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CONTENTS

Editorial

- How To Write a Paper For Publication 4
Dr. Md. Anisur Rahman

Original Articles

- Changes in Macular Thickness Following Uneventful Phacoemulsification Surgery in Diabetic and Non-diabetic Patients. Meljabin Haque 7
- Efficacy of Intralesional Triamcinolone Acetonide Injection in the Management of Chalazion. Md. Ataur Rahman, Md. Sharfuddin Ahmed, Md. S A Wadud, M A Sattar 14
- Evaluation of Pediatric Ocular Trauma at a tertiary public hospital in Bangladesh (NIO&H) Dr Utpal Sen, Prof A.H.M. Enayet Hussain, Dr Shovana Alam, Dr Mashreka Matin, Dr. Mujtahid Mohammad Hossain (Rubel), Dr. Md. Ashiqur Rahman Akanda 26
- A Study of Transcanalicular Dacryocystorhinostomy (DCR-TC) using Diode Laser Dr. Syeed Mehbub Ul Kadir, Dr. Md.Siddiquir Rahman, Dr M A Rakib, Dr. Abid Akbar 37
- Juvenile open-angle glaucoma- Management and outcome at a tertiary ophthalmic center Dr Shams Mohammed Noman. FCPS, ICO, FELLOWSHIP IN GLAUCOMA (India & USA) 46

Case Report:

- Successful Management of Multi-Drug Resistant Staphylococcal Corneal Tunnel Infection Following Phacoemulsification. Dr. Md. Amiruzzaman, Prof. Sarwar Alam, Dr.Md. Shafi Khan, Dr.Mahmood Mujtaba, Dr.Moutushi Islam, Dr.Md.Zafrul Hassan 56

- Abstract from foreign journal: 64

Case Series :

- Clinical Profile of Patients with Ocular Myasthenia Gravis (OMG) in a Tertiary Level Hospital A Case Series. Shayamal K. Sarkar, Biswa Nath Gosh, Md. Lutfur Rahman, Md. Moinul Haque, Meshbahul Alam, Md. Hafizur Rahman, Utpal Sen 66

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A Study of Transcanalicular Dacryocystorhinostomy (DCR-TC) using Diode Laser

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Abstract

Purpose: To evaluate the clinical results of carrying out transcanalicular dacryocystorhinostomies using a diode laser (DCR-TC), including advantages and to identify the causes of failure of this technique. **Methods:** This prospective quasi study was conducted at Harun eye Hospital, Dhaka. 34 patients were enrolled for this study. We evaluated the cases with a clinical history of epiphora or dacryocystitis for nasolacrimal duct obstruction. This procedure may be painful in some situation even under local anesthesia so we did all cases under general anesthesia. A diode laser was used to vaporize and coagulate the lacrimal sac wall and nasal mucosa and to make an osteum. With the help of the video sinoscope we do visualize nasal cavity to locate the exact position of the osteum and to prevent collateral injury. We do medialization of middle turbinate in some cases which causes obstacle for visualization of the site and carries risk of synechia later on. In all cases, bicanalicular intubation was carried out using a silicone tube for 6 weeks period. Follow-up was between 6 weeks to 6 months. The degree of epiphora was evaluated clinically using slit lamp biomicroscopy and sac patency test in all cases. **Results:** 34 cases were realized, excretory lacrimal apparatus was patent in 30 cases (88.24%). One case (2.94%) presented lower canaliculi obstruction and one case was common canaliculi obstruction. Two patients (5.88%) showed closing of the osteum due to adhesion with the middle turbinate. The mean duration of surgery was 25 minutes (range 20 to 45 minutes). **Conclusions:** Transcanalicular dacryocysto-rhinostomy carried out using a diode laser is a useful method because it does not cause cutaneous scarring, less bleeding; it needs less surgical trauma, minimum post operative care and early recovery.

Keywords: Transcanalicular, dacryocystorhinostomy, diode laser.

