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## Research Article

## Early Outcomes of External Dacryocystorhinostomy Done by an Orbit and Oculoplastic Fellow at the Aravind Eye Hospital, Madurai, India

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### Abstract

Dacryocystorhinostomy (DCR) is the gold standard in the treatment of the nasolacrimal duct obstruction. Before 2014, there was no orbit and oculoplasty surgeon in Cameroon. We had had a fellowship in the training in that topic at Aravind Eye Hospital of Madurai in India from the 1<sup>st</sup> of July to the 31<sup>st</sup> of December 2013. We carry out a prospective descriptive and longitudinal study in the orbit and oculoplasty unit on our external DCR surgeries without silicone tubes done on adults patients with primary chronic lacrimal ducts obstructions.

**Result:** we operated under local anaesthesia 98 adults patients with chronic dacryocystitis, including 24 males (24.5%) and 74 females (75.5%). The mean age was 55.7±14.1 years. Day 1 postoperative findings included: mild epistaxis in all patients; moderate inflammatory oedema of the eyelids in 96 patients (98%); patent nasolacrimal drainage system in all patients, after irrigation with normal saline (100%, n=98). Day 2 to day 10 postoperative most complications was severe epistaxis in 3 cases. On the 40<sup>th</sup> postoperative day, we noted one case of canalicular obstruction and one case of hypertrophic scar (1%) respectively. improvement of symptoms (relief of epiphora) was noticed in 97 patients.

**Conclusion:** a long-term follow up of external DCR patients operated by a fellow, can give a better view on complications to improve skills. In our setup, patients are now operated without worry since we went back in Cameroon.

**Keywords:** External; Dacryocystorhinostomy; Fellow; Aravind; Madurai; India.

### Introduction

Dacryocystorhinostomy (DCR) is the gold standard in treatment of patients with acquired naso lacrimal duct obstruction [1,2]. It consists of the marsupialisation of the lacrimal sac into the nasal fossa after creating an osteotomy opposite the common canalicula [2]. It can be done either under general or local anaesthesia, depending on the choice of the surgeon or the general condition of patient. Three procedures are well-known, endoscopic DCR with contact Laser, surgi-

cal endoscopic DCR without Laser, and External DCR [3,4]. External DCR is often cited as having a higher success rate in terms of patient comfort and disappearance of epiphora, with overall success rates of about 90 to 100% [1,5-9], compared to endoscopic approach 89% [10]; however, few authors noticed that endoscopic DCR had a significantly higher success rate than external DCR [11]. All These procedures were not yet carried out in Cameroon due to lack of resources and training in orbit and oculoplastics until we went back home after orbit and oculoplasty fellowship at Aravind eye

hospital in Madurai India. Patients requiring these procedures was usually left to themselves; the few who can pay for the cost elsewhere, was usually referred to Europe. Cameroon is not the only country lacking expertise in this domain. To the best of our knowledge, this is the case for most countries in the central African sub region. The Cameroonian minister of Public Health in his policy on the development of human resources decided upon our request to sponsor the training of an ophthalmologist in orbit and oculoplastic surgery. This training spanned 1<sup>st</sup> July to 31<sup>st</sup> December 2013 at the Aravind Eye Hospital in Madurai, India. In the above training centre, we were trained to carry out external DCR with and without intubation in adults under local anaesthesia. During the training, we put forth a research question: what is the outcome of external DCR without intubation done by our self? We therefore carried out a mid-term evaluation study with the aim of describing preventable complications of this procedure. This will help in improving the management of cases with primary or secondary nasolacrimal duct obstruction in our setting in Cameroon.

