Endolaser assisted DCR for nasolacrimal duct obstruction

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خلاصة البحث:
تشكل عملية مفاغرة كيس الدمع بواسطة الليزر عن طريق الأنف الحد الجائر الأدنى لتجاوز القناة الدمعية .
هدف البحث: تقييم نتائج العملية كطريقة جديدة في مركزنا (مستشفى الديوانيةالتعليمي) في علاج 54 مريضا يعانون من دماع والتهاب كيس الدمع المزمن أو المتكرر ومقارنة نتائجنا مع البحوث المنشورة .
طريقة الدراسة: تم إجراء العملية على 54 مريضا تتراوح أعمارهم من 5-55 سنة في الفترة نيسان2010 –حزيران 2011 في مستشفى الديوانية التعليمي . تم اعتماد الطريقة المتبعة وباستخدام الليزر وغرز دعامات مؤقتة ، ثم متابعة المرضى لفترة تتراوح من 6-13 شهرا. *النتائج:* حصل تحسن (اختفاء الدماع) في 5 3مريضا وبنسبة نجاح 64% ، وحصل التصاق انفي في 13 مريضا ، لم تحصل أي مضاعفات كبرى في المرضى . أجريت عمليات تنقيحية في 13 مريض. كانت نسبة النجاح بعد العمليات التنقيحية72%.
خلاصة البحث: نستنتج أن عملية مفاغرة كيس الدمع بالانف بواسطة المنظار عن طريق الأنف ، وهي خبرة جديدة في مستشفى الديوانية ، طريقة آمنة في علاج انسداد قناة الدمع وبنسبة نجاح مقبولة مقارنة مع العديد من الدراسات .

ABSTRACT

Objective: The objective of this prospective case series study is to evaluate the clinical outcome of endonasal laser assisted Dacryocystorhinostomy (ENL-DCR) using diode laser 810 in patients

Material and Methods:Fifty four patients with age range from(10-55)years where included in the study which performed at Diwannyia teaching hospital(from April 2013 to June 2014).Patients were followed for 6-12 months.

.Success of procedure was absence of epiphora (subjective) or patency of lacrimal system on irrigation (objective).

RESULTS: We observed absence of epiphora and a patent nasolacrimal duct on irrigation in 35 out of 54 treated eyes, with success rate (64.8%).(16) patients developed postoperative adhesion. Revision surgery was done on failed cases, only four patients show clinical improvement. the total success rate after revision surgery is (72.2%).
Three cases was lost from the fellow up .

ConclusionWe conclude that endonasal laser assisted DCR with bicanalicular intubation is a safe, minimally invasive quick procedure in treating nasolacrimal duct obstruction with an acceptable success rate that matches many studies.

Introduction:

Dacryocystorhinostomy is a surgical procedure by which lacrimal flow is diverted into the nasal cavity through an artificial opening made at the level of lacrimal sac . the operation can be carried out using an external or endoscopic surgical approach[1].

Toti in 1904 described the first external approach and became the surgical approach of choice for most surgeons[2].
1889) McDonough and Merring descriped the endoscopic(in approach but this approach was abonded due to difficulity in the visualization of the lateral nasal wall[2,3].

However, with the advent of new technology used in endoscopic sinus surgery, permitting better visualization, the endoscopic approach has been revived[2]. This approach permits direct visualization of the lateral nasal wall in the middle nasal meatus,

where the osteotomy is performed. The advantages of transnasal endoscopic DCR (TNE-DCR) over external DCR are: No outer skin incision with resulting scar, shorter procedure time, and shorter patient recovery time and preservation of medial canthal tendon anatomy[3].

Due to the above mentioned advantages over the classical approach, today TNE-DCR is becoming a treatment of choice for obstructions at the level of the lacrimal sac or nasolacrimal duct and as a revision procedure for failed classical cases of DCR[3,4].

The last step in the development of less traumatic DCR is the endocanalicular/transcanalicular approach. In this approach, a probe is inserted through the lower lacrimal punctum via the canaliculus into the lacrimal sac following the anatomical pathway of tear outflow[4]. Osteotomy is performed either by a mechanical drill or laser energy through an optic fiber, which is inserted within the probe[5].

