Comparison of Endonasal DCR Surgery Using Cautery and Surgical Blade Technique in Cases of Chronic Dacryocystitis

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Abstract Dacryocystitis is defined as inflammation of lacrimal sac. This can be congenital or acquired. Congenital dacryocystitis is commonly chronic while acquired dacryocystitis is acute and chronic both. Endonasal DCR surgery is the most commonly used treatment in chronic DCR but recent use of cautery technique in endonasal DCR surgery rather than traditional surgical blade technique has emerged with promising results with good success rate and fewer complications.

Keywords Chronic dacryocystitis · Cautery and surgical blade technique · Endoscopy · Bleeding

Introduction

Chronic dacryocystitis is commonly attributed to the effects of obstruction of the nasal duct, whether it is due to congenital or acquired reasons such as trauma, infection or iatrogenic in nature. It can be divided into obstruction before the sac, at the sac and beyond the sac.

Obstruction to the lower end of the nasal duct can be either primary due to inflammation of unknown cause or secondary to pressure of nasal polyp, hypertrophied inferior turbinate or extreme deviation of septum. This accumulation of secretions and tears within the sac is easily infected. Organisms commonly found are staphylococci, pneumococci and streptococci reflecting the conjunctival

flora. Untreated chronic dacryocystitis rarely undergoes spontaneous resolution and there is always an impending threat to adjacent ocular structures.

Increased incidence of nasolacrimal duct obstruction in middle aged females could be due to smaller dimensions in lower nasolacrimal fossa and middle nasolacrimal duct. It was due to bony osteoporotic changes in middle aged females. Hormonal changes may lead to de-epithelization may cause obstruction within sac [1].

The puncta are 0.3 mm in diameter and are about 6 mm from the medial canthus. The upper and lower canaliculi are lined by non-keratinized stratified squamous epithelium so that they can be dilated to about 2–3 times their diameter. The lacrimal sac is about 15 mm in size while nasolacrimal duct is 17 mm in length.

There is a valve at the junction of the lacrimal sac (Rossenmuller) and the nasolacrimal duct. There is valve at the lower end as well in the opening of the lower meatus (Heisner). This helps to prevent lacrimal reflux. The blockage can be detected by either a dacrocystogram or a fluorescein test. However, syringing and probing is mandatory to assess the level of obstruction.

Dacryocystorhinostomy (DCR) is the treatment of choice for patient with chronic dacryocystitis. The external DCR was first described by Toti [2] in 1904.

The endonasal approach was first introduced by Caldwell [3]; but it was inherently limited by poor visibility of endonasal anatomy during surgery.

McDonogh and Meiring explained first endoscopic transnasal DCR [4].

However endoscopic endonasal DCR has only become recently employed with new endoscopy instruments and technique. Now use of cautery has been increased in surgery of DCR with better results and lesser chances of complications and failure.

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External DCR is regarded as the gold standard for NLD obstruction. This procedure has got the advantages of direct visualization of the anatomical structures surrounding the lacrimal sac compared to endoscopic DCR. But the procedure leaves a cutaneous scar and the potential for injury to the medial canthal structures, cerebrospinal fluid (CSF) rhinorrhea and functional interference with the physiological action of lacrimal pump.

Endoscopic DCR has gained popularity over the last few decades due to its equally promising result and especially due to lack of external scar. In most of the studies more number of females is undergoing this procedure which perhaps points towards long term cosmetic effects on the eyes [5].

Endoscopic procedure allows direct visualization of lacrimal sac pathology. Assessment of failure can also be viewed endoscopically, so mistakes can be corrected immediately. Option for converting an endoscopic DCR to an external DCR during surgery is always available for difficult cases or those with lacrimal sac tumour. The endoscopic approach allows diagnosis and management of nasal pathology.

Disadvantage of endonasal DCR is that it requires an endoscope and proper training. Onerci et al. [6], in Turkey, conducted a study in which experienced surgeons carried out surgery on 108 patients and inexperienced surgeons operated on 50 during a period of 8 years. They compared the performance of the two groups carrying out endoscopic DCRs and reported 11 complications by the experienced surgeons and 21 by the inexperienced surgeons.