## Patients and Methods

We carried out a prospective descriptive and longitudinal study in the orbit and oculoplastic unit of the Aravind Eye Hospital in Madurai from 1<sup>st</sup> September to 15<sup>th</sup> October 2013. All patients above 19 years old with chronic dacryocystitis, irrespective of sex or age upon whom we operated during the study period were included. The diagnosis of chronic dacryocystitis was clinical and was based on chronic epiphora; purulent or mucopurulent secretions; thick lacrimal film; reflux of mucopurulent material upon pressure over lacrimal sac; and a prolonged retention time on the 2% fluorescein disappearance test (FEDT), normal excretion time is 3 to 5 minutes. Obstruction was also diagnosed after irrigation of the lacrimal drainage system with normal saline. The inferior punctum was probed and irrigated; there was reflux through the superior punctum without the patient feeling the passage of fluid into the pharynx. Anterior segment examination of the eyeball was done to exclude signs of ocular surface complications of chronic dacryocystitis (conjunctivitis, keratitis). Posterior segment examination was done after pupillary dilatation with 0.5% Tropicamide eye drops in search of associated ocular pathologies. We did anterior rhinoscopy with a torch to exclude any inflammation, tumour or malformation as an underlying cause. Blood pressure was measured using a mercury sphygmomanometer and hypertension was diagnosed when measures was above 140/90 mmHg. Paraclinical investigations included: a full blood count, with haemoglobin level and platelet count; fasting blood sugar and bleeding time. Patients admitted to the operating room fulfilled the following criteria: haemoglobin level of at least 11g/l; normal platelet count ( $150-450 \times 10^3$ /ml); normal fasting blood sugar (0,5-1,1g/l); normal blood pressure (systolic of 90 to 140 mmHg and diastolic of 60 to 90 mmHg).

## Surgical Procedure

External DCR was done under local anaesthesia with 2% Lidocaine associated to 1/100 000 epinephrine, if the blood pressure was normal. One millimetre was injected into the inferior trochlear canal and 4ml was injected adjacent the nasal bone, 10mm medial to the medial canthus. The induced oedema was massaged until it disappeared. Nasal packing was done with gauze initially moistened with 2% Lidocaine gel for anaesthesia of the nasal mucosa. A straight incision about 12 mm was made at the side of the nose, 10 mm medial to the medial canthus and medially to the angular vein. The incision extended 2 mm above and 10 mm below the horizontal inter-canthal line. After soft tissue dissection, the anterior arm of the medial canthal tendon was disinserted from the anterior lacrimal crest and the sac reflected laterally. The periosteum was incised and an osteotomy/rhinostomy size of approximately 1.5 cm<sup>2</sup> surface area, including the frontal process of the superior maxillary bone and the anterior part of the lacrimal bone was done by a Kerrison rongeur. The lacrimal sac was later incised to produce two flaps. The posterior flap was resected. The nasal mucosa was also incised. The anterior flaps of both mucosae were sutured to each other and suspended by suturing with the orbicularis muscle. The anterior arm of the medial canthal tendon was sutured to the periosteum. The orbicularis muscle was sutured and the skin was later sutured with 4 to 5 sutures. All sutures were done with 6/0 polyglycolic acid sutures (Vicryl®). At the end of surgery, the lacrimal drainage system was irrigated with normal saline to test for permeability. The test was positive when normal saline was felt in the throat after irrigation. Postoperative medications included systemic antibiotics for 5 days (400 mg/day of Ofloxacin per os); Diclofenac 50 mg tablets three times daily; a nasal decongestant Xylometazoline hydrochloride (Otrivine®); antibiotic eye drops (Ofloxacin 0,3%) 4 times daily into the eye of the operated side for two weeks; and Ofloxacin ointment applied twice a day to the wound for 10 days. The patient was also advised to avoid nose blowing for 15 days, to prevent post-operative subcutaneous or orbital emphysema and nasal haemorrhage.

The following were monitored on day one: the state of the wound (dehiscence or infection), lid and orbital appearance (oedema or not). The nasal packing was removed and the lacrimal drainage system was once again irrigated to confirm patency. The patient was then discharged and reviewed 10 days later.

At the 10<sup>th</sup> day post operative; the wound was examined, the height of the marginal tear strip and the patency of the lacrimal drainage system by irrigation were noted. In the absence of any complication, local antibiotics were continued for 3 weeks and the patient seen 1 month later (40<sup>th</sup> post-operative day) for a similar examination.