The first laser described for clinical use in DCR procedure was the KTP laser in 1993 by Reifler[6]. This was soon followed by the use of Ho:YAG laser and the Nd:YAG laser, as described by Metson *et al*., Piaton *et al*., Dalez and Lemagne, and Woo *et al*. in 1994, 1996 and 1998, notably with an endocanalicular approach in the latter three studies[6,7,8,9]. The first descriptions of an endoscopic laser DCR (EL-DCR) with an Er: YAG laser from Emmerich *et al*., and Móllner *et al*. date back to the year 1997 and 1998[10,11].

The use of a diode laser for EL-DCR has been first reported by Eloy *et al*. in 2000, followed by Fernandez *et al*. in 2004[12,13].

Diode laser-assisted DCR seems to offer specific advantages for DCR[14].

The main technical obstacles in EL-DCR are to deliver a sufficiently powerful laser beam via a relatively narrow optical fiber, which in turn fits into an endocanalicular probe[15]. Several laser wavelengths successfully comply with this requirement. Yet there are other considerations to take into account, mainly unwanted collateral heating of the probe and residual thermal damage to the target tissue[11]. Based on theoretical and our own preclinical studies, the 810 nm diode laser seems to adequately fulfill all of the above requirements[16].

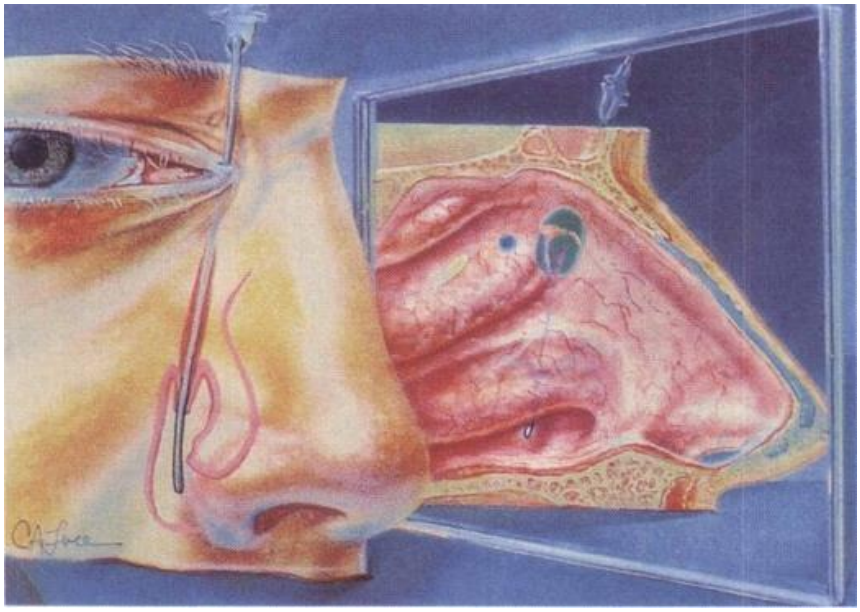
The advantages of transnasal endoscopic laser assisted DCR are: no external scar, it preserves the lacrimal pump system ,any intra nasal pathology that have caused failure of a previous procedure can be addressed including adhesions ,enlarged middle turbinate and septal deviation and more of the lacrimal sac is preserved with the endonasal laser procedure, there is also diminished risk of CSF leak[17] .

The main disadvantage is that TNE-DCR fairly new procedure and so long term complications are unknown ;no mucosal flaps are created since mucosal flaps have been found to decrease recurrence rates in the external procedure .the size of the osteotomy created in the TNE-DCR is smaller than that in the external approach which increase failure rate[18].

Canalicular laceration and intranasal adhesion could occur[18].

Despite much debate ,many ophthalmologists still believe that external DCR provides a higher success rate than edonasal laser DCR and consider external DCR to be the gold standard treatment for nasolacrimal duct obstruction . though many types of endoscopic approaches have been attempted , long term success rates have not been equivalent to that achieved with external DCR which approximated[19]. 90 %

Figuree(1) origin of middle turbinate corresponds to lacrimal fossa



Patients and Methods:

Fifty four patients were included in this study which was performed in the departments of ophthalmology and ENT in AL-Diwannyia teaching hospital in the period from(April2013 to June 2014).Patients ages were ranging from(10-55 years) .mean age 35 years.

All patients were evaluated in the ophthalmology department .

In the history ;asking about whether the epiphora is unilateral or bilateral,constant or intermittent.whether any environmental factor affect tearing. any history of trauma. complete ophthalmic examination was performed to rule out other causes of watery eye.