Laser DCR has also been tried. The Royal College of Ophthalmologists advises that endoscopic DCR with a laser is less efficacious (success rates of 77–83%) which can cause serious complications such as infection and loss of sight. The laser unnecessarily lengthens the time of the surgery and its use is best avoided.

Surgical Procedure

An initial nasal endoscopy of the nose was carried out under local anesthesia to ascertain the surgical anatomy of the nose on the side of the proposed surgery and point out any obstruction and anatomical abnormalities. CT scan can be done pre-operatively.

The surgery is carried out under hypotensive general anesthetic and the nose is extensively prepared preoperatively with xylometazoline 0.5% (5 sprays on the side of surgery) and further neurosurgical patties are soaked in 1:1000 adrenaline and placed at specific sites in the nose especially the mucosa overlying the frontal process of the maxilla just anterior to and level with the axilla of the middle turbinate (Fig. 1).

Fig. 1 Bony anatomical landmark of lacrimal sac (illuminated area)

Site of incision is 0.9 mm anterior to ant surface of uncinate process. This area is also known as atrium of lateral wall. Mucosa is reflected either by using surgical blade number 12 or by using long handle cautery point (Fig. 2). In cautery we have to denude the sac area with better surgical exposer and less bleeding chances. After Identifying the maxillary crest bone cutting is done from maxillary crest in post-superior direction till sac is exposed. Confirmation of the sac is done by putting external pulsatile pressure medial to the medial canthus over lacrimal sac area. Medial wall of sac is excised (Fig. 3).

In a study done by Aslam et al. [7] the ophthalmologist uses the lacrimal probe to assess the patency of the superior, inferior and common canaliculi and enters the punctum of either of the lids usually with a punctum dilator.

Fig. 2 Intra operative view of lacrimal sac

Fig. 3 Intra operative partial removal of lacrimal sac

Subsequently, a fiber optic light carrying probe replaces the punctum dilator and after negotiating its way through the canaliculi and the common canaliculus enters the lacrimal sac. The otolaryngologist dims the intensity of the light of his endoscope (0° or 30° 4 mm 18 cm) which enables the external probe light to give a glow inside through the lacrimal bone at the site of the lacrimal sac.

Endonasal DCR was done with or without stent. Slitting of the canaliculi and punctal stenosis is also one of the complications.

Septoplasty is required in some cases of DNS. In a study done by Shiraj et al. 37.5% of the patients there was a deflection of the nasal septum on the side of the DCR while only 6.3%, which is one patient, underwent a septoplasty and another one a sub mucous resection of the septum. There was no need to trim back the anterior end of the middle turbinate on the side of the surgery in the majority (87.5%) of the patients and only two patients out of the lot had their middle turbinates trimmed to make room for the sac surgery [7].

Success of the procedure is determined by patient's resolution of symptoms with patency on irrigation and a positive fluorescein dye disappearance test. Recurrence of postoperative dacryocystitis, blocked syringing postoperatively, scarring noticed on nasal endoscopy at the intranasal osteotomy and no visualization of fluorescein dye was also considered as a surgical failure. Patients with improved or resolved symptoms but with postoperative obstruction on irrigation were still classified as surgical failure.

Complications

Postoperative bleeding—use of cautery in reflecting mucosal flap leads to better hemostasis n better exposure of sac area and hence lesser bleeding complication.

Table 1 Comparison of surgical techniques

	Surgical blade	Cautery
Hemostasis	Bleeding	Better
Surgical exposure	Hamper by bleeding	Better
Post-op pain	Painful	Much less
Mucosal obliteration	Common	Not seen
Nasal synaechae formation	Common	No
Recurrence	More	Less

In a study done by Shiraj et al. almost 88% did not have any postoperative bleeding. The nasal bleeding, they encountered was as a mild trickle in the patients who had to undergo corrective septal surgery (which is expected) or trimming of the middle turbinate [7] (Table 1).

