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To study the surgical outcomes of external dacryocystorhinostomy (Trephine Vs Punch): a comparative retrospective study

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Abstract

This retrospective comparative study describes the surgical outcomes of primary external DCR by two instrument sets Kerrisons punch vs Lacrimal trephine. We reviewed the medical records of total forty eight patients who had undergone primary external DCR in the last one year period in our institution. Procedure success rate was among Kerrisons group 91.66% vs 83.33% in lacrimal Trephine group(p=0.157),that was marginally significant. But the operative time was slightly higher in Kerrison punch group. Chances of nasal mucosal damage was higher in lacrimal Trephine group. The follow-up period was upto six months after surgery.

Introduction

DCR(Dacryocystorhinostomy) is an operation that creates a lacrimal drainage pathway into the nasal cavity to facilitate drainage of the previously obstructed excreting systems. This operation is indicated for nasolacrimal duct(NLD) obstruction. The causes of NLD obstruction are idiopathic, iatrogenic, congenital, traumatic, lithiasis, and infection. Suspicious of obstruction may be confirmed by syringing, Jones test and Dacryocystorhinography(DCG).

Classically DCR had been performed by using an external approach. This was first described by Addeo Toti[(1)] in 1904. External DCR is the standard treatment of nasolacrimal duct obstruction with success rates consistently above 90%. Alternative pathway of DCR by intranasal pathway was described by Caldwell in early as 1893.[(2)] It was modified by West in 1910.[(3)] later on with the introduction of rigid nasal endoscopic approach.

Although external DCR is still regarded as gold standard, endoscopic DCR is evolving as an equally effective alternative in the recent pass.[(4)] Various studies have been shown that that success rate for both the procedures ranges from 63%-97%.[(5,6)]

The wide range of success rate is likely due to surgical variability, patient demographic and lack of standardized outcome measures.[(6)]

External DCR was regarded as the gold standard treatment for treating nasolacrimal duct obstruction at the turn of the century. Endonasal DCR had gained increasing popularity and acceptance in the last decade for the treatment of primary acquired nasolacrimal duct obstruction(PANDO). In our study, lacrimal bone removal was done by Kerrison punch or lacrimal trephine. In endoscopic or endonasal DCR numerous variations had been used for creation of bony opening at the level of lacrimal bone using a bone rongeur,[(7)] power drills[(8)] or Lasers.[(9)]

With this background this study was done with the aim to compare results and advantage of external DCR by two sets of instruments(trephine vs drills) regarding the success rate, operative time, intraoperative and postoperative complications.

Material and Methods

The present study was conducted in the department of ophthalmology Narayan medical college and hospital, Sasaram. This is a retrospective, comparative study. In this study we reviewed the medical records of 48 cases of primary acquired nasolacrimal duct obstruction(PANDO) who underwent external DCR between July 2015 to June 2016.

Out of 48 cases of PANDO, group 1 included 24 patients who underwent external DCR by using kerrison punches of different size and group 2 included rest of the 24 cases who underwent external DCR by lacrimal trephines.

Inclusion criteria:

1. All the cases of PANDO
2. Chronic dacryocystitis

Exclusion criteria

1. Cases of canalicular / punctal obstruction
2. Secondary acquired nasolacrimal duct obstruction(SANDO)

Surgical techniques: All the patients underwent the surgical procedure under local anaesthesia. The nasal cavity of the side to be operated was packed with gauze soaked in xylocaine jelly 2% and adrenaline 1 in 100000. Curvilinear skin incision about 14 to 16 mm was given medial to the medial canthus above the medial canthal ligament avoiding the angular vein. Lacrimal crest was visualized, periosteum elevated, the anterior lacrimal crest in the bone for lacrimal fossa were removed. To remove the bone from the lacrimal fossa we used two sets of instruments first Kerrision punch/rongeurs of different sizes (1.5mm, 2mm and 2.5mm) and second trephines(5mm).

We compared the efficacy of the two sets of instruments for the surgical outcome of external DCR.