We performed a Jones dye test and irrigation of the lacrimal pathways.

problems e.g rhinologic Examination was also performed to rule out concomitant nasal pathology such as septum deviation،bullos concha nasal polyposis.

Patients with concomitant nasal pathology were referred to the treatment of rhinologic problem.

The surgery was consider successful if the patient had one or more of this criteria:

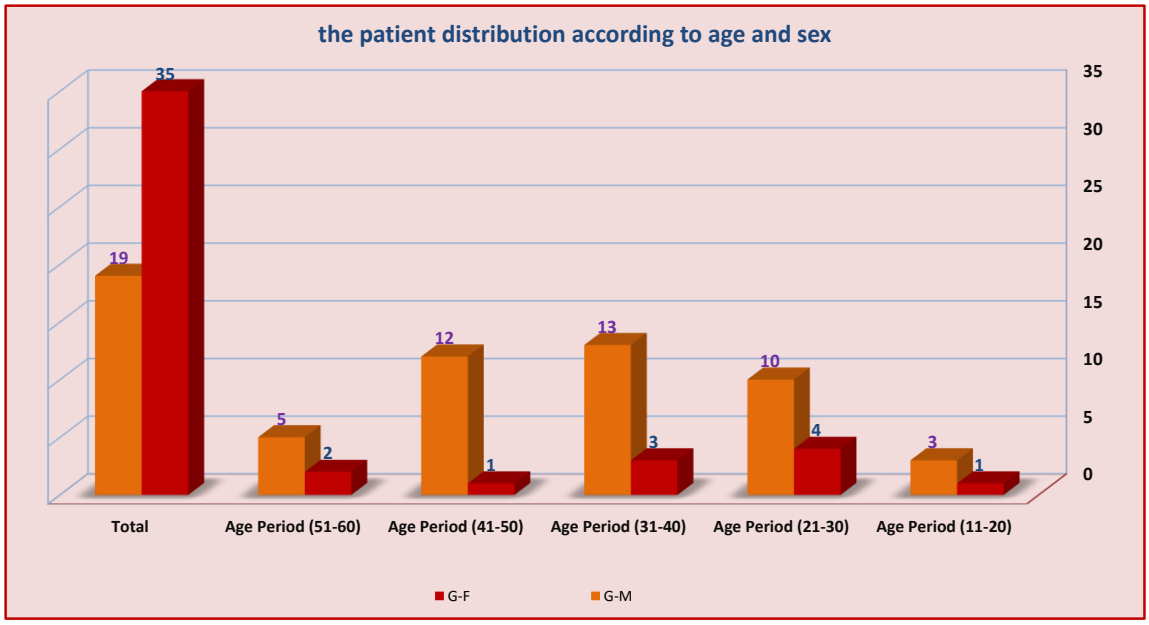
-1-marked improvement of chronic dacryocystits or episode of epiphora.

patent lacrimal passage on irrigation..2-

Table (1)show the involved side of the patients and the distrubatrion according to age, sex

AGE)YEARS(	TOTAL	GENDER		SIDE			
		F	M	Unilateral			Bilateral
				R	L	Total	
11-20	4	3	1	4	0	4	0
21-30	14	10	4	9	5	14	0
31-40	16	13	3	8	8	16	0
41-50	13	12	1	6	7	13	0
51-60	7	5	2	3	3	6	1
Total	54	35		30	23	53	1

T=total R=right L=left****



The operative procedure:

All procedures were done under general anesthesia in combination between ophthalmologists and ENT surgeons . During the procedure zero degree endoscope was used exclusively.

The nasal mucosa of the lateral nasal wall was anesthetized by packing with gauze and infiltration with a solution of epinephrine 1:100000 . The site of osteotomy was just anterior and inferior to the attachment of the middle nasal concha.Osteotomy was achieved by applying laser energy via an optic fiber, which was inserted into the lacrimal sac with a probe . The size of osteotomy was controlled through the nasal endoscope. Once an opening of at least 5 mm in diameter has been achieved, application of laser energy ceased.

The next step in the procedure consisted of intubation with silicone stent through both the upper and lower canaliculi.

We measured procedure time (defined as time from anesthesia of nasal mucosa to fixation of silicone stents), the total amount of laser energy, and carbonization of nasal mucosa.

