

Endonasal DCR with Silicon Tube Stents: A Better Management for Acute Lacrimal Abscesses

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Abstract Acute dacryocystitis, or inflammation of the lacrimal sac with lacrimal abscess, is almost always secondary to nasolacrimal duct obstruction. The standard practice for the treatment is incision and drainage because of concerns about the risks of exacerbation and spread of infection. Here we tried to evaluate primary EnDCR as a treatment for acute dacryocystitis with abscess formation. Department of ENT, Head and Neck Surgery, KVG Medical College, Sullia. This is comparative case series analysis study done in our medical college hospital during the study period 61 months from January 2007 to November 2011. 31 cases of acute dacryocystitis with lacrimal abscess managed were included in the study. 13 cases were operated primarily with EnDCR. Rest of the 18 cases was managed conventionally by incision and drainage and later by an external approach of DCR. Swelling disappeared intraoperatively in all EnDCR cases while medial canthal edema and erythema completely reduced within 2–3 days post-operatively. While in incision and drainage swelling disappeared partially intraoperatively and repeated draining was needed on the 2nd and 3rd day. The mean VAS score on first post operative day was 3.14 in group A and was 4.64 in group B. Group A had faster pain relief with 92.3% improvement in epiphora while group B had slower pain relief but epiphora remained. Mean intraoperative

blood was 65 ml in group A and minimal in group B. Primary EnDCR is successful as a procedure of choice for acute dacryocystitis with abscess preventing further episodes of abscess formation and epiphora in the patients. We recommend EnDCR as the treatment of choice for acute dacryocystitis with lacrimal abscesses.

Keywords Endoscopic dacryocystorhinostomy (EnDCR) · Dacryocystitis · Lacrimal abscess · Incision and drainage

Introduction

Acute dacryocystitis, or inflammation of the lacrimal sac with abscess, is almost always secondary to nasolacrimal duct obstruction and is extremely painful and slow to resolve even with systemic antibiotic therapy [1, 2].

The conventional treatment of acute dacryocystitis with abscess formation includes warm compresses, systemic antibiotics, percutaneous drainage, and external dacryocystorhinostomy (ExDCR) after resolution of acute infection [3]. This may result in fistula formation or the risk of recurrent infection before DCR can be performed and prolonged use of systemic antibiotics [4]. In addition, ExDCR results in a visible scar and can disrupt the lacrimal pump mechanism [4].

Primary EnDCR in acute dacryocystitis with abscess has advantages over standard treatment with rapid improvement in pain and inflammation, and economic benefits of reduced patient stay with the need for later readmission and DCR as definitive treatment [5]. Also the procedure is difficult as comparatively more bleeding is seen with inflamed nasal mucosal membranes than with elective cases [6]. The present study was done to prospectively

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evaluate primary endoscopic DCR as a treatment for acute dacryocystitis with abscess formation [6]. The standard treatment of acute purulent dacryocystitis has not included surgical intervention because of concerns about the risks of exacerbation and spread of infection [7].

So external dacryocysto-rhinostomy (ExDCR) is usually performed after the resolution of acute infection through the use of warm compresses, systemic antibiotics and percutaneous abscess drainage [2]. This treatment plan, however, may result in several complications, such as prolonged or recurrent infection, adverse antibiotic effects because of long-term use, cutaneous scar or fistula formation, and failure of lacrimal system reconstruction because of scarring or granuloma formation in the lacrimal sac [7].

EnDCR with lasers are also proven alternatives for the conventional incision and drainage but the results are short lived unless a wide rhinostome is created using drills and punches [5, 8]. Even laser-assisted EnDCR are less effective as treatment of chronic dacryocystitis because of the small size of the ostia created and the ostial fibrosis and stenosis resulting from the heat generated by bone and mucosa ablation with a holmium:yttrium aluminum garnet (holmium:YAG) and potassium titanyl phosphate (KTP) laser [5, 8]. EnDCR has added advantage of minor traumatization, lacrimal pump function being preserved, reduction in time of surgery, minimal morbidity and simultaneous treatment of Sinonasal diseases [9].

Materials and Methods

This is comparative case series analysis study done over a study period of 61 months from January 2007 to November 2011. 31 cases of acute dacryocystitis with lacrimal abscess managed were included in the study. 13 cases were operated primarily with EnDCR under general anaesthesia were included in group A. Rest of the 18 cases managed conventionally by incision and drainage under local anaesthesia and later by external DCR were included in group B. EnDCR done for chronic dacryocystitis were excluded from the study (Figs. 1, 2, 3). Baseline investigations were done along with CT scan PNS (Fig. 4).

