Endoscopic Endonasal Dacryocystorhinostomy: Best Surgical Management for DCR

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Abstract EEDCR is a highly rewarding Endoscopic procedure for management of dacryocystitis when epiphora does not respond to medications or repeated syringing of nasolacrimal duct. It is a simple, less time consuming, safe but skilful, highly satisfying surgery both for the patients as well as the surgeons. There is very big advantage of EEDCR, it is close 100% successful procedure, even if there is recurrence of epiphora it is again correctable fully with no residual affects. EEDCR is far more superior to External DCR/Laser DCR and there are definite reasons for it. A total number of 578 cases have been operated by me from April 1, 2005 to March 31, 2011, only very few reoccurrences were there and they were corrected easily so much so that it can be said that it is a close 100% successful procedure and best surgical management of DACRYOCYSTITIS up to date. The successful outcome was defined as symptomatic relief from epiphora and dacryocystitis and a patent nasolacrimal duct upon syringing at the end of procedure and on follow up of patient.

Keywords Endonasal endoscopic dacryocystorhinostomy (EEDCR) · Dacryocystorhinostomy (DCR) · Orbicularis oculi (OO) · Lacrimal muscle (LM) · Nasolacrimal duct (NLD) · Lacrimal fluid (LF) ·

Dacryocystectomy (DCT) ·
Functional endoscopic sinus surgery (FESS)

Introduction

Lacrimal system starts with lacrimal gland situated in a pad of fat in the dorsolateral part of orbital cavity and drains into conjunctival sac via many excretory ducts [1]. The tear film serves as a blanket of moisture over corneal surface preventing dryness of eye. Tears are spread all over conjunctival lining by the blinking action of upper and lower eyelids. Tears collect in the medial canthal segment of eye where lacrimal lake is situated. Orbicularis oculi acting on the medial canthal ligament including the lacrimal muscle, pump the lacrimal fluid into upper puncta (30%) and lower puncta (70%) during contraction stage of muscle [2]. Relaxation of Orbicularis oculi and lacrimal muscle directs fluid from puncta and canaliculus to the lacrimal sac as a negative pressure is created in the sac lumen [3]. Again contraction of OO and LM and also minimum contribution of gravity [2] compresses the fluid collected in the sac to the nasolacrimal duct situated in anterolateral wall of nose, passing anterior to middle turbinate mostly (not always) and opening in the anterior portion of inferior meatus of nose. Tarsal plates and tarsal fibres keep the puncta opening directed towards conjunctival lining in the lacrimal lake area [3]. So epiphora can also result whenever eyelid is in abnormal positions. Blockage of NLD whether intra luminal, extra luminal causes decreased outflow of LF and resultant stasis of secretions causes inflammation of NLD as well as lower sac area. Recurrent blockage of NLD ultimately leads to complete adhesions and permanent blockage, resulting in Dacryocystitis.

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Materials and Methods

All the patients were referral to my centre by various senior consultant ophthalmologists in vicinity after they did not respond to conservative measures, failed on syringing, those who desired Endonasal DCR done for cosmetic reasons or due to good results of EEDCR itself. All the patients were operated under local anaesthesia with sedation under the stand by cover of Anaesthetist. Endotracheal intubation i.e. general anaesthesia was required in three children only under 12 year age group. Even under 12 age group 22 cases were done under local anaesthesia with sedation requiring ketamin under the cover of Consultant Anaesthetist. This is a study of round figure of 578 cases of 5 year duration i.e. 2005–2011. The views I have given in my work experience was somewhat different from previous studies therefore it was essential for me to share with everyone. In my catalogue of patients as they were referred maximum were females so the male, female ratio is according to the patients who got finally operated at my centre and not the actual number presenting with DCR in ophthalmic OPD. All the EEDCR were done using 0 degree Karl Storz endoscope and Karl Storz camera and cases could be recorded on computer. Instruments were routine FESS and occasional microdrill with 2 mm diamond tip burr with angled hand piece Fig. 1 and 2.