A randomized controlled trial run by Hartikainen et al. [8] in Finland carried out DCR procedures on 60 patients over a period of 15 months out of which 6.25% of the patients required a nasal packing and hospital readmission for 3 days for excessive nasal bleeding.

Nonpatent lacrimal drainage system occurred to 26.7% of endoscopic DCR group in study done by Khan et al. [9].

Allergic rhinitis in a study of Shiraj et al. 25% reported with allergic rhinitis while 50% complained of itchy eyes, more in the females than the male patients [7].

Ecchymosis though reported; its overall incidence is less. A study by Unlu [10], with 25 patients in 4 years had 2 patients with ecchymosis around the eye.

Obliteration of sac has been reported in very few cases. Wormald [11], in Australia (36 patients in 30 months) had only one patient who had obliteration of the sac postoperatively.

In study of Shiraj et al. 100% were symptom free at the eighth months post-surgery and removal of the silicon tubes. There were no patients with a stenosis [7].

Results

In this study we have included 63 patients in total. 32 patients were operated using surgical blade no 12 and rest of 31 patients were operated by using uni-polar cautery handle in the period of January 2016–August 2017 (Table 2).

The study shows that the patients who underwent surgery using cautery are having less post-operative pain and bleeding as compared to those in whom we used surgical blade. Less hospital stay is required and less chances of post-operative complication is seen.

Results were defined by patient's resolution of symptoms with patency on irrigation and a positive fluorescein dye disappearance test. Patients resolution of symptoms were categorised as follows:

Table 2 Comparison of post-operative presentation in both surgical techniques

	Duration	Surgical blade	Cautery
1	1st POD	Bleeding present in 20 pt	Less bleeding, 3–4 pt
2	3rd POD	Swelling (25 pt) bleeding (4 pt) epiphora (10 pt)	Swelling (4 pt) pain (2 pt) epiphora (2 pt)
3	7th POD	Swelling (6 pt) pain (7 pt) epiphora (5 pt)	Pain (2 pt) epiphora (1 pt)
4	15th POD	Blocked syringing 2 pt, partial 1 pt epiphora (3 pt)	Partial obstruction 1 pt
5	30th POD	Endoscopic correction req. in 2 pt (epiphora 2 pt)	All pt. patent syringing

1. No epiphora and complete resolution of symptoms.
2. Improved epiphora with associated patient satisfaction, with no further follow-up required.
3. Continued epiphora with no improvement.
4. Revision DCR surgery required.

Patients with patency on irrigation of the lacrimal system and a negative fluorescein dye disappearance test postoperatively could be considered as successful. Patients who were categorized 1 and 2 with patency on irrigation were defined as a successful outcome.

Patients were also categorized as surgical failure if they experienced any postoperative episode of dacryocystitis. Inability to irrigate the lacrimal system postoperatively, nasal endoscopy with scarring at the intranasal osteotomy, and/or no visualization of fluorescein dye was also classified as a surgical failure.

It can be noted that patients with improved or resolved symptoms but with postoperative obstruction on irrigation were still classified as surgical failure.

Overall results are good and as per world literature varies from 80 to 90%.

Sham and Hasselt [12] performed 17 DCRs and claimed a success rate of 88% with 7 revision procedures.

Weidenbecher et al. [13] showed a success rate of 79.12%. They supported our results as far as a low morbidity and safety of this procedure is concerned.

Eloy et al. [14], preferred the endoscopic route.

Rasan et al. [15], in Malaysia also concluded that the endoscopic DCR is an easy, efficient treatment for nasolacrimal duct obstruction with minimal complications.

Conclusion

Use of cautery in endonasal DCR has become an established procedure having better exposure, lesser bleeding, lesser failure rates and lesser nasal complication and lesser hospital stay. No scar postoperatively leading to better cosmesis, preserved medial canthal area and preservation of lacrimal pump mechanism are one of the advantages.

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