

Outcome of Diode Laser Assisted Endoscopic DCR

Utpal Kumar Kundu,¹MahmudulHasan,²Utpal Kumar Datta,³ Md. JoynalAbedin,⁴ Md.OliUllah,⁵ Abdullah Yusuf,⁶Md. RojibulHaque⁷

Abstract

Background and Objectives: Endoscopic laser dacryocystorhinostomy(DCR) is now a well established, effective approach to relieve nasolacrimal duct obstruction.The aim of DCR surgery is to create a permanent opening between the lacrimal sac & nasal mucosa in patient of chronic dacryocystitis. There are many methods to perform DCR but our approach was diode laser assisted endoscopic DCR. The Objective is to study the outcomes of diode laser assisted endoscopic DCR.

Material and Methods: This hospital based prospective non-randomized interventional clinical trial included 49 patients with chronic dacryocystitis at National Institute of ENT between august 2015 to July 2016. Success and complications were assessed by evaluating the patient at 1 week, 1 month, 3 month, 6 month postoperatively and at least 3 month after removal of silicon tube those who were intubated by nasal endoscopy and sac patency test. Success was defined as absence of epiphora and patency of lacrimal drainage system.

Results: Mean age with SD was 44.96 ±15.807 (Range 13 – 70 years). Patients between age group 40 – 60 yrs. was the highest (40.8%), Female were predominant 35 (71.4%) than male. Male Female Ratio was 1: 2.5. Septoplasty for DNS in 8 (16.33%) cases, turbinoplasty for hypertrophied turbinate in 1 case were performed. Complications were injury to middle turbinate, sump syndrome, synechia and granulation tissue formation. Overall success rate of DCR was seen in 87.76% cases.

Conclusion: Laser assisted endoscopic DCR surgery eliminate the need of conventional external DCR. It is easy to perform, cosmetically good, high tech and has excellent outcome.

Key Words: Dacryocystitis, Diode Laser, Endoscopy, Dacryocystorhinostomy.

Introduction

The aim of DCR surgery is to create a permanent opening between the lacrimal sac & It can be performed through a cutaneous incision, traditionally referred to as external DCR or via a transnasal approach under either direct

1. Dr. Utpal Kumar Kundu, DO, MCPS, MS, Assistant Professor (EYE), Mugda Medical College, Dhaka, Bangladesh. Mobile no.01717-225687, email: dr.utpalnio@gmail.com

2. Dr. Mahmudul Hasan; MBBS, MS, Assistant Registrar, National Institute of ENT, Tejgaon, Dhaka. Bangladesh.

3. Dr. Utpal Kumar Datta; MBBS, MS, Assistant Prof. ENT, National Institute of ENT, Tejgaon, Dhaka. Bangladesh.

4. Dr. Md. Joynal Abedin, DLO, MCPS Medical Officer, National Institute of ENT, Tejgaon, Dhaka. Bangladesh.

5. Dr. Md. Oli Ullah, Medical officer, National Institute of ENT, Tejgaon, Dhaka. Bangladesh.

6. Dr. Abdullah Yusuf, Assistant Professor, Microbiology, National Institute of Neuroscience and Hospital, Dhaka.

7. Dr. Md. Rojibul Haque MBBS, MS, Prof. of ENT and HNS, National Institute of ENT, Tejgaon, Dhaka. Bangladesh. Mobile No: +8801711676039, email: rojibul@yahoo.com

Corresponding Author

Dr. Utpal Kumar Kundu DO, MCPS, MS, Assistant Professor (EYE), Mugda Medical College, Dhaka, Bangladesh. Mobile no.01717-225687, email: dr.utpalnio@gmail.com

visualization or endoscopic guidance. In both approaches, the lacrimal sac mucosa is connected to the nasal mucosa above the level of the mechanical obstruction at the nasolacrimal duct.¹⁻⁶

External DCR is performed in a standardized fashion: a skin incision is made, the lacrimal bone is removed, and the sac mucosa is connected to the nasal mucosa over a silicone stent. Endoscopic or endonasal DCR, however, though maintaining the same surgical principles, has been described in numerous variations.^{3,6-10} Some simply involve removal of the nasal mucosa; the creation of a bony opening at the level of the lacrimal bone using a bone rongeur,¹¹ power drill,¹² or laser⁷; and then stripping the lacrimal sac to create a direct fistula from the sac to the nose. Others perform a more complicated surgery by creating a flap from both nasal mucosa and lacrimal sac bridging the bony opening.¹³⁻¹⁵

The first intranasal DCR was performed by Caldwell in 1893.¹⁶ Endonasal endoscopic DCR was first performed by Rice in 1988, and popularized by McDough & Meiring in 1989.¹⁷ Since the description of endonasal endoscopic DCR, a number of modifications using lasers have also been described as a useful tool in endoscopic DCR. Modifications have been described using the Holmium: YAG, argon, carbon dioxide and KTP laser.¹⁶ A transcanalicular approach with the Neodymium: YAG laser has also been described.¹⁷ Precise cutting, easy removal of tissue by ablation, minimal trauma to adjacent tissues are the some advantages of Laser DCR over conventional method.