All cases were followed up for 3–6 months. Cases lost early were excluded and no cases of lacrimal sac tumors were seen. Septal deviation or concha bullosa obstructing the view were corrected before DCR. Preoperative intravenous antibiotic was started on the day of admission, with nasal decongestants and analgesics. EnDCR was performed under general anesthesia using DCR punch of 2, 3 mm straight and curved (Fig. 5). 2% lidocaine with 1:100,000 adrenaline infiltrations were done anterior to anterior end of middle turbinate. Mucosal flap bleed were cauterized and bony landmarks were identified, and bone over the



Fig. 1 Left sided abscess being drained by EnDCR



Fig. 2 EnDCR giving dramatic results



Fig. 3 Bilateral abscess before EnDCR

medial wall of lacrimal sac was removed using these bony landmarks like anterior end of middle turbinate, and posterior margin of frontal process of maxilla.

Lacrimal sac was exposed and incised and drained. Silicone tubal stent was introduced from the punctum and knotted in the nasal cavity later packed with framycetin pack for 24 h (Figs. 6, 7). Intravenous antibiotics were continued, and the patient was discharged the next day. Oral antibiotics and anti-inflammatory drugs were continued for further 8 days along with antibiotic eye drops and nasal decongestant drops. The stent was placed for 3 months. All the 18 cases in group B were treated by incision and drainage with supra, infraorbital, and lateral nasal wall infiltration was done using lidocaine 2% with 1:100,000 adrenaline (Fig. 8). Abscess drainage was repeated on 2nd and 3rd day.

Results

A total of 31 patients including 13 males and 18 females were included in the study. The mean age in group A was 57.4 years and 52.5 in group B. Bilateral abscesses were seen in two cases in group A and three cases in group B. Incision and drainage earlier was done in three cases in group A and six cases in group B.

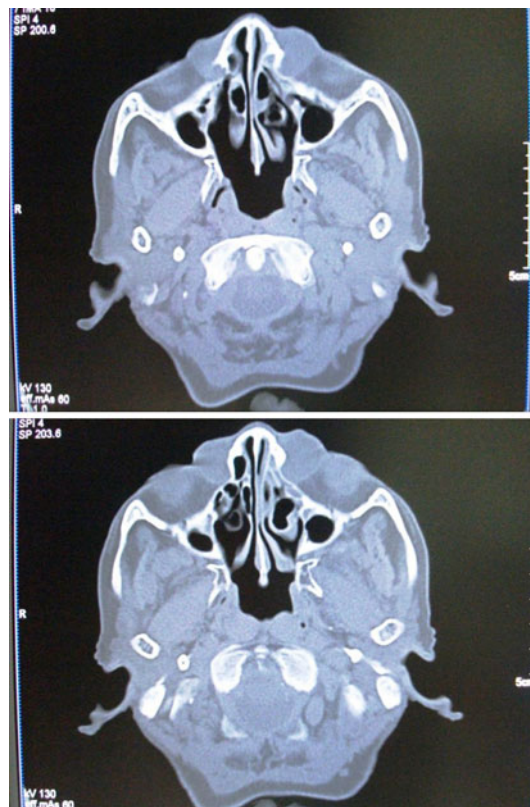


Fig. 4 Axial cuts of bilateral lacrimal abscess



Fig. 5 Instruments set used for EnDCR

EnDCR was attempted previously in three cases in group A and one case in group B. The mean previous episodes of swellings were 2.42 in group A and 2.44 in the other. Lesser hospital stay seen in EnDCR group with mean of 1.33 days compared to 5.28 in the other (Table 1). EnDCR was done in all the group A patients under general anaesthesia with silicone tube stent. Incision and drainage was done in all the 18 cases in group B with surface anaesthesia 15% lidocaine spray and local infiltration.