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Introduction

LASER DCR is the latest technique of Nasolacrimal duct obstruction. This technique provides no skin scarring and less bleeding, early recovery and less time consuming. Since Toti described standard dacryocystorhinostomy (DCR) for chronic dacryocystitis in 1904. Now a days, various treatment modalities have been tried for the treatment of chronic dacryocystitis like conventional DCR, laser DCR, implants, tubings, endonasal approach with a varying success rate (Joshi RS, 2009). Laser Dacryocystorhinostomy is an alternative to the standard external DCR because it avoids the cutaneous incision, excessive tissue trauma and postoperative morbidity. In this era of small incision and micro incision surgery as practiced by the cataract surgeons, it is the need of the time that this surgery also crosses the incision barrier and embarks upon the 'no incision' surgery. This has been achieved by the introduction of the 980 nm diode laser which has been designed for the use in laser DCR surgery. The use of diode laser for Transcanalicular DCR is of advantage to both, the patients and the surgeon. It makes the surgery extremely simple and easy, with results good and comparable to conventional DCR surgery (Kumar A et al., 2008)

Purpose: To evaluate the clinical results of carrying out transcanalicular dacryocystorhinostomie (DCR-TC) using a diode laser, including the advantages, to identify the causes of failure of this technique and to describe the surgical technique and tips which have dramatic role to achieve the success.

Methods: This prospective quasi study were conducted in the Harun Eye Hospital, Dhaka from January 2010 to November 2010 and 34 patients were studied in this study. We evaluated the cases with a clinical history of epiphora or dacryocystitis for nasolacrimal obstruction above the age of 15 years. Children (< 15 years), Acute exacerbation of chronic dacryocystitis, Lacrimal fistula, any eye lid infections and deformity, ocular infections, atrophic rhinitis, grossly deviated nasal septum (DNS) were excluded from this study. Variables like as age, gender, sac patency test, time of surgery, amount of laser energy delivered, complications of the surgery were evaluated. Preoperative evaluation were done properly including lacrimal system and extra ocular examination with sac patency test. The degree of epiphora was evaluated clinically using slit lamp biomicroscopy and sac patency test in all cases. Follow up were taken 1st

POD, 7th POD, 6 weeks after surgery, and 12 weeks after surgery. Laser DCR is a painful procedure sometimes even under local anesthesia and better to do under general anesthesia. A diode laser was used to vaporize and coagulate the lacrimal sac wall, nasal mucosa and to make an osteotomy. To prevent injury and subsequent adhesion to the osteum and for proper visualization of the surgical site we do medialization of middle turbinate. We use a video sinuscope in the nasal cavity. In all cases, bicanalicular intubation was carried out using a silicone tube for 6 weeks period.

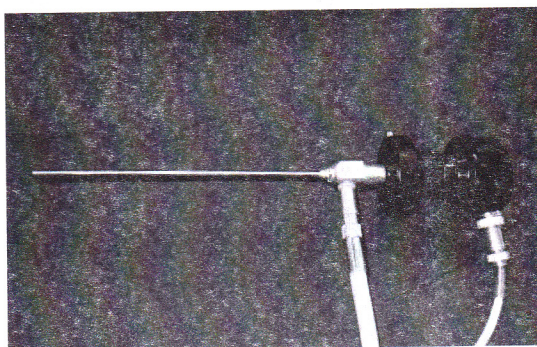
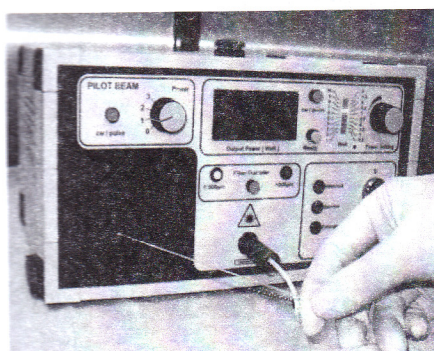
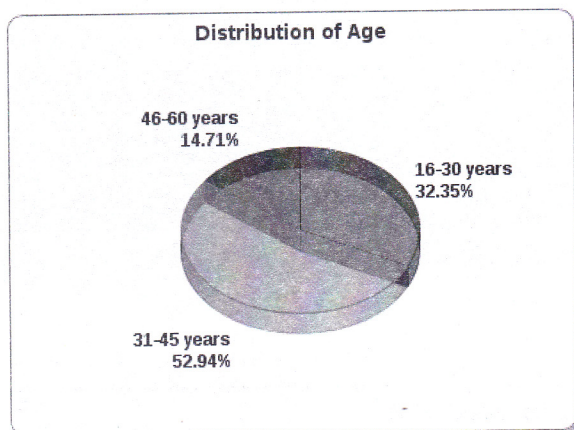


Fig: Diode laser DCR machine with fibreoptic probe and video endoscope

Results: 34 patients were evaluated in this study. The patients were divided into three age groups like as 15 to 30 years, 31 to 45 years and 46 to 60 years. The youngest patient was 17 years & oldest was 56 years. The mean age was 36.41 years.