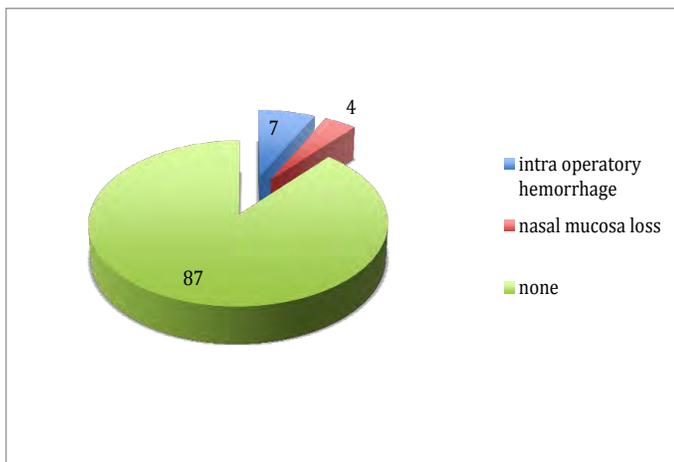
Anatomical and functional success is defined as improvement

of symptoms, patent syringing and a positive FEDT (7).

**Variables analyzed included:** age; sex; past history of systemic disease; the diagnosis; per operative complications; postoperative complications up to the 40<sup>th</sup> day. Data was analysed through SPSS software.

**Results**

During the study period, we operated 98 adults patients with chronic dacryocystitis, including 24 males (24.5%) and 74 females (75.5%); giving a male to female ratio of 1:3. The mean age was 55.7±14.1 years, with extremes of 20 and 85 years. Eighteen patients (18.4%) were hypertensive and 4 (4.1%) were type 2 diabetic. All the patients were seronegative to the Human Immune Deficiency Virus (HIV). Fifty-six surgeries (57.1%) were done on the right side and 42 (42.9%) on the left side. Surgery was done under local anaesthesia in all cases. It was 2% Lidocaine with 1:100,000 epinephrine in 80 patients and 2% Lidocaine without epinephrine (due to systemic hypertension) in 18 (18.4%) of the cases. Two cases (2%) presented a lacrimal fistula to the skin; fistulectomy was done in both cases peroperatively. Perioperative complications included 4 cases (4.1%) of nasal mucosal trauma with loss of tissue during osteotomy with Kerrison punch forceps, requiring that the lacrimal sac anterior flap be sutured to the periosteum; 7 cases (7.14%) of intra operative haemorrhage, 4 (4.1%) of them due to angular vein lesion and 3 (3%) due to nasal mucosal lesion (figure 1).

