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OUTCOME OF TRANSCANALICULAR ENDONASAL DIODE LASER ASSISTED DACRYOCYSTORHINOSTOMY IN PATIENTS OF CHRONIC DACRYOCYSTITIS

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ABSTRACT

Our study was conducted to evaluate the outcome of transcanalicular diode laser dacryocystorhinostomy in chronic dacryocystitis patients.The study group comprised of 24 patients. The cases were operated by one team to make the uniform analysis. Patients with epiphora, mucocele, lacrimal sac fistula and recurrent dacryocystitis were included in the study. However, patients below 10 years or having canalicular block, granulomatous diseases, malignancy were excluded. All the patients had undergone endoscopic transcanalicular diode laser dacryocystorhinostomy (DCR) surgery under general anesthesia. The free flow of saline through newly created stoma during sac syringing was considered as successful criteria. The stent were used in most of the cases. The average follow up period was 6 months. The success rate seen was 83.34% concluding that the transcanalicular DCR with diode laser is a safe procedure with comparable success rate without any orbital complications.

KEYWORDS

Endoscopic dacryocystorhinostomy, diode laser, transcanalicular DCR, Chronic dacryocystitis

INTRODUCTION

Dacryocystorhinostomy (DCR) is a procedure done for chronic dacryocystitis with for more than 100 years. Dacryocystorhinostomy is performed by using an external approach, endonasal approach with or without laser under direct vision (endoscopically) and laser assisted nasolacrimal duct obstruction (NLDO).It is a bypass surgery in which obliterated nasolacrimal duct is bypassed and the lacrimal sac is opened directly into the nasal cavity.DCR has been used transcan alicular approach.

External DCR approach was first performed by Toti[1] in 1904 and later mucosal anastomosis with suturing of mucosal flaps was described by Dupuy-Dutemps and Bourguet[2]. In 1893, Caldwell [3] used an intranasal approach for treating NLD block but this approach did not gain popularity due to poor intranasal visualization. The introduction of modern endoscopes and rhinology instrument, has greatly improved the visualization of the nasal cavity.

Mc Donogh and Meiring[4] described the first modern endonasal DCR procedure in 1989. Endonasal endoscopic DCR has definitive advantages over external DCR. It is a simple, less time consuming, safe and scarless procedure. Introduction of laser in endonasal DCR has further helped surgeon to perform surgery in less invasive and simpler way.

Massaro et al. [5] introduced endonasal laser DCR by using argon laser device. Laser is used to vapourize the mucosa and bone between middle meatus and lacrimal sac. The creation of an ostium with laser has reduced the intraoperative trauma and bleeding. Later carbon dioxide and potassium titanyl phosphate (KTP) laser[6], holmium:YAG Laser[7],neodymium :YAG laser [8,9] were used. In 1992, Levin and Stormo-Gipson[10] proposed Transcanalicular laser assisted dacryocystorhinostomy (TLDCR) technique by passing KTP laser fibre through lacrimal apparatus and directing the laser energy toward the nose.

In transcanalicular laser–assisted dacryocystorhinostomy(TLDCR), laser fiberoptic is threaded through the canaliculus and into nasolacrimal sac. Laser energy is used to create a fistula between the lacrimal sac and the nose. Compare to endonasal DCR, this approach is safer because the laser energy is directed towards the lacrimal nasal sac and energy is not directed towards the orbit. We assessed the use of transcanalicular diode laser for endonasal DCR to treat NLDO. The purpose of our prospective study was to analyze the success rate of transcanalicular laser DCR with 980 nm diode laser in patients of chronic dacryocystitis.

MATERIALAND METHODS

The present study is on the outcome of Transcanalicular endonasal diode laser assisted DCR conducted in the Department of Otorhinolaryngology, University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi. 30 procedures were done on 24 patients of acquired chronic dacryocystitis with nasolacrimal duct obstruction. They were taken for transcanalicular endonasal diode laser assisted DCR surgery under general anaesthesia.

All procedures were performed by a team including the same otolaryngologist and referring ophthalmologist. There were 6 males and 18 females with a male: female ratio of 1:3. The mean age was 34.27 (range from 14 to 68 yrs). The indications for DCR were epiphora, mucocele, lacrimal fistula, and recurrent dacryocystitis. The exclusion criteria consisted of punctual and canalicular abnormalities, lower eyelid laxity, malignancy, acute inflammation and age younger than 10 years. Dacryocystorhinography, (DCG), lacrimal sac syringing with regurgitation of fluid from the opposite puncta, hard stop on probing were the criteria to decide the surgery. Pre-operatively, informed written consent and related history was taken .All patients undergone routine ophthalmic and rhinological evaluation. The procedure was performed under general anaesthesia with appropriate laser safety precautions for patient and operating team. Patient placed in supine position, head end elevated. Nasal packing done with cottonoid soaked in 4% lidocaine and 1:100,000 adrenaline solution for five minutes, a solution of 2% lidocaine and 1: 100,000 adrenaline was injected into the lateral nasal wall adjacent to the lacrimal sac and middle turbinate.