Fig. 6 Silicone tube stents

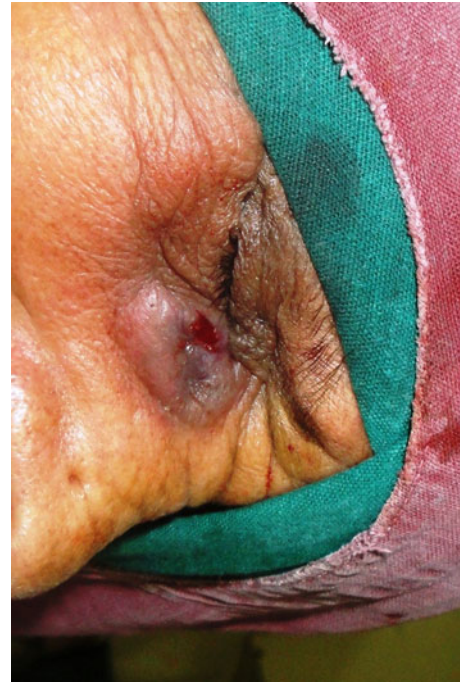


Fig. 8 External drain done in a old lady

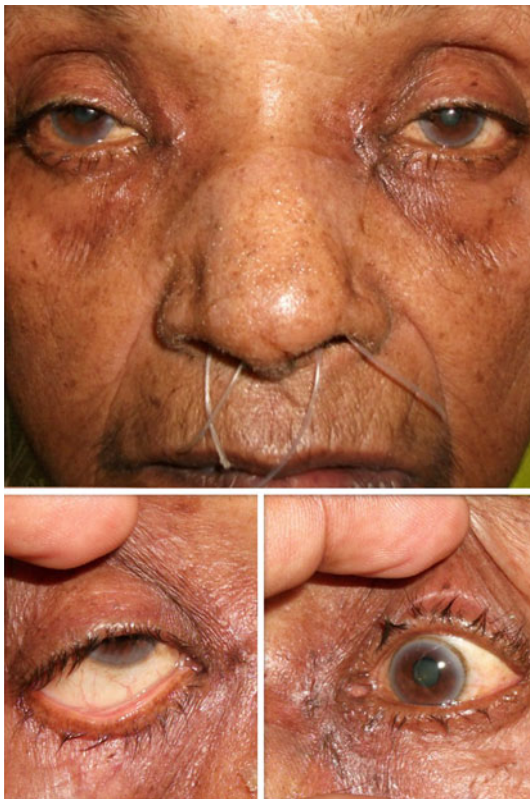


Fig. 7 Silicone stents in place bilaterally

Swelling disappeared intraoperatively in all group A cases while medial canthal edema and erythema completely reduced within 2–3 days postoperatively. While in group B

swelling disappeared partially intraoperatively and repeated draining was needed on the 2nd and 3rd day.

Medial canthal edema and erythema took a week to disappear. Patency on syringing was seen immediately after EnDCR later the stent was placed for 3 months in group A and patency was tested at 3 and 6 months after stent removal. 12 patients showed patency on syringing at 3 and 6 months. No syringing was done in group B (Table 2). The mean VAS score on first post operative day was 3.14 in group A and marginally higher in group B i.e. 4.64. (Fig. 9) The group A patients had dramatic pain relief in 2 days but group B patients had slow pain relief over a week. Improvement in epiphora was seen in 92.3% of group A patients none in group B. Mean intraoperative blood was 65 ml in group A and minimal in group B. Concha bulloplasty in two cases, septoplasty in two cases were done to expose the lacrimal area better. FESS in three cases and polypectomy in one case was done as they had the disease along with lacrimal abscess and could not afford one more surgery (Table 3).

All the cases were followed up for 6 months, more complications were seen in group B like recurrence of abscess in two cases, postoperative fistula in one case, and external scar in 16 cases but no such problems in group A (Fig. 10; Table 4). Drastic improvement in epiphora, immediate resolution of abscess with no complication with lesser hospital stay was seen in group A, so we recommend EnDCR as the primary treatment of choice in acute dacryocystitis with abscess. Silicon tube stent was placed in all

Table 1 Post operative patient analysis (grading system)

	Group A (<i>n</i> = 13)								Group B (<i>n</i> = 18)							
	PO 1	PO 2	PO 3	PO 1 (week)	PO 2 (week)	PO 1 (month)	PO 3 (month)	PO 6 (month)	PO 1	PO 2	PO 3	PO 1 (week)	PO 2 (week)	PO 1 (month)	PO 3 (month)	PO 6 (month)
Swelling subsided	+++	+++	+++	–	–	–	–	–	+	++	++	++++	–	–	–	–
Pain on VAS scale	3.14	2.85	2.42	–	–	–	–	–	4.64	4.52	3.92	3.76	–	–	–	–
Patency on syringing	–	–	–	–	–	–	+	+	(–)	(–)	(–)	(–)	(–)	(–)	(–)	(–)