Male was 13 (38.24%) and female was 21 (61.76%) among the study patients. Female were more than male patients. Most of the patients were in age group 2

Table 1: Distribution of gender of the study subjects

Age range	Male		Female		df
	No	%	No	%	P value
Group 1. 16-30 years	03	37.50	05	62.50	8.01
Group 2. 31-45 years	08	37.50	10	62.50	
Group 3. 46-60 years	02	25.00	06	75.00	2
Total	13	38.24	21	61.76	< 0.05*

ROPLAS was positive in 11 (32.35%) cases. Regurgitation of pus through opposite punctum was in 10 (29.41%) cases and Regurgitation of fluid through opposite punctum in 24 (70.59%). All the patients were underwent surgery using intubation anesthesia. The duration of surgery was 17 to 45 minutes and mean surgical time was 25 minutes.

Table 2: Distribution of duration of surgical procedure

Parameters	Duration of surgical procedure
Mean duration of surgical procedure $\pm$ SD (minutes)	25.09 $\pm$ 7.32
Range of Surgical procedure	15 to 45 minutes
Standard Error (SE)	1.54

The mean energy of Diode LASER applied to create a bony ostium were 3.0 watt and the range of energy of Diode LASER varies from 2.5 to 4 watt.

Table 3: Distribution of energy of Diode LASER applied to create ostium

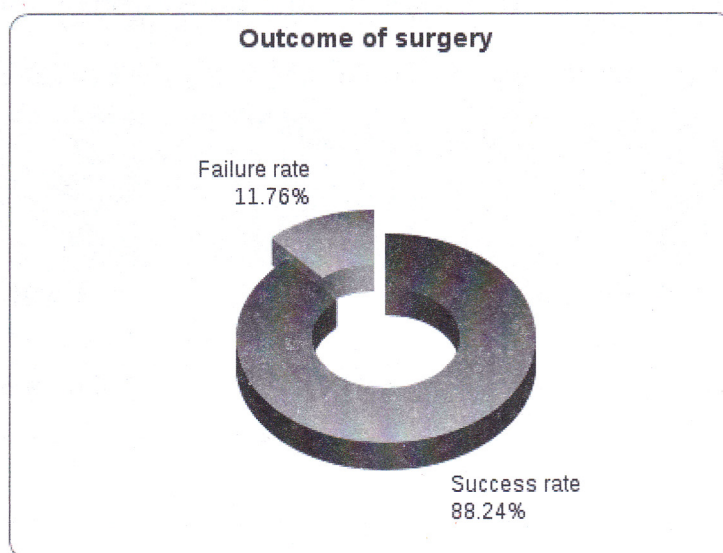
Parameters	Duration of surgical procedure
Mean energy of Diode LASER	3 watt
Range of energy of Diode LASER applied	2.5 to 4 watt

We were faced some intraoperative difficulties like as misdirected laser to skin over the lacrimal sac, improper ostium, difficulty to medialization in 2.94% cases. We was used bicanalicular silicone tube following transcanalicular diode laser (980 nm) DCR in all cases for 6 weeks. Sac patency test were done after 6 weeks, 34 patients (100%) were patent and after 12 weeks, 30 patients (88.24%) were patent.

Table 4: Patency of lacrimal drainage system following 12 weeks of surgery

Parameters	Patent		Not patent		df
	No.	%	No.	%	
					P value
After 6 weeks	34	100.00	00	00.00	6.13
After 12 weeks	30	88.23	04	11.77	2
					<0.05*

The success rate was 88.23% in this procedure. Failure rate was 11.76%.



Following 12 weeks of surgery, 29 (85.29%) cases were asymptomatic and 5 cases (14.71%) complained of epiphora. Among the cases, common canalicular obstruction, lower canaliculi obstruction and lower punctal eversion was 01 case (2.94%) respectively. Two patients (5.88%) showed closing of the osteum due to adhesion with the middle turbinate.

Post operative outcome	No	Percentage
Sac test was patent after 6 weeks	34	(100%)
Sac test was patent after 12 weeks	30	(88.23%)
Asymptomatic after 12 weeks	29	(85.29%)
Epiphora	05	(14.71%)
Common canalicular obstruction	01	(2.94%)
Lower canaliculi obstruction	01	(2.94%)
Closing of the osteum	02	(5.88%)
Lower punctal eversion	01	(2.94%)

Discussion:

