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Original Article

Effectiveness of Crawford Tube Implantation in Pediatric Age Group at Tertiary Care Hospital

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ABSTRACT

Objective: To observe effectiveness of Crawford tube intubation in paediatric age group at tertiary care hospital.
Study Design: Quasi experimental study.
Place and Duration of Study: Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from Apr 2021 to Apr 2022.
Methodology: A sum of 25 subjects were included in this study ranging from 24 months to 72 months. After multiple failed probing subjects underwent bi-canalicular Crawford tube intubation under GA. After dilating punctum, Crawford tube was inserted from upper and lower punctum and passed through inferior meatus endoscopic guided and was knot in a square shaped. Tube remained in place for 3-6 months.
Results: Out of 25 subjects, 8(32%) were males and 17(68%)were females who underwent Crawford tube intubation, there was 24(96%) success rate among children with endoscopic guided Crawford intubation. Follow-up was done up to 06 months. After 3-6 months in the absence of epiphora tube was removed. Failure was noticed in 1(4%) of cases due to tube dislodgement.
Conclusion: Intubation in CNLDO with Crawford shows promising results among Pakistani population. Early treatment can effectively increase the success rates and reduces the fibrosis formation.

Keywords: Crawford tube, Functional nasolacrimal duct obstruction.

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INTRODUCTION

Congenital nasolacrimal duct obstruction is becoming common problem with an incidence of 6-20% in new borns and in one third of cases, it is present in both eyes (1-5).[1] Primary problem in naolacrimal system is at the level of valve of Hasner, while the nasolacrimal duct opens at the level of inferior meatus in the nose. Earlier it was mentioned by Weiss *et al.* that the congenital obstruction may be due to the membrane at the terminal end of the duct, bony obstruction or narrowing of inferior meatus.[1,2] Epiphora being the most common symptom along with matted lashes, recurrent conjunctivitis and macerated periocular skin. Preseptal or orbital cellulitis may complicate and worsen the disease and may require hospitalization.[3,4] Noticeable signs include increased tear meniscus, distended lacrimal sac along with purulent or mucopurulent discharge. In the absence of above signs a dye disappearance test may be helpful tool in diagnosing of disease entity. Macewen and Young in their study told that this test had 90% sensitivity and 100% specificity in the diagnosis of congenital nasolacrimal duct obstruction (CNLDO). Other causes of epiphora like triachiasis, glaucoma and ocular surface disease. Epiphora can be managed non surgically before 9 months of age with the help of nasolacrimal duct massage. In literature review it is mentioned that 66% of CNLDO is relieved by application of proper massage while 96% of the obstruction is relieved by the age of 1 year. So surgical intervention is unnecessary in the first year of life.[5,6] Probing of CNLDO was studied by the pediatric eye disease investigator group (PEDIG).[7] The rate of complications like discharge, fistula formation and fibrosis, decreases with the help of early probing. Intubation is the most successful procedure in the failure of multiple probing and canalicular stenosis. Intubation with the nasal endoscopy confirms the exact route of the instruments and avoids formation of false passage.[8] In our study, we insertedbicanaliculcrawford tube endoscopic guided and retrieve it with Crawford hook. Thus, the purpose was to see the effectiveness of Crawford tube in children with functional block while the fellow eye was considered as a control.

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METHODOLOGY

The quasi experimental study was carried out at Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from April 2021 to April 2022 after approval from hospital ethical review committee (Ltr no. 1010/

ERC/AFIO). Prior history of probing was present in almost all subject.

Inclusion Criteria: Subjects of either gender, aged > 24 months to 72 months, having epiphora from one or both eyes with patent punctipresenting in OPD of AFIO were included.

Exclusion Criteria: Patients below 24 months with punctual stenosis or atresia were excluded from this study.

All surgical procedures were done by occuloplastics surgeons of tertiary care hospital. Nasolacrimal system was intubated with Crawford tube under general anaesthesia. The tip of Crawford tube consists of olive bulbs which prevents the lacrimal system from destruction. Punctum were dilated and Crawford tube was inserted from upper and lower puncti and passed through inferior meatus. Excess tube was cutted and remainder was tied in a square shaped knot. Out of 25 patients, 8 females and 17 males who had constant epiphora from one or both eyes presented to us following one or more failed probing. Crawford tube remained in place for 3-6 months and was removed afterwords in the absence of any epiphora through nose under visualization with endoscope.

Data was analyzed by using Statistical Package for the social sciences (SPSS) version 23.00. Mean±SD was calculated for continuous variable. Frequency and percentage was calculated for categoricalvariables.

