Original Article

Outcome of Transcanalicular Laser Dacryocystorhinostomy in Different Age Groups - A Prospective Study in Rangpur Medical College Hospital

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Abstract

Background:
Dacryocystorhinostomy (DCR) is the treatment of choice for Chronic Dacryocystitis. Although external DCR surgery is still regarded as the gold standard for acquired nasolacrimal duct obstruction, due to short surgery time and relative bloodless operation, transcanalicular diode laser DCR is evolving as an equally effective alternative treatment in the recent past.

Objective:
To assess the prognostic value of age on the outcome of transcanalicular diode laser DCR in patients with acquired nasolacrimal duct obstruction.

Methods:
This hospital-based prospective and longitudinal study was conducted in the Department of Ophthalmology in Rangpur Medical College Hospital (RpMCH) from July 2018 to March 2020. 100 patients, 47 males, and 53 females were treated with transcanalicular laser-assisted DCR without intubation for NLDO. The patients were divided in four age groups <30 years (10%), 31-40 years (36%), 41-50years(20%) and >50 years(34%).The inclusion criteria included primary NLDO and failed External DCR. The exclusion criteria included common canalicular obstruction, lacrimal pump failure, acute dacryocystitis, mucocele, nasal polyps, and gross nasal septal deviation Follow-up examinations were done after 1 week, 6 weeks, 12weeks, and 24 weeks after surgery. Surgical success was defined as resolution of symptoms (epiphora or discharge) and unobstructed lacrimal irrigation.

Results:
Among 100 patients, 47 males and 53 females. The mean age was 48.87 years, ranging from 18 to 85 years. The majority of patients (36%) were aged 31-40 years. At first follow-up patients of all age group shows patent SPT (success rate 100%). At final follow-up (after 24 week) success rate was high (88%)in age group >50 years,($p< 0.05$) which is statistically significant.

Conclusion:
As this study showed that the older patients experienced better transcanalicular diode laser-assisted dacryocystorhinostomy results than the younger patients Transcanalicular Laser Dacryocystorhinostomy is a better option for elderly patients with epiphora. The diminished inflammatory response in the older population may be a possible contributing factor to these results.

Keywords: Dacryocystorhinostomy, Laser DCR, Transcanalicular Laser DCR

Introduction:

Chronic dacryocystitis is an inflammatory condition of the lacrimal sac most commonly associated with partial or complete obstruction of the nasolacrimal duct.[1] Most chronic dacryocystitis presents with watering and discharge but some cases may progress and cause severe ocular and extraocular complications. These include orbital cellulitis, formation of lacrimal fistulas, meningitis, brain abscess formation, cavernous sinus thrombo-

sis, severe sinusitis, permanent loss of vision, and even death.[2] Dacryocystorhinostomy (DCR) is the mainstay treatment for epiphora resulting from nasolacrimal duct obstruction.[3] Dacryocystorhinostomy (DCR) means the creation of anastomosis for direct communication between the lacrimal sac and the nasal cavity through a bony ostium and thus reestablish lacrimal outflow by creating a bypass into the nasal cavity.[4] There are different surgical techniques available for DCR. These include external DCR, nonmechanical laser DCR, endonasal laser DCR and transcanalicular laser-assisted DCR.[5] External DCR has been a successful surgery in the treatment of NLDOs (Naso Lacrimal Duct Obstructions) since 1724.[6] Modern external DCR was introduced by Ohm in 1920 where he created both anterior and posterior lacrimal and nasal flaps and sutured them together6. This technique was subsequently popularized by Dupuy-Dutemps and Bourguel.[7] Despite the popularity of External surgical DCR, it has many complications like prolonged surgical time, unpredictable bleeding, and external scar.[1-8] The first endonasal DCR was described by Coldwell in 1893[6] when a metal probe was passed through the canaliculus into the lacrimal sac down into the nasolacrimal duct. An electric burr was then used to create an opening through the bone and nasal mucous membrane until the probe can pass freely into the nasal cavity. The popularity of this approach increased in the 1970s and 1980s. There was a major limitation to the endonasal approach due to limited visibility from poor illumination and bleeding of the nasal mucosa.[9] In 1989 McDonough and Meiring first introduced endoscopic endolaser DCR that helped revive interest in endoscopic technique.[10] Inadvertent exposure of the nasolacrimal duct during endoscopic nasal surgery gave them the idea of introducing a rigid Storz Hopkins Rodlens endolens with a 30 viewing angle for endoscopic DCR.[10] Alternative techniques such as transcanalicular diode laser DCR are gaining popularity due to the innovation of high-resolution fiber-optic endoscopes which yield high-quality images. The success rate of such laser-based transcanalicular DCR (46% - 100%) is approaching that of external DCR (>90).[1-5] Transcanalicular laser-assisted DCR can be done under local anesthesia, involves precise cutting and removal of tissue by ablative procedure, is bloodless, less time consuming, leaves no external scars, can be repeated, preserves ligaments and muscles of the internal canthus, and preserves lacrimal pump function.[1-5] Over the years lasers with different wavelengths have been used to perform an osteotomy. We used the transcanalicular approach because of its better success rate and it allows direct application of the laser to the obstructed site.[11,12] Here we present our experience of transcanalicular laser-assisted DCR without intubation in different age groups in 100 patients using a 980 nm diode laser in the Ophthalmology department of Rangpur Medical College Hospital.