Endonasal DCR Surgery

After taking a good number of surgeries in all age groups starting 4–87 years it was realized which cases should be taken up for EEDCR surgeries. Out of 578 cases which were operated by me in past 5 years maximum were females so much so that 546 were females from teenage to all age groups [4]. In paediatric age group male child were more than females. Initial few cases i.e. operated by me before

Fig. 1 Acute dacryocystitis

Fig. 2 Methylene blue dye flowing through newly made Endonasal sac ostia anteroinferior to middle turbinate to confirm patent syringing during EEDCR

2005 landed up in failure but during revision surgery it was realized that all of them are correctable and there are definite reasons for it. All the patients are highly satisfied and all of them were given mobile number so as to inform immediately in case of epiphora or report to concerned ophthalmologist in case of any complication related to surgery.

Fitness Criterias for DCR Surgery

- (1) Endonasal DCR should not be done when malignant tumour is in proximity of NLD—it may be cause of obstruction. Benign growths, sinonasal polyposis, septal deviations, allergic rhinitis, atrophic rhinitis, are all patients fit to be taken up for surgery, but since the pathology could be causative factor should be eliminated before/simultaneously or after the endonasal DCR procedure explaining clearly the patient reasons for it.
- (2) Acute Dacryocystitis are operable in acute stage also, but it is advisable to settle the acute stage first by giving appropriate course of antibiotics. After resolution of acute stage dacryocystitis becomes easily operable. Bleeding sometimes becomes difficult to manage since the field is restricted reason is obvious.
- (3) Failed previous DCR (external/laser) are fit candidates for EEDCR provided lacrimal sac has not been excised in total during previous surgery. Lacrimal sac is very often removed during external DCT so as to prevent any nidus of infection in the anterior segment of eye prior to cataract surgery, so it is very important to confirm details regarding previous surgery, since a major portion of sac should be there. And for the same reason laser DCR failures are all fit to be taken up for EEDCR. Even lacrimal sac radiography prior

to surgery is not reliable indicator of sac wall. In such cases the area may be occupied by a fibrotic tissue. Even silicone stents in such cases do not help.

- (4) Patency of puncta/canaliculus/sac :More than 70% of lacrimal fluid is pumped in the lower punctum so less than 30% also drains through upper puncta [2]. Any one of the puncta and the corresponding canaliculi should be patent draining to sac sometimes directly (in 10% cases common canaliculus absent) [2] and via common pathway i.e. common canaliculus which is 1–5 mm in length [2]. Recurrent dacryocystitis may cause external sinus, fistula, and or fibrotic adhesions around or in the sac itself distorting much of the sac structure even these cases are fit for the EEDCR since upper half of sac is usually patent and lumen of sac is directly visible during surgery. Excision of medial wall of sac in cases of blocked lower canaliculus, puncta is done in the upper medial wall of sac, and have very good success rates. External sinus, fistula close spontaneously following EEDCR.

Total number of patients (2005–2011) = 578

Age	Males	Females	Total
4–12 years	13	12	25
12–30 years	1	86	87
30–45 years	2	164	166
45–60 years	3	272	275
60–75 years	0	24	24
75–90 years	1	0	1
Total	20	558	578

Surgical Procedure

Patient should be fit for surgery. Normotensive, afebrile, controlled blood sugar, Hb, BT, CT, within normal limits. Since maximum patients are operated under Local Anaesthesia under controlled sedation minimal investigations are sufficient. Asthmatic patients require special mention because post nasal trickling of blood during procedure causes irritation of laryngotracheobronchial tract can lead to bronchospasm during surgery. Early morning empty stomach or fasting for at least 6 h prior to the procedure is usually sufficient. In hot humid weathers drinking water is allowed up to 2 h before surgery.

Preanaesthetic Medication

This medication starts with 5 mg tablet of alprazolam night before surgery. Alprazolam can be repeated prior to

surgery is the choice depending on the anxiety which varies from person to person. In asthmatic individuals hydrocortisone/deriphylline/dexamethasone/medrol as a pre-medication depending on severity of asthma by the Anaesthetist. Analgesics/antiemetics/is again important component of each surgical procedure. Controlled sedation during surgery may be required using midazolam, ketamin, buprenorphine, pentazocine, nalbuphine is the choice of anaesthetist. No endotracheal intubation was required in any patient in age >12 years.