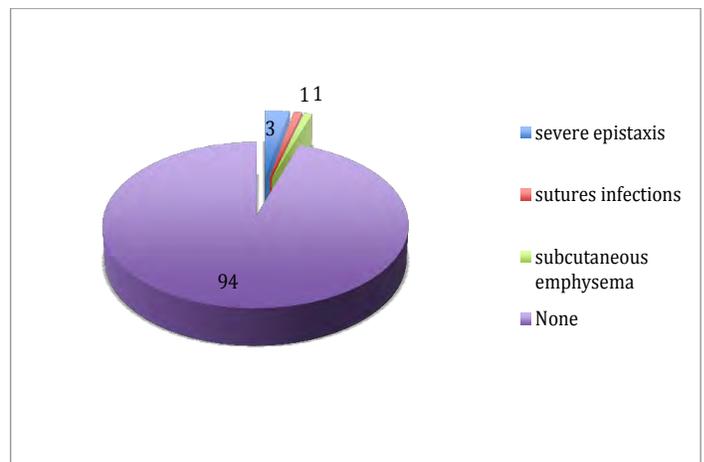


**Figure 1.** Intra operative external DCR complications.

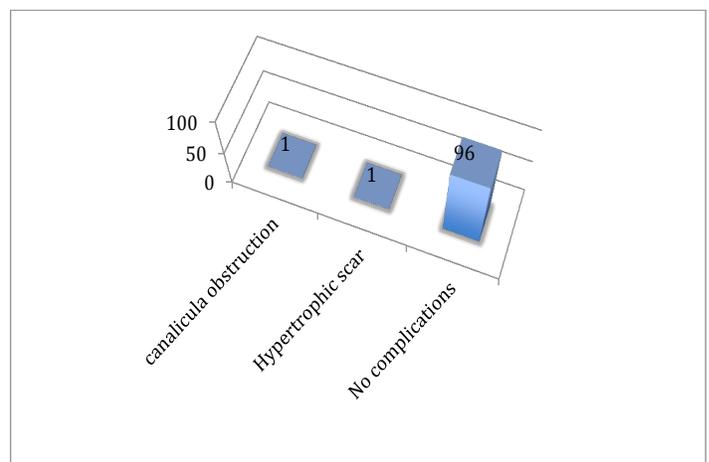
Day 1 postoperative findings included: all sutures in place in all patients; mild epistaxis in all patients; moderate inflammatory oedema of the eyelids in 96 patients (98%); patent nasolacrimal drainage system in all patients, after irrigation with normal saline (100%, n=98).

Day 2 to day 10 postoperative complications (figure 2) included: 3 cases (3%) of severe epistaxis. Two of the cases oc-

curred on day two and was due to severe high blood pressure in known hypertensive patients; one case had a blood pressure of 200/120 mmHg and the second had a blood pressure of 220/130 mmHg. The third case of bleeding was seen on the 5<sup>th</sup> day, after blowing the nostrils with retraction of blood clot. Both cases were managed by the emergency department of the hospital and this management included: evaluation of vital signs (level of consciousness, blood pressure, and pulse); the placement of an intravenous line with Ringer’s lactate solution and the use of antihypertensive treatment for the hypertensive cases; they were discharged two days later with better hemodynamic status and no nose bleeding. On the 10<sup>th</sup> postoperative day, we noted a case of subcutaneous emphysema (1%) and one case of suture infection (1%). The lacrimal drainage system was patent in all patients after syringing and FEDT.



**Figure 2.** early postoperative external DCR complications (between the 2<sup>nd</sup> and 10<sup>th</sup> days).



**Figure 3.** 40<sup>th</sup> day post operative external DCR complications.

On the 40<sup>th</sup> postoperative day (figure 3), we noted a functional complication (1%): canalicular obstruction in a 30 years old lady who had a past history of canalicula obstruction on a con-

tralateral DCR done 6 months before. There was also one case of hypertrophic scar (1%). In 97 patients (98.9%), the drainage system was free on syringing and the FEDT was positive; these 97 patients had improvement of symptoms: relief of epiphora, no sticky eyelashes, no discharges, no more conjunctival congestion and no more blurred vision.

## Discussion

The indications for DCR are nasolacrimal duct obstruction in all its clinical forms: chronic tearing, chronic dacryocystitis and mucocel. [2,12]. External dacryocystorhinostomy can be done with or without bicanalicular intubation and surgery can be ambulatory. [2]. Bicanalicular intubation theoretically increases the chances of success by mechanically maintaining the orifice open and enhancing epithelisation around the tube; it is usually reserved for cases with canalicular or common canalicular obstruction ; atretic lacrimal sac and atrophic nasal mucosa. [2] This is what is carried out in Aravind Eye Hospital; nasal endoscopic DCR is sometimes done by the medical chief officer, with or without laser. Chronic dacryocystitis is results from a low grade chronic infection of the lacrimal sac secondary to nasolacrimal duct obstruction. It is one of the most frequent ophthalmic pathology in India, with a prevalence of 6.6% [13] reported in 1997 amongst patients awaiting cataract surgery. It is known more common in females than men [14,15]. External dacryocystorhinostomy is the first surgery taught fellows in orbit and oculoplastics. It was done by the third month in a fellowship lasting six months. The first part of the training consisted of observing and assisting in over 300 surgeries. Then came the hands-on training; this was done on 6 cases under the supervision of a senior orbit and oculoplasty fellow.