Methods:

This prospective study included patients from July 2018 to March 2020 at the Ophthalmology department of Rangpur Medical College Hospital. 100 patients, 47 males, and 53 females were treated with transcanalicular laser-assisted DCR without intubation for NLDO. The patients were divided in four age groups <30 years (10%), 31-40 years (36%), 41-50 years (20%) and >50 years (34%). The inclusion criteria included primary NLDO and failed External DCR. The exclusion criteria included common canalicular obstruction, lacrimal pump failure, acute dacryocystitis, mucocele, nasal polyps, and gross nasal septal deviation. All patients had preoperative irrigation of the lacrimal pathways to evaluate the site of block and X-ray PNS to exclude gross DNS. Slit-lamp examination was done to rule out chronic conjunctivitis, ectropion, entropion, blepharitis, and lagophthalmos. Diode laser (980 nm infrared) using fiber-optic cable was used. The laser settings included optical power of a maximum of 5 watts with an aiming beam of 635 nm, pulse length 90 ms, and interpulse pause of 50 ms. The interior of the nasal cavity was visualized with the help of the nasal endoscope on a monitor. All patients were operated on under local of both puncta was done with a punctal dilator for facilitating the passage of the fiber-optic probe. The exact site of osteotomy was determined using an endoscope. The site just anterior and inferior to the attachment of the middle concha was selected for osteotomy. The laser probe was inserted horizontally into the sac through both puncta and then turned vertically downward, medially, and backward (same as in probing) till it was vertical. Then, the probe was pushed till a hard resistance was felt. A 0° rigid camera-mounted nasal endoscope was used to

visualize the laser beam. The laser beam was properly focused in the middle meatus. A contact continuous mode diode laser 980 nm was used to create osteotomy. Laser light was delivered through 0.5 mm optic fiber with 0.36 mm core. The osteotomy was enlarged to 5 mm by pulling up and then pushing down the laser probe in a circular pattern. No intubation with silicone stent was done. Syringing was carried out after creating an adequate opening. The success of the procedure was assessed by the patency of the lacrimal passage on irrigation with normal saline. The average size of osteotomy was 5 mm wide and procedure time was 15 min. A postoperative nasal pack was given. The patient was discharged the next day on combined steroid and antibiotic eye drops and xylometazoline hydrochloride 0.1% nasal drop. Follow-up examinations were at 1 week, 6 weeks, 3 months, and 6 months after surgery. Surgical success was defined as resolution of symptoms (epiphora or discharge) and unobstructed lacrimal irrigation.[13]