Usually in Bangladesh, External DCR is practiced by ophthalmologist. Very few ENT surgeons practise endonasal endoscopic DCR as facilities and training is not available in the country. Diode and CO₂ Laser are the recent addition in very few Eye and ENT hospitals of Bangladesh.

Beside other Eye and ENT Laser surgeries, Laser assisted endoscopic DCR surgery using a

Diode laser is regularly performed now-a-days. This article assessed the use of the transcanalicular diode laser for endonasal DCR and the outcomes of this modality.

Material and Methods

This was a prospective non randomized interventional clinical trial. The objective of the study was to assess the outcomes of diode laser assisted endoscopic DCR. This prospective study was carried out in National Institute of ENT, Tejgaon, Dhaka for the period of one year from 1st august 2015 to 31th july 2016. Total 49 consecutive patients, who had acquired nasolacrimal duct obstruction with or without nasal pathology referred to this hospital for laser assisted endoscopic DCR operation, were included in the study. In this study, 980 nm diode laser was used in repetitive pulse. Laser setting was 8-10W, pulse length 90ms. Laser light was delivered through a 0.35mm optic fibre. A silicone tube was passed through the canaliculi and kept in place for 2.5 to 3 months. In some cases no silicon tube was introduced. Identical topical antibiotics and steroid drops were prescribed in tapering dose for one month in each patient. Success and complications of patients were assessed by evaluating the patient at 7th pod, 15th pod, after 1 month, after 3 month, after 6 month postoperatively and at least 3 month after tube removal by nasal endoscopy and patency of osteotomy by lacrimal system irrigation. Success was defined as absence of epiphora and patency of osteotomy by lacrimal system irrigation.

Result

A total of 49 eyes of 49 patients were operated. Male were 14 (28.6%) and female were 35 (71.4%). Male to Female ratio was observed with 1:2.5. Age range of the patients was 13 – 70 yrs. Mean age with SD was 44.96 ± 15.807. 24 (48.98%) were operated on the right eye and 25 (51.02%) on the left eye. Associated correction of nasal diseases (Septoplasty 8 for DNS, turbinoplasty 1 for hypertrophied turbinate) was done in 9 cases. The commonest postoperative complication was injury to the middle turbinate (2 cases). The postoperative

complications were Sump syndrome (1case),synaechia in the nasal cavity (1 case) and granuloma at the ostium (1 case).The overall success rate was observed in 87.76%.

Table -I: Distribution of age (n=49)

Age Group	Frequency	Percentage
Less Than 20 yrs	04	08.2
20 to 40 yrs	17	34.7
40 to 60 yrs	20	40.8
More than 60 yrs	08	16.3
Total	49	100.0

Mean ± SD = 44.96 ± 15.807 (Range – 13 – 70 years)

Table - II: Distribution of Sex (n=49)

Sex	Frequency	Percentage
Male	14	28.6
Female	35	71.4
Total	49	100.0

Male: Female – 1: 2.5

Table - III: Site of operation performed (n=49)

Site of operation	Number	Percentage
Right	24	48.92
Left	25	51.02
Total	49	100

Table -IV: Overall Success rate of study subject (n=49)

Number of Patients	Success	Failed	Success Rate
49	43	6	87.76%

Table-V: Associated Nasal surgery

Name of operation	No. of operation	Percentage
Septoplasty	8	16.33
Turbinoplasty	1	2.04

Table-VI: Complications of surgery

Complications	No. of subjects	Percentage
Injury to the middle turbinate	02	4.08
Sump syndrome	01	2.04
Synaechia	01	2.04
Granuloma	01	2.04

Discussion

The aim of new developments in the field of DCR is to shorten the procedure time, to shorten patient recovery time, to decrease complication rate, to avoid surgical skin and mucosal scars, and to make the procedure possible on an outpatient basis under local anesthesia.¹⁸

