outpatient for stent removal. The mean time for stent removal was 6 weeks±2 weeks. Syringing was done in all the patients except children(3) and it was patent in all except one patient and none of the patients complained of epiphora until last follow-up.

The only post-operative complication that was encountered was the stent extrusion in two patients, one in a 9-year-old boy at 2 weeks and another in 30-year-old patient at 4 weeks postoperatively. In a child, the cause of stent extrusion was frequent rubbing, and in an adult, it got removed spontaneously. Syringing was patent in adult

patient despite extrusion; however, in young patient, it was not done. No other corneal or surface complications were seen. All the patient were cosmetically satisfied and clinically asymptomatic for epiphora.

DISCUSSION

Canaliculus is an important structure for the normal passage of the tears. It is one of the most common part of the lacrimal drainage system that gets injured, because it is quite exposed as compared to other structures. About 16% of the eyelid injuries are canalicular lacerations.[1]

No doubt canalicular lacerations do not pose any threat to vision and is not considered as sight threatening emergency; however, repair of the laceration is the new concept. Leaving the injury untreated can lead to lifelong epiphora in patients which are troublesome to the patient and in addition to its cosmetic intolerance carries with it the social blemish. Time and again different materials such as Teflon, suture, and silver wire have been used, but silicon remains the material of choice for the repair of canalicular tear due to its easy availability, inert nature, cost effectiveness, and easy handling.[3-7]

In our study, out of 18 patients majority were male (15, 83.33%). This is in accordance to other studies carried worldwide.[2,3,6] In our study, the mean age group affected was 37.5 years which is in refute to other studies, where canalicular tear is commonly seen in children.[2,3,6] All the patients that presented to ophthalmology emergency lower canaliculus were involved and similar has been reported in other studies, where lower canaliculus was more commonly affected than upper canaliculus.[2,4,8,9] One of the patients with lower canaliculus tear also had associated punctal injury and was excluded from the study. Hence, the success rate of the use of Mini-Monoka stent in the upper canalicular, both canalicular tear and punctal injury, could not be established in this study. We recommend another study for the same.

One of the distinctive findings in our study was that there were different modes of injury. The most common mode of injury in our study was road traffic accident (five patients, 27.7%), followed by accidental stone injury in four patients (22.2%) and trauma due to fall in four patients (22.2%). In our study, there was only one patient, in which canalicular tear was caused by dog bite. This is in contrast to the study done by Jordan et al., in which dog bites have been implicated as the most common cause of canalicular injury, especially in children.[10] Furthermore, in our study, we did not find any injury caused due to blouse hook of mother during breast feeding which has been found as an unique cause of canalicular injury in study conducted by Nayana et al.[11] This can be attributed to the cultural disparity in the study population.

In our study, we found that canalicular tears were not commonly associated with intraocular injuries. The most common associated injuries found were lid injuries in nine patients (50%), followed by ocular surface injuries in seven patients (38.8%). Out of seven patients, five had sub conjunctival hemorrhage and two had corneal abrasions. Associated intraocular injuries was seen in two patients (11.11%), one with scleral perforation and another corneal tear. In the patients with associated injuries whether intraocular or extraocular, the repair of same was done in the same sitting. Subconjunctival hemorrhages were managed with cold compresses and corneal abrasions with patching and lubricating drops postoperatively.

In our study, 17 patients were repaired within 24 h of injury and one of the patients 5 days after injury. The urgent repair within 24 h of injury aided in better visualization due to absence of edema, fibrosis, or scarring. Once the inflammation around pericanalicular tissue sets in the identification of the distal torn end, and subsequently, the repair becomes difficult. In our study, since there was no significant control, so it could not be concluded whether the final outcome depends on the time gap between injury and surgery. However, in our study we found that there is better visualization and localization of cut ends of canaliculus in absence of edema and fibrosis.

All the patients were operated under operating microscope. Various methods for the localization of the cut nasal ends have been mentioned in the literature like injection of air or dye through the opposite punctum and passing pigtail through normal punctum.[12,13] In our study, we employed different methods to see what worked best. In some patients, while the medial cut end of the canaliculus was easily visible as pinkish white tubular mucosal structure, in some, it was identified by injecting dye or air or saline through opposite punctum, and then, the constant pressure over the sac would aid in identification after seeing the nasal end immersed in saline. Usage of pigtail has been mentioned in various studies but if not handled properly carries the risk of normal canaliculus damage in amateur hands.[14] In our study, we used the pigtail in patients in whom the above methods of cut end visualization did not work and medial cut end was deep. The usage of pigtail did not cause any sort of injury in those patients and it was concluded that pigtail can prove to be a very useful tool if used meticulously in patients, in which all other methods fail.

Once the nasal cut end was identified, the Mini-Monoka stent was then inserted through the injured punctum,

and then its way made through the cut end into the sac by holding firmly with needle holder by grasp regrasp technique and collarette fixed at the punctum. In our study, we used the needle holder to hold the stent and found it to be an expedient tool for easy handling and insertion of Mini-Monoka stent. No other study has mentioned the use of needle holder as a golden tool in this surgery. The technique of grasp-regrasp with needle holder at the leading end of the stent helped in easy insertion. The torn tissues around the lids were sutured with 6–0 vicryl and other associated injuries taken care of.

Our study had anatomical success rate of 77.77% and functional success rate of 94.4% which are similar to the studies conducted earlier.[15-18] With regard to the time gap between injury and repair, Chu et al., conducted a study to see if delayed repair affects final outcomes and concluded that delayed repair did not lead to poorer results.[19] Raj et al., concluded that time of surgical intervention is an important predictor of final surgical success.[20] In our study, there was one patient in whom anatomical and functional success could not be achieved and we could not ascertain whether the cause was delayed repair or the deep nasal cut end and further studies are needed to assess the association of delayed repair and final outcome.

In our study, the only post-operative complication encountered was stent excursion and frequent eye rubbing was the cause of same, thus concluding that patient should be strictly advised and prohibited from doing so.

Limitations of the study

The drawbacks of this study were small sample size and absence of controlled group.

We did not compare Mini MONOKA with other intubation materials.

CONCLUSION

This study which was conducted to assess the outcomes of Mini-Monoka stent repair in canalicular tear concludes that it is a safe and reliable simple technique requiring minimum manipulation and has high anatomical and functional success rate. It is a cosmetically satisfying procedure.

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