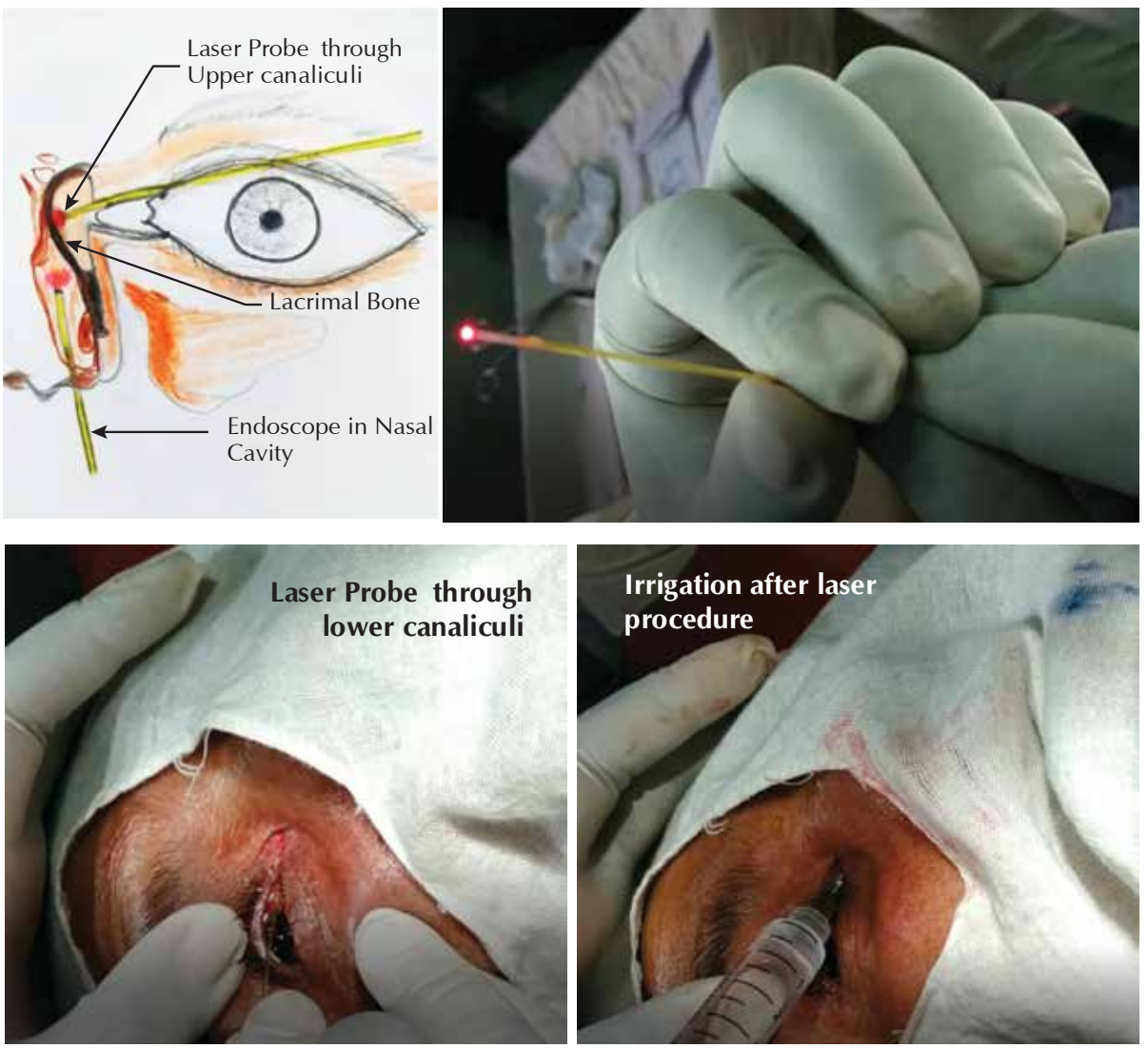


Figure-1: Transcanalicular laser-assisted DCR without intubation for NLDO

Results:

Our study initially included 130 patients among which up to last follow-up at 24 weeks (wk), 100 patients were available for study. The majority of the patients were female (Figure-2).

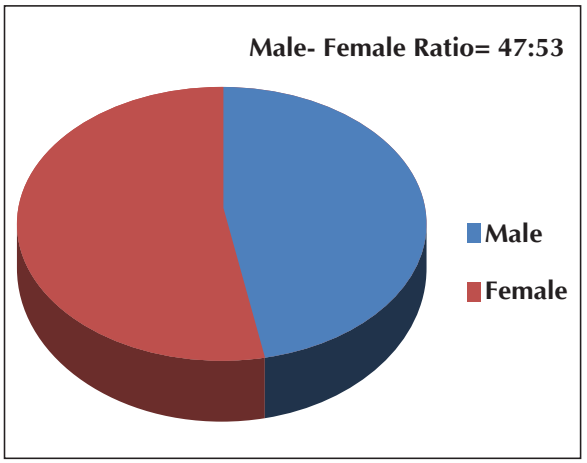


Figure-2: Male- Female Ratio= 47:53

Among the 100 patients, most the patients were between 31-40 years (36%) followed by patients above 50 years (34%) (Figure-3).