RESULTS

After a follow up of six months and tube removal of 25 subjects who underwent bicanalicular Crawfo-rd tube intubation, 17(68%) were female while 08(32%) were males.The mean age was 4.04±3.21 years. 13(52%) were right eyes and 12(48%) were left eyes (Table).

Table: Results of Crawford tube intubation (n=25)

Variables	Frequency (%)
Age (Mean± SD)	4.04±3.21 years
Gender (n=25)	
Male	08(32)
Female	17(68)
Eyes	
Right	13(52)
Left	12(48)

Bilateral tube intubation was performed in 01(4%) subject. There was failure noticed in 01(4%) subject. The tube remained in place for 3-6 months after intubation and no epiphora was noticed upto 06 months of follow up. The success rate was almost 24(96%) in our study shown in Figure. No major complication was seen per operative and post operative except in one subject in which there was tubedislodgement.

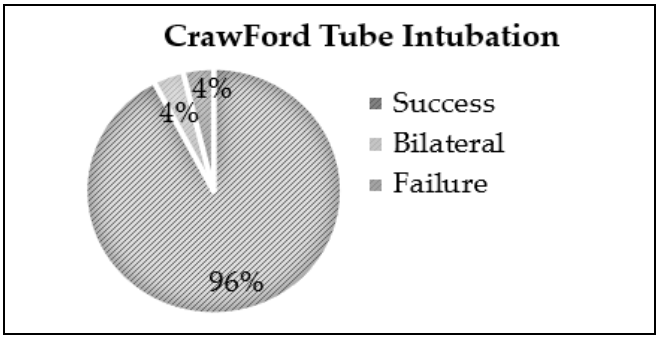

Figure: Crawford Tube Intubation

DISCUSSION

Congential nasolacrimal duct obstruction occurs due to presence of membrane at the level of valve of rosenmullar. Initial management is nasolacrimal duct massage and probing. In case of failure, intubation of lacrimal system is the favourable treatment option in pediatric age group. Guerry and Kendig, told about the incidence of epiphora in infants which is almost 6%.[7] We in our study included the children above 18 months with functional block and main symptom of epiphora. Since the invention of Crawford tubes in 1977, many modifications have been observed.[9,10] We used Crawford tube with olive tips of 0.6mm. The procedure of a Crawford tube intubation is rapid, noninvasive, pain free, and safer for the subjects. The aim is to broaden the punctum and canaliculus by placing crawford tube in lacrimal system and preventing narrowing of the lacrimal system, similarly as it is done in angioplasty.[11,12] In literature review there is high success rate of silicon tube intubation in CNLDO. Orhan *et al.* also used silicon tube under endoscopic guided from 18-48 months of children.[13] We included the patients between 18 months to 60 months of age in our study. Repka *et al.* and Andalib *et al.* achieved almost 90% success rate in their studies.[13,14] We also had success rate of 96% in our study with a follow up of 06 months. About 60 of 100 ophthalmologists in the United Kingdom after failed probing proceed for secondary probing procedure; while Crawford and Ritlengbicanalicular silicone tube intubation systems following failed primary probing is being used by 33 out of 100 ophthalmologists.[15] While we used Crawford tube in our study after multiple failed probing. According to Katowitz and Welsh and Cha *et al.* success of late probing is less likely in older age groups.[15] Well-established treatment option for the

treatment of CNLDO is Silicone tube intubation. Literature review reports 82-97% success rates following silicone intubation.[16-19] Our study also confirms success rate of Crawford tube intubation of almost 96%. Failure was seen in one subject secondary to tube dislodgement. Gardiner *et al.* performed nasolacrimal intubation without endoscopy and reported success rate of almost 62.5%.[20-24] We in our study did Crawford tube intubation endoscopic guided, which showed better prognosis of 96%.Contrary to El-Esaawy who removed tube after 06 weeks of intubation in children, we removed tubes after 3-6 months respectively.[25] Furthermore, this is the first study done in Pakistani population with Crawford tube intubation after multiple failed probings in congenital nasolacrimal duct obstruction having successful results in treating functional nasolacrimal duct block.

LIMITATION OF STUDY

We did not included children <18 months of age and also children with monocanalicular system. Study on large scale should be conducted for monocanalicular Crawford intubation through upper punctum of both eyes.We also did not include older children above 7 years of age in our study.

CONCLUSION

Crawford tube intubation can be effective, safe and non invasive in treating the congenital nasolacrimal duct obstruction and thereby preventing the complication like fistula formation and fibrosis of lacrimal system.

Conflict of Interest: None

Author's Contribution

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

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

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

FH & AR: Data colllection, Entry and analysis of data, preparation of rough draft & 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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