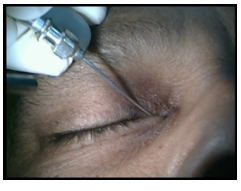

FIGURE 1: Hand piece and cannula introduced via lower puntum.

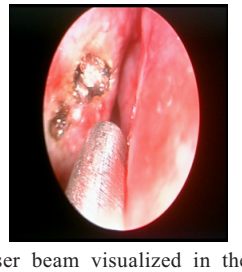

FIGURE 2: Laser beam visualized in the nasal cavity using endoscope, laser fired to create multiple openings, later enlarged to form rhinostoma.

Upper punctum then lower punctum was dilated with Nettle ship punctum dilator. A diode laser fibre of 300 micron introduced into the punctum and advanced into lacrimal sac through the hand piece (Figure 1). When sac entered, a 0 degree or and 30 degree 4 mm diameter rigid nasal endoscopes were used to visualize the beam of diode laser. The laser fired at 5-6 W, in continuous mode, only after confirmation of position, just anterior to middle meatus. Multiple back & forth motion made with laser cannula and angulated for enlarging the hole, on aqn average 5-6 attempts required for the same (Figure 2). In some cases, hole (rhinostoma) was expanded endonasaly by firing with laser from inside the nose. Patency confirmation was done by lacrimal irrigation and bicanalicular silicon stent (23 G) was used. Nose packed with merocele nasal dressing.

DIODE LASER: All cases were operated using Arc Diode Laser unit Diode Laser 980 nm and 300 micron fibre, at 5 watt continuous mode. (Figure. 3).The intended effect of the laser application is based on the contact with the tissue, which is converted mainly into heat and so causes the desired effects (Coagulation / Vaporisation).

FIGURE 3: Arc Fox Diode laser unit

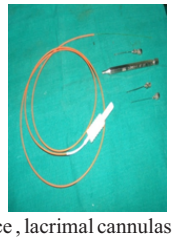

FIGURE 4: Hand piece , lacrimal cannulas and diode laser fibre

POST OPERATIVE PROTOCOL

Systemic antibiotics, analgesics and antihistaminics were administered for 7 days. Antibiotic eye Drops and nasal decongestants were given postoperatively for 3-4 times a day for 7 days. Nasalpack was removed 48 to 72 hours after surgery. Follow up nasal endoscopy was done at 1 week, 2 weeks, 4 weeks, 3 months and 6 months. Nasolacrimal silicon stents were left in position for 3 months following primary DCR and 6 months following revision procedure. All patients were followed up for a period of 6 months for the evaluation of objective findings as well as subjective symptoms (Table 1). Also performance of additional surgery and any synechiae was recorded. The procedure was classified as successful if the patient was free of subjective symptoms with nasolacrimal patency confirmation by syringing and positive fluorescein dye test. For statistical evaluation, mean & standard deviation and results in percentages were calculated.

TABLE 1: POST OPERATIVE ASSESSMENT

SUBJECTIVE ASSESSMENT	OBJECTIVE ASSESSMENT
1) epiphora relief on a 5 point visual analog scale 2) Whether patients were disturbed by silicon tubes.	3) Visualization of rhinostomy opening. 4) Presence of granulation tissue at the opening. 5) Syringing of the eye. 6) Flourescein dye observed in the nasal cavity after instillation of solution of 2% flourescein dye to the eye whether spontaneously or after pressure applied to lacrimal sac

Score	Symptoms	Outcome
1	Free of symptom	successful
2	Significantly improved	successful
3	Slightly improved	successful
4	No improvement	Failed
5	Worse	Failed

RESULTS

In present study, there were 24 patients (Male: Female ratio 3:1) with mean age of 34.27 years. 6 had bilateral disease. All cases had complaints of epiphora. Three cases had mucocele and two had lacrimal fistula, which were closed spontaneously following procedure. In five cases revision surgery was done. One patient had recurrent ethmoidal polypi and required removal of polypi to visualise lacrimal sac area who developed allergic reaction to stent and later on recurrence of polyposis leading to failure of procedure.

Duration of surgery ranged between 20 and 55 minutes and an average time taken for surgery was 30.67 minutes. Blood loss was between 50 and 100 ml. (average 45.83 ml).

Patient was asked to grade degree of epiphora relief on a 5 visual analog point scale, 25 were significantly improved. Seven patients were disturbed by silicone tubes with complaints of itching and mild pain at the stent site and were treated conservatively with combined antibiotic, steroidal eye drops and in some cases early removal of stents. One patient developed failure due to allergic reaction to stent material. One patient had accidental removal of stent at second month. Two patients had lower punctal injury and one patient developed cheese wiring of silicon stent. There were no cases of diplopia, blindness, orbital hematoma, Epistaxis. Few had lid edema that resolved in 3 days. One patient developed synechiae after surgery but these were asymptomatic, removed as an office procedure.