Table 2 Post operative symptoms improvements

	Group A (<i>n</i> = 13)	Group B (<i>n</i> = 18)
Improvement in epiphora	12 (92.3%)	0%
Intraoperative blood loss (mean)	65 ml	Minimal
Bilateral abscess seen in	2 (15.38%)	3 (23.07%)
Earlier incision and drainage done	3 (23.07%)	6 (33.33%)
Earlier EnDCR was attempted	3 (23.07%)	1 (5.55%)
Earlier External DCR was attempted	–	–
Mean previous episodes of swelling	2.42	2.44
Hospital stay days	1.33	5.28

Table 3 Co-existent nasal pathology corrected with EnDCR

Co-existent nasal pathology corrected	Group A (<i>n</i> = 13)	Group B (<i>n</i> = 18)
Concha bulloplasty	2 (15.38%)	–
Septoplasty	2 (15.38%)	–
FESS	3 (23.07%)	–
Polyps removed	1 (7.69%)	–

**Fig. 9** VAS score being graded

cases and removed at 3 months follow up. Punctum dilation and probing was done in all cases as most of them stenosed making the stents necessary in all cases.

Discussion

Acute dacryocystitis commonly presents as preseptal cellulitis as lacrimal sac lies anterior to the orbital septum and hence infection localizes in the preseptal space [10]. Acute

**Fig. 10** Scar of drainage and ExDCR

dacryocystitis is an ophthalmic emergency that can cause orbital cellulitis with abscess formation, and even vision loss, if left untreated [11].

Table 4 Analysis of follow up of 6 months

	Group A (n = 13)	Group B (n = 18)
Recurrence at follow 6 months follow up	Nil	2 (11.11%)
Pre operative fistula	Nil	1 (5.55%)
Post operative fistula	Nil	2 (11.11%)
External scar	Nil	16 (88.88%)
Improvement in epiphora	12 (92.30%)	Nil
Difficulty in removal of stent	Nil	–
Spontaneous expulsion of stent	1 (7.69%)	–
Closure of rhinostomy opening	Nil	–

Usually caused by infection by commensals like *Staphylococcus aureus* or β -hemolytic streptococcus which presents as epiphora, swelling and redness at the medial canthus of the eye [12, 13]. In untreated cases the infection may spread to surrounding tissues causing preseptal or orbital cellulitis or abscess formation [12]. 10% of adults aged 40 years or older have obstruction of the lacrimal drainage system and this percentage increases with age [14]. In India the incidences are more in females as cosmetics especially kajol may lead to partial or complete blockage of the draining system [3, 15].

Lacrimal abscess due to obstruction of nasolacrimal duct converts the lacrimal sac into a reservoir of infection causing a constant threat to cornea and orbital soft tissue [13]. Moreover, it causes social embarrassment due to chronic watering from the eye [13]. Dacryocystitis is more common in females and left eye is more frequently involved than right eye and is common among lower socioeconomic strata with habit of pond-bathing in India [13].

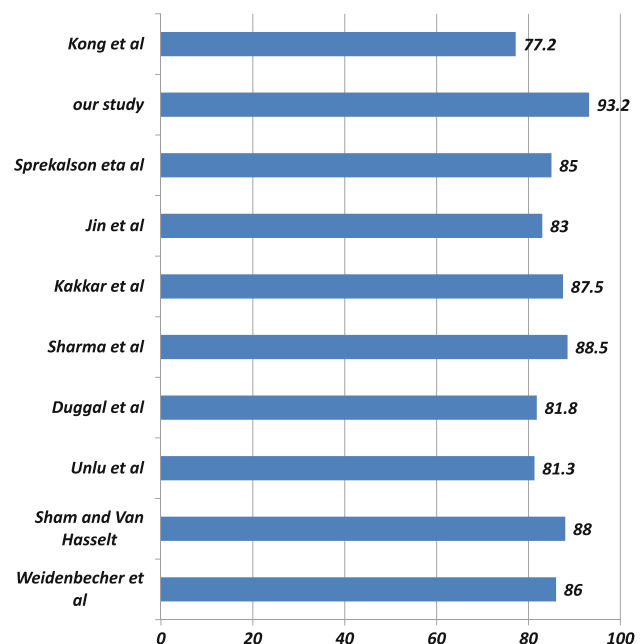
Dacryocystorhinostomy by external approach (ExDCR) is contraindicated in acute dacryocystitis with abscess because of the risk of spreading infection through tissue planes, septicemia, and exacerbating inflammation [10, 16]. EnDCR gives the advantage of approaching the lacrimal sac through the noninfected tissue planes and can prevent spread of infection and prevents external scar and can be practiced as the primary treatment of choice for lacrimal abscesses [6]. Earlier EnDCR was tried in cases where acute dacryocystitis were resistant to antibiotics [17].