The complications observed in our series are similar to those reported in the literature. Per-operative bleeding is rarely heavy but can prolong operating time [2]. The management in our cases consisted of an external pressure pad for 5 minutes or bipolar cauterization when bleeding was liable to prolong operative time. In the other hand, we can use surgical hemostatic agents such as oxidized regenerated cellulose, thrombin, absorbable gelatin sponge and bone wax. [2]. In the absence of these adjunctive hemostatic agents, we were able to control bleeding in our patients. Nasal mucosa trauma and loss observed in 4 patients was due to lack of experience in the beginning surgeon and per-operative bleeding impairing visibility of the field, despite aspiration. There was no case of lamina cribrosa fracture which usually manifests with cerebrospinal fluid leak detected by double-ring sign; no case of incision of the lateral wall of the lacrimal sac and fat herniation into the operative field.

The follow-up of patients is long, varying from several months to several years [16,17]. In our series, follow-up was limited to 40 days. This was due to the fact that the fellowship lasted 6

months, and surgical training starts on the 3<sup>rd</sup> month. Post-operative bleeding occurring as epistaxis is similar to the rate describe by tarbet et al 3.9% [4]; it is described in the literature as having two major causes with two distinct peaks of occurrence. The first is a consequence of rising blood pressure. This usually occurs within the first 24 hours [2]. This was the case of two of our patients who were known hypertensive patients. A second peak occurs between the 4th and 7th post-operative days ; this is due to the retraction of a formed blood clot. This was the case for one of our patients who presented with heavy epistaxis on the 5th post-operative day, with stable hemodynamic status. Subcutaneous emphysema was seen in one patient following early nose blowing. Air passes into the subcutaneous tissue of the eyelids and the preseptal space. This air is usually resorbed spontaneously over several days. No case of severe post-operative infection such as bone infection and orbital cellulitis was seen. However, one case of stitch abscesses was noticed. This was treated with oral Ofloxacin 400 mg daily for a week. There was healing with no complication.

Hypertrophic scarring is rare 2,6% by Tarbet et al [6]. It is favoured by subcutaneous sutures. Several times daily massage with a steroid ointment is helpful; this was started on 40th post-operative day. Average-term complications such as pseudo-epicanthus (resulting from tear trough incision, scar retraction, cheloid formation, secondary obstruction of the common canalicula from surgical trauma to the horizontal canalicula or associated canaliculitis) and obstruction of the naso-frontal duct resulting from the removal of the middle concha [2], were not recorded. Sump syndrome which is the incomplete evacuation of tears in the lacrimal gutter was not noted.

Long-term follow-up would have permitted the search for long-term complications such as recurrent dacryocystitis and cutaneous fistula. For a beginner, this would help to constantly review surgical techniques in order to improve outcome.

## Limitations

The short follow-up period, due to the relatively short period of training, Delaney et al described at 3 years' follow up of external DCR a declination of success rate due to postsac and presac occlusions [5]. The non-association of an Ear, Nose and Throat specialist (ENT) to carry out anterior rhinoscopy for recognition of early fibrosis or synechia, which are causes of DCR failure.

## Conclusion

Carrying out external DCR was one of our challenges in orbit and oculoplastic surgery. It was carried out with few complications and a functional success rate of 98.9% (n=97/98) recorded on the 40<sup>th</sup> postoperative day. The technique has been mastered and patients are now operated since we went back in January 2014 in Cameroon without worry. On the other hand,

a little training in nasal endoscopic DCR at Aravind Eye Hospital could be introduced in the fellowship schedule to complete skills in this topic. The endoscopic approach allows simultaneous treatment of associated anatomic anomalies and sino-nasal disorders [16].

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