Post operative care and follow up:

All patient were given oral antibiotics for two weeks,topical antibiotics were given for further two weeks . patients were followed weekly in the first month and monthly for at least six months . patient with nasal polyps were given nasal sprays for three months .the patency of lacrimal passages is checked with fluorescein dye applied into the conjuctival sac at the time of stent removal at the sixth month and the recovery of fluorescein in the nose checked with cotton wick in the nose .

RESULTS:

Fifty four patients under went endonasal laser assisted DCR for nasolacrimal duct obstruction and or chronic dacryocystitis.

.patients develop postoperative adhesion Sixteen

No major complications like severe haemorrhage , orbital injury , optic nerve injury or CSF leak occurred.

Fellow up peroid was 6-14 months average10 months0

The stent was removed at the end of fourth postoperative months.

The primary success rate was 64.8%.

Fifty four patients who under went the surgury,from whom there are thirty five patients had clinical improvement in epiphora or decrease the rate of dacryocystitis,four of them lost from the fellow up..

The remaining (15)patients in whom the procedure failed, where followed up.Two of them had canalicular obsturaction which was missed in the evaluation,(13)of them developed postoperative adhesion.

For those patients who developed adhesion revision surgury was done,four of them develop clinical improvement.

The success rate increase to72%after revsion surgury.

Table 2 : (show the result of the surgery, complication .successful and failed cases).

AGE(YEARS)	NO.	COMPLICATIONS	SUCCESS	FAILURE
11-20	4	1)AD(	2	2
21-30	14	4)AD(	9	5
31-40	16	3)AD(	13	3
41-50	13	3)AD(	10	3
51-60	7	2)AD(	5	2
Total	54	13	39	15

AD= adhesion

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 anaesthesia[20].

On the other hand Toti classical external approach with 90-95%-success rate,while endoscopic approach was80-85%and endonasal laser assisted DCR was70-80.%[21]

EL-DCR is a minimally invasive surgical procedure.

It takes advantage of accessing the operating field through anatomic pathway so minimizing trauma to surrounding tissue and avoiding unnecessary surgical skin scars[17]. The procedure has a fast learning curve and from our point of view even easier to learn as compared to classical or endoscopic DCR.

Of course there are certain disadvantages of this procedure: Some concern handling of the laser and the costs of it [15].

It is not easy to compare the published success rates of lacrimal surgery because different studies use different criteria of success[11].

In our patients, the success was determined by resolution of symptoms and anatomic patency assessed by fluorescein flow on nasal endoscopy. The primary success rate in our study is 64.8 %after revision surgery it increase to 72.2%.

Fellow up peroid was ranging from(6-14)-months average about 10 months.

One of the openning question is the osteotomy size as inadequate size is the leading cause of long term failure in DCR[19] .

In the classical approach the size about 10 mm,in endoscopic approach it is about 7 mm,in the laser assisted DCR ,it is about 5mm[22].

We believe this is sufficient when using laser technique, as there is minimal trauma to the surrounding mucosa and connective tissue, resulting in less postoperative scarring .

The patients in this study reported little or no pain postoperatively and were able to leave the hospital the in first or second day after surgery, which is a great advantage over classical or endoscopic DCR.

Additionally, in cases of restenosis, the procedure can be easily repeated , as there is no scarring of the lacrimal pathways and no changes in anatomical relations.

Reported preoperative risk factors for the failure of ENL-DCR include septum deviation, nasal trauma, sinus disease and nasal polyp. so those patients need rhinological evaluation[21].

One of the major cause of procedure failure is the adhesion that is caused by granulation tissue at the site of the osteotomy.

Many authors had adopted the use of steroid or mitomycin c in those high risk group to prevent or delay the granulation[14,20].In our patients we used steroid(topical betamethasone).

In spite of being inert, silicone stent can act as a nidus for the inflammatory reaction, some adopt removal of silicone tube early[18].

In our patients we removed the silicone tube after the fourth month.

Conclusion:

endonasal laser assisted DCR use diode laser is efficient techinque,with low rate of complications and well tolerated by the patients.

it still need refinement in order to achieve the higher success rate of the EXT-DCR which remain the gold standard method for the treatment of nasolacrimal duct obstruction.

Recommendations:

We recommend the proper evaluation and selection of cases that are suitable for laser assisted DCR and further refinement to achieve higher success rate.

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