Results in our study was similar to that done by Duggal et al. [6] where all the patients with abscess had immediate resolution with EnDCR and no recurrence for the next 6 months of follow up, with minimal hospital stay and absent external scar compared to the group treated conventionally with incision and drainage. The external scars seen in incision and drainage are absent making it a cosmetically superior approach and also functionally better as lacrimal pump is not damaged as orbicularis oculi is not incised [18]. Also coexistent middle turbinate anomalies

causing obstructions to the flow of lacrimal fluid can be corrected [17].

A vast review of literature reported on studies on acute dacryocystitis with abscess treated with EnDCR and various results of studies done by different authors show success rates of EnDCR with and without stents as comparable to external DCR (Graph 1). Duggal et al. [6] in their study on 11 cases of acute dacryocystitis with abscess treated by EnDCR found a success rate of 81.8% which was less compared to other studies. The lesser success rates were due to scarring and obliteration of lacrimal sac abscess cavity after surgical drainage and may reflect the presence of acute inflammation promoting restenosis [5, 6, 19]. Use of silicone tube stent following EnDCR for acute dacryocystitis abscess are not present in literature and its use in chronic dacryocystitis is controversial [20]. Some studies report higher rates of failure caused by the stents due to damage to the mucosa of the canaliculi and increased granulation formation resulting in rhinostomal restenosis [21]. Duggal et al. [6] in their study did not use stents as they found the sac was edematous and cellulitis had set in causing the maneuvering of stent difficult and led to false passages.

Subbaiah et al. [22] in their study on nine cases of acquired lacrimal abscess found EnDCR to be very effective and cessation of epiphora and closure of the fistula was seen in all the cases after the surgery. All the lacrimal fistulas in the study were as a result of improperly treated lacrimal abscesses by conventional incision and drainage [22].

**Graph 1** Comparison of EnDCR success rates

Also incision and drainage and ExDCR in acute cases can cause damage to the sac with added infection from the acute infection together cause fibrosis and granuloma formation in the lacrimal sac thereby reducing the rhinostomal patency later [23]. Wencan et al. [7] and Lee and Woog in separate studies advocated EnDCR as primary treatment of choice for acute purulent dacryocystitis which are consistent with the results in our study. Wencan et al. [7] found 90% success with EnDCR with silicon tube stents after removal at 12 months done for acute dacryocystitis.

Failures in EnDCR are usually due to rhinostome occlusion by membrane or synechiae formation between rhinostome and the middle turbinate [24]. Attempts to improve results led to silicone tube stent being placed or special Pyrex tube placed across the lacrimal sac and nasal mucosal anastomosis to prevent recurrent obstruction [25, 26]. Whenever there is absence of canalicular function, either due to obstruction less than 8 mm from the puncta or to lacrimal pump failure, conjunctivo–canalicular DCR with Lester Jones tube insertion has been done for relief of epiphora [25, 26]. Recently balloon dacryocystoplasty is done in adults with partial nasolacrimal duct obstruction who do not exhibit signs of chronic infection [25, 26].

In our study the highly edematous mucus membrane due to acute inflammation and preexistent stenosis of the common canaliculus was prudently managed by endonasal bipolar cautery and silicon tube stents used in all the cases.

Conclusions

Primary EnDCR has proven highly successful as a procedure of choice for acute dacryocystitis with abscess preventing further episodes of abscess formation and also relieving the preexisting symptoms of epiphora in most patients.

EnDCR has over-ranked the conventional methods of incision and drainage with medical line of management for lacrimal abscesses. We recommend EnDCR as the treatment of choice for acute dacryocystitis with lacrimal abscesses.

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