Local infiltration was done using 2% lidocaine with 1:200000 adrenaline and nose packed with the same using cotton pledges. Both infiltration and topical anaesthesia is better then any one alone. Surgery consisted of basic steps [5, 6]. Elevation and simultaneous complete excision of nasal mucoperichondrium flap anteroinferior to MT around 5–10 mm as the first step. Exposure of ascending process of maxilla and adjacent lacrimal bone. Removal of bony processes overlying sac and NLD which are usually ascending process of maxilla, lacrimal bone, agger nasii and sometimes also anterosuperior using kerrison 2–3 mm punches up cutting and down cutting. Adequate hemostasis is a must during procedure lest orbital fat can create trouble which lies in close proximity. Lacrimal sac in seven cases was located too anterior >1.5 cm to MT, where working with 0 degree endoscope was a bit difficult. Removal of bone was accomplished using kerrison punches but angled bone drill using diamond burr 2–3 mm when bone was thick was also required in many cases [5]. Average duration of surgery starting from incision to completion was 6 to 15 min on an average in most cases. Average time of stay in hospital of patient including premedication, surgery, post operative to discharge was 3–4 h. All the patients were taught how to do alkaline douching of nose post operatively and nasal douching was started from day one of procedure to at least for 10 days after surgery despite no epiphora. Also regular massaging over sac area was advised post operatively for at least 10 days. Post op. 7 day course of antibiotics, eye drops, nasal drops was given .

Result

100% after primary surgery in first follow up after 7 days, 4–5% failures were there in follow up as they came whenever there was epiphora. These cases were again corrected easily under direct vision of endoscope by removing crust, granulation tissue, suction clearance over the endonasal ostia of sac under no sedation as an OPD procedure. Syringing was done simultaneously and patent NLD confirmed. So there are no complaints of epiphora in all patients up to date. In patients who had recurrent epiphora were 11 were easily corrected fully and are in

follow up with no complaints for the last 6 months. Main reason of failure in these cases was due to, not cleaning the nose properly following initial 10 days of surgery. There was no serious complication during surgery in any case except for some minor bleeding as no endonasal cautery was used in any case.

Discussion

Endonasal DCR is far superior than external DCR reason is simple and obvious [7]. Most of patients are females so if in any way a scar can be prevented over face will be a better option [4]. Females have significantly smaller dimensions in the lower nasolacrimal fossa and middle nasolacrimal duct. Hormonal changes that bring about a generalized de-epithelization in the body may cause the same within the lacrimal sac and duct. An already narrow lacrimal fossa in women predispose them to obstruction by the sloughed off debris [8]. Moreover an injudicious use of kaajal and adulterated cosmetics applied on the wrong side of eyelashes can also play important role in obstruction of nasolacrimal system. Female to male ratio advocated in one study recently was 10:1 in a study of 800 DCR cases [4].

Secondly, in external DCR medial canthal ligament has to be incised and then the sac is approached, the pumping system is interfered [9]. The circumferential OO muscle and the lacrimal muscle acting on the medial canthal ligament do suffer in external approach. Thirdly nasal anatomy is variable, in external approach nasal side is not taken care of. In Laser DCR again nasal endoscope is required to visualize the middle meatus due to anatomical variation of sac so difference is of knife and incision. In Laser DCR new sac opening and bone opening made is same size and usually narrow. Advantage of Endonasal DCR over LASER DCR is in follow up cases, less failures following Endonasal DCR since puncta canaliculus are not heated or injured [10, 11]. Deviated septum, sinusitis, cause closure of endonasal sac opening due to retention of secretions and correction again require endonasal endoscopic approach to sac. So in Laser DCR endoscopic guidance is must, difference is of knife. Anatomical variation of sac is dependent on anatomy of lateral wall of nose which is the sole reason of direct visualization under endoscopic guidance helps in achieving 100% success. Adequate removal of

bone during procedure is the only root for success for surgery. In follow up patient should be strictly instructed to clear nose proper by using buffered saline solution to clear crusts/clots overlying endonasal sac ostia.

Conclusion

Endonasal endoscopic DCR is the best at present treatment of DCR. Under endoscopic guidance nasal anatomy is understood directly, managed accordingly, sac is approached directly under vision and so at the time of surgery result is known. Even if the lower punctum is blocked along with canaliculus, upper puncta with patent canaliculus opening into lumen of sac, even though higher up or small lumen is easily approached under endoscopic vision and so result is good even in these cases.

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