Dacryocystorhinostomy is a bypass surgery in which obliterated nasolacrimal duct is bypassed and the lacrimal sac is opened directly into the nasal cavity. Traditionally, external approach (External Dacryocystorhinostomy) has various disadvantages like external skin incision and scar, excessive intra operative bleeding, disruption of the medial canthus anatomy, mild ptosis (if medial palpebral ligament is not repaired) long surgical time and high morbidity. LASER DCR has been achieved 'no incision' surgery by the introduction of the 810 nm diode laser which has been designed for the use in laser DCR surgery. The use of 810 nm diode laser for Transcanalicular DCR is of advantage to both, the patients and the surgeon. It makes the surgery extremely simple and easy, with results good and comparable to conventional DCR surgery. We evaluated the age of the study subjects that were divided into three groups like as group one 16-20 years, group two 31-45 years and group three 46-60 years. 11 cases (32.35%) were in group 1, 18 cases (53%) were in group 2 and 5 cases (14.7%) were in group 3. More than half of the patients were involved in group two. Mean age of all the patients were 36.41 years. A similar study done by Kumar A et al., (2008) studied the age of the patient ranged from 15 to 69 years with mean age of 30.1 years. Male were 16 cases (47.08%) and female were 18 cases (52.92%) in this study. Female were more than male patients. Out of ninety four patients, 56 were male and 38 were female studied by Kumar A et al., (2008). We evaluated the duration of surgical procedure. The range of duration of LASER DCR varies from 15 to 40 minutes, the mean time of surgical procedure were 25.09 minutes in this study. A similar study done by Felix J and Fernandez A (2004) described the mean duration of surgery was 14 minutes (range 7 to 29 minutes) which is less duration of surgery. The mean energy of Diode LASER (980 nm) applied to create a bony ostium were 3.0 watt and the range of energy of Diode LASER varies from 2.5 to 4 watt. Drnovsek-Olup B and Beltram M (2010) used a 980 nm diode laser with power of 10 watts to achieve osteotomy by applying laser energy via an optic fiber. We described the surgical outcome of LASER DCR with silicone tube intubation which was confirmed by sac patency test after six weeks and twelve weeks of surgery. Sac patency test were done after 6 weeks of LASER DCR, thirty four

patients (100%) were patent and after twelve weeks, thirty patients (88.23%) were patent. Kumar A et al., (2008) described a series of 94 patients with 4 months follow-up and 100% success rate with the use 10 nm Diode Laser. Drnovsek-Olup B and Beltram M (2010) presented a prospective, non-comparative case series study of 126 consecutive diode laser-assisted transcanalicular dacryocystorhinostomy (TCL-DCR) procedures on 122 patients and analyzed success rate of 83.3%, with an average follow-up period of 12 months. Felix J and Fernandez A (2004) studied 43 cases of Laser DCR and analysed 90.7% success rate with using bicanalicular intubation and follow-up was between 4 to 38 months. Joshi RS (2009) described that out of 50 patients who were operated by T.C.D.C.R. 33 patients had blocked syringing (failure rate 66%). When 33 patients were subjected to conventional DCR success rate was 96.97%. Our study evaluated intraoperative complications. LASER misdirected to skin over the lacrimal sac were in one (2.94%) case, improper ostium and difficulty to medialization in 2.94% cases. Joshi RS (2009) discussed anatomy of the sac and the bone was not altered in any case and no major intra-operative problems encountered during the procedure. We discussed postoperative complications. Lower canaliculi obstruction occurred in one (2.94%) cases, Common canaliculi obstructions found in one (2.94%) cases and Blockage of ostium by fibrous tissue in two (5.88%) cases. One patient (2.94%) showed punctal eversion. Felix J and Fernandez A (2004) described one case (2.32%) presented lower canaliculi obstruction. One patient showed total osteotomy closing. This study preferred general anaesthesia in all cases for suitable and comfortable surgery. Kumar A et al., (2008) mentioned that all the operations were performed under local anesthesia. Drnovsek-Olup B and Beltram M (2010) was performed under general anesthesia, and the nasal mucosa was anesthetized. Felix J and Fernandez A (2004) used local and topical anaesthesia in patients with a clinical history of epiphora or dacryocystitis for nasolacrimal obstruction. So, it is debatable to comfortable in Local with topical anaesthesia or general anaesthesia.

Conclusion:

Transcanalicular diode laser dacryocystorhinostomy is useful technology because it causes little or no bleeding, it respects the lacrimal pump, it needs

less surgical time and it generates minimal intra and postsurgical morbidity. Identification of the cause of failure is the key of success. Easy Reproducible procedure, so actually no case remained 'failed'. LASER DCR with bicanalicular silicone tube intubation at least six weeks provides eighty eight percent success rates after twelve weeks of surgery.

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