Patients were followed up after 1 wk, 6 wk, 12 wk, 24 wk. At first follow-up (1wk) patients of all age groups showed patient SPT (success rate 100%). At 2nd follow-up (after 6wks) age group <30 showed. 90% patent SPT , age group 31-40 yrs showed 83% patent SPT, age group 41-50 yrs showed 90% patent SPT and age group >50 yrs showed 100% patent SPT. At 3rd follow up (after 12 wks) sac patency was 60%, 69%, 80% and 97% respectively. At last follow up (after 24 wks) sac patency was 50%, 56%, 60% and 88% respectively. After 24 wks total success rate of transcaralicular diode laser DCR in all age group was 67%, where in age group >50 yrs success rate was high (88%) (Table-I).

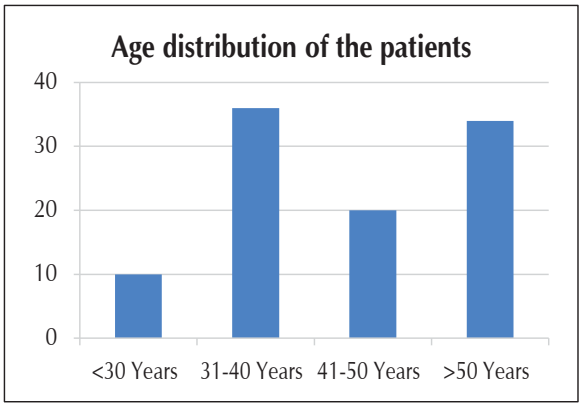


Figure-3: Age distribution of the patients

Table-I: Number of Patients of Patent and Blocked Irrigation in different follow up visit

Group (Years)	After 1 week		After 6 week		After 12 week		After 24 week	
	Patent (%)	Blocked (%)	Patent (%)	Blocked (%)	Patent (%)	Blocked (%)	Patent (%)	Blocked (%)
<30 (n=10)	10 (100)	0(0)	9(90)	1(10)	6(60)	4(40)	5(50)	5(50)
31-40 (n=36)	36(100)	0(0)	30(83)	6(17)	25(69)	11(31)	20(56)	16(44)
41-50 (n=20)	20(100)	0(0)	18(90)	2(10)	16(80)	4(20)	12(60)	8(40)
>50 (n=34)	34(100)	0(0)	34(100)	0(0)	33(97)	1(3)	30(88)	4(12)
Total	100(100)	0(0)	91(91)	9(9)	80(80)	20(20)	67(67)	33(33)

Discussion:

In recent years, diode laser has emerged as the preferred laser for performing transcanalicular laser DCR. A wide range of success rates with TCL-DCR has been reported in various age groups. Emre et al conducted a prospective study on 125 patients of different age groups and showed that patients below 30 yrs old, the success rate of TCL-DCR was 52% whereas in patients 51-60 yrs, it was 76% and patients >60 success rate was 88%.[13] Fahrettin akag et al conducted a study on 70 patients and showed that after 12 months young patients (>45 yrs) had a success rate of 46% whereas elderly patients (>45 yrs – 60 yrs) had a success rate of 76% after transcanalicular diode laser DCR.[14] In our study after 24 weeks (6 months) the success rate in the young age group(<30 yrs) was 50% whereas in the elderly age group(>50 yrs) success rate was 88% that closely resembles other studies[13-16], p<0.05 which is statistically significant.The main cause of failure with this technique is the obstruction of the bony window

due to fibrovascular proliferation. Other reasons for the failure of TCL-DCR are adhesions between the rhinostomy and the middle coacha.[17-20] Old patients mostly have involutional NLDO; however young patients tend to have local or systemic causes to precipitate NLDO. It has also been reported that strong expression of nasal mucosal heat shock protein 47 leads to the induction of fibrosis and scar tissue, thus decreasing. the effectiveness of transcanalicular laser DCR.[21-23] As age increases, the number of fibroblasts decreases due to the degeneration process. Decreased number and activity of fibroblasts produce fewer fibrous components. This explains the high success rate of transcanalicular laser DCR in elderly patients.

Conclusion:

This study clearly showed better transcalanicular diode laser DCR results in elderly patients (>50 yrs) than younger patients. So transcanalicular diode laser DCR can be a good surgical option for elderly patients suffering from chronic dacryocystitis.

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