All cases undergone syringing of eye postoperatively and patency was found in 25 cases after 6 months. Three patients had recurrence of symptoms within three to six months due to granulation tissue formation at stoma. One had recurrence of allergic ethmoidal polyp and other fibrotic closure of rhinostoma after 4 months.

DISCUSSION

Thirty procedures were done on twenty four patients of chronic dacryocystitis. In the present study, the mean age of the patients was 34.27 years. It indicates that onset of disease is at an early age in the Indian population.

Transcanalicular endonasal laser assisted dacryocystorhinostomy is a recent technique with very little work done. Transcanalicular (or endocanalicular) approach was first described in 1963, but soon was abandoned due to poor visualization, until lasers offered technical refinements that facilitate its use. Transcanalicular approach is safer because laser energy is directed primarily along the axis of the laser fibre, which reduces collateral damage as it is directed toward the obstructed site (nose) and away from the orbital structures, so there is less chances to medial canthal structure[11, 12] as compared to endonasal laser assisted DCR which has more orbital complications like orbital fat prolapsed, swelling of lower eyelid.

TANSCANALICULAR DCR is scar-less, simple and less time consuming procedure with mimimal blood loss in comparison to external DCR surgery. In external DCR, nasal mucosa is stitched with lacrimal sac mucosa hence healing is by primary intention, whereas absence of formal mucosal flaps in transcanalicular DCR encourages greater postoperative fibrosis and leads to secondary intention healing. This may be one of the reasons for higher failure rate in endonasal/ transcanalicular DCR. In our study, fibrous tissue growth, granulation tissue and scarring have been seen at rhinostoma site during follow-up nasal endoscopy. Besides this, few patients were disturbed by silicon stent and there was no difference in the outcome of procedure with or without stent in our study. One patient having lacrimal sac fistula was also included in study and with regular dressing, the fistulous opening healed well.

Smithard[13] et al recommended laser assisted DCR is a safe and efficient technique in anticoagulated patients without any disruption of anticoagulant therapy We also encountered bloodless field as compared to conventional endonasal DCR with the use of diode laser.

Hofmann [14] used mini endoscopes for lacrimal endocsopy for better visualization and achieved success rate of 83% by using KTP Laser.

Jenny, Mark, Martin and Fay [15] described advantages and disadvantages of three different DCR techniques as illustrated in (Table 2)

TABLE 2: ADVANTAGES AND DISADVANTAGES OF THREE DIFFERENT DCR

	External DCR	Transcanalicular DCR	Endonasal DCR
Direction of laser beam	None	Away from globe	None or towards globe
Incision	Yes	No	No
Operating time	Variable	Very brief	Variable
Hemostasis	Good	Excellent	Variable
Recuperation	Several days	Half day	Variable
Lacrimal-sac biopsy	Yes	Unreliable	Unreliable
Dacryolithiasis	Yes	Contraindicated	Variable

Henson performed Diode Laser Endocanalicular DCR with mitomycin –C application over rhinostoma site and found to have better success rate 87.5%.

Narioka and Ohashi [17] reported the results of transcanalicular diode laser assisted DCR in revision (failed external DCR)cases.the functional success rate after initial revision surgery was 80% and 100% after second revision treatment. In contrast we performed 25 primary and 5 secondary procedures,and success rate were 88% and 60% respectively.

McHugh, Rose and Marshall[18] showed that diode laser can achieve effective tissue dissection with minimal collateral damage external to the target zone hence minimises the risk of retrograde damage. During lacrimal surgery the use of diode laser for mucosal incision results in minimal hemorraghe and improved intraoperative view.

The success rate of transcanalicular laser assisted DCR has been reported to be very high (Table 3) and as good as external DCR when done by experienced skillfull hands. Our success rate is 83.34%.

TABLE 3: VARIOUS STUDIES OF TRANSCANALICULAR LASER DACRYOCYTORHINOSTOMY AND SUCCESS RATES

AUTHORS	YEAR	No. Of cases	LASER	SUCCESS
Hofmann et al.[14]	2003	78	KTP	83%
Henson et al.[16]	2007	40	Diode	87%
Plaza et al.[19]	2007	25	Diode	88%
Narioka & Ohashi[17]	2008	15	Diode	80%
Present study	2009	30	Diode	83.34%

Conclusion

Transcanalicular DCR with diode laser is a minimally invasive alternative procedure for the treatment of NLDO. The benefits of this newer technique include decreasing operating time, reducing morbidity, shortening functional recovery and can be done in cases of narrow nasal fossae. However the success of the surgery also depends on many other unavoidable biological factors like recurrence of ethmoidal polyps, allergic reaction to the stent, fibrotic closure of rhinostoma and formation of granulation tissue, which are inherent to the individual.

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