The upper and lower punctum were dilated with punctum dilator with gradually increasing sized probes to create a good passage. The Laser fiber which is 0.35 in diameter was inserted through the puncta and was maneuvered so that it is in contact with the medial wall of the lacrimal sac. At this point, the aiming beam is switched on. This beam is then visualized through the endoscope in the nasal cavity. It has to be ensured that the aiming beam is at the brightest and is not scattered. Switch off the light source so that beam is better visualized. Scattered beam means the probe is still in the sac or is not touching the lacrimal bone. Light gets diffused as fiber tip distance is increased from bone. Laser is fired only after confirmation in short pulses with equal gap intervals. One must adequately enlarge the hole by pulling back fiber and engulfing it. Osteotomy done in this way should be at least 8 to 10mm wide.

Comparing published success rates of lacrimal surgery is a difficult task because different studies use different criteria.¹⁹

Guidelines¹⁹ published by the Royal College of Ophthalmologists suggest that lack of tearing 3 months after surgery is a good indicator of successful surgery. Therefore, this study used these guidelines for patients with at least 3 months' follow-up time postoperatively.

The peak age in the present study was the fourth to fifth decade of life (40.8%), whereas it was the fifth to seventh decades of life in the report by Emmerichet al²⁰ from Germany and the fourth to fifth decades of life in the report by Kunavisarut et al²¹ from Thailand. This difference may reflect the geographic-environmental population structure; however, in most studies, as in this study, epiphora was the most prevalent symptom.

Among the total 49 patients of the present study, female were 35 and male were 14. (Male: Female= 1:2.5). In a study of Brigita Drnovšek-Olup and Matej Beltram,²² they observed 89 female and 33 male out of 122 patients. Regarding sex distribution, the present study was in compatible with the previous study.

Associated nasal pathology was corrected by septoplasty for DNS in 8 cases and turbinoplasty for hypertrophied turbinate in 1 case. Per operative complication of the present study was injury to middle turbinate in 2 cases and post operative complications were Sump syndrome (1 case), synechia in the nasal cavity (1 case), granuloma at the ostium (1 case). The patients of this series complaint little or no pain post operatively and were able to leave the hospital mostly on the day of operation.

Among 49 operated patients in the present study, we observed absence of epiphora and a patent nasolacrimal duct by irrigation in 43 out of 49 treated eyes. This yielded a overall success rate of the present study was 87.76%. In a study of Brigita Drnovšek-Olup and Matej Beltram²² the success rate was 83.3%. In other study by Hong JE¹, Hatton MP, Leib ML, Fay AM²³ the success

rate was 87.5%. In a study by Gupta SK, Kumar A, Agarwal S, Pandey P. successful outcome was seen in 85 patients (90.5%) out of 94.²⁶ The success rate of the present study was in compatible with the previous study. But in many studies the success rate were between 70-80%.^{24,25} The higher success rate in the present study might be due to correction of associated nasal pathology.

Advantages of Laser assisted endoscopic DCR include a relatively shorter operating time, precise cutting and removal of tissue by ablation, minimal trauma to adjacent tissue, short recovery period, minimal morbidity, and low complication rate. The procedure can be performed under local anesthesia and on an outpatient basis. The limitations of endoscopic DCR have been described as follows: small rhinostoma, high recurrence rate, costly equipment, and difficult to master.²⁷

EL-DCR is a minimally invasive surgical procedure. It takes advantage of accessing the operating field through anatomic pathways. This contributes greatly to minimizing trauma to surrounding tissue and avoiding unnecessary surgical skin scars. The procedure has a fast learning curve and even easier to learn as compared to classical or TNE-DCR.²²

In this study, a diode laser with flexible fibre had been used. The flexible diode laser fibre heats only at the tip and does not burn or cause stenosis of canaliculi, and it is effective in vaporizing the lacrimal bone.¹⁸

To achieve a high rate of success, it is very important to be able to visualize the sac from the fundus to the duct and to remove the whole medial wall or at least the lowermost part, with a laser. Wide openings to the nose allow better results and prevent mucosal closure as well as retention pouches caudal to the rhinostomy.²⁶

Additionally, in case of restenosis, laser assisted endoscopic DCR can be easily repeated as there is no scarring in the lacrimal pathway or any anatomical alteration.²²

Conclusion

Laser-assisted endoscopic DCR surgery eliminates the need for conventional external DCR. It is easy to perform, cosmetically good, high tech and has an excellent outcome. Surgeons should have appropriate knowledge and experience about endoscopic surgery, use of laser, surgical anatomy of lacrimal drainage system and nasal cavity for a good outcome.

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