The surgical outcome was compared on following parameters(surgical time, intraoperative complications like haemorrhage, loss of nasal flap, laceration of nasal flap , lacrimal sac flap loss , orbital injury, and postop epiphora based on Munke"s score.[10]

We followed the cases records of cases upto 6 months of post-operative period.

Observation & Results

In our study, total 30 females and 18 males had underwent external DCR, out of which 16 females(66.66%) and 8 males(33.33%) underwent DCR via lacrimal trephines and 14 females(58.33%) and 10 males(41.66%) underwent DCR via kerrison punch.

All the patients were in the age group of 32 to 65 years, with mean age of 53.16 years in the lacrimal trephine group versus 50.75 years in kerrison punch group.

Out of 48 cases left side was operated in 26 (54.16%) cases and right side in 22 cases(45.83%).

Table 1

	Instrument set used	
	Lacrimal trephine	**Kerrison punch**
Age (Mean)	53.16	50.75
Gender	Female-16(66.66%)	Female-14 (58.33%)
	Male-8(33.33%)	Male-10 (41.66%)
Lateralization	Right-10(41.66%)	Right-12 (50%)
	Left-14 (58.33%)	Left-12 (50%)

Overall success rate of lacrimal trephine group was 83.33% compared to 91.66% in Kerrison punch group. The mean operative time for surgery in the lacrimal trephine group was 48.50 minutes compared to 57.25 minutes in Kerrison punch group. Overall success rate of external DCR was 87.50%.

Table 2

p=0.157(approximately significant); Chi-Square test used.

	Instrument set used	
	Lacrimal trephine	**Kerrison punch**
Success Rate	20 cases(83.33%)	22 cases (91.66%)
Mean Operative Time	48.50 minutes	57.25 minutes

Complication encountered during our study were intraoperative (excess bleeding, lacrimal sac flap loss, loss of nasal mucosa) and post-operative(reactionary haemorrhage and wound infection).

Table 3

Intra-Operative Complications	**Lacrimal trephine (n=24)**	**Kerrison punch (n=24)**
excess bleeding	2	1
lacrimal sac flap loss	1	2
loss of nasal mucosa	3	1
orbital injury	0	0
SF rhinorrhea	0	0
Post-Operative Complication		
Reactionary haemorrhage	1	1
Others(Wound infection)	0	1
Total	7	6

Fig. 1: Kerrison bone punch set

Fig. 2: Lacrimal trephine set

Fig. 3: Lacrimal bone window by kerrison punch

Fig. 4: Lacrimal bone window by trephine

Fig. 5: Wound infection (postoperative)

Discussion

Advantage of the external approach include excellent success rates reported to be upto 90-95%.A large osteotomy is created with direct visualization of lacrimal sac abnormalities such as lacrimal stones, foreign bodies or tumors. Direct suturing of the nasolacrimal sac and lateral nasal mucosal flaps allow for optimal opposition and primary intension healing of the flaps to create the bypass system. Disadvantages include a visible scar compared to the internal approach.

Anastomosis of posterior flaps does not seem to affect success rate of external DCR. Creating the anterior anastomosis is technically simpler and does not seem to negatively influence the outcome of DCR surgery.

Osteotomy and creation of the bony lacrimal window is a crucial step during any DCR surgery. Creation of a large bony stoma does not mean successful procedure since minimization of intra-operative tissue damage and postoperative scarring is another key point for success.[11,12]

The creation of the bony window can be achieved by many technical variations including Chisel and hammer, kerrison and Citelli` bone punch, lacrimal trephine, and drills. Each instrument has been well described in literature with different results and consequences, but comparison between those instruments and surgical outcome is still nonconclusive.[13]

Our study showed that Kerrison punch group having marginally significant success rate compared to Lacrimal Trephine group but having more operating time. The hypothesis behind this may be due to some important differences between these two instrument sets and surgical technique. Lacrimal bone window formed by lacrimal trephine is small compared to Kerrison punch since the inner diameter of trephine used is 5mm, so the bone window formed having maximum diameter of 5mm while bone window formed by kerrison punch can be extended upto desired extent, so we can form large bony osteum by kerrison punch. Lacrimal trephine having chances of inadvertent injury to nasal mucosa due to sudden pass during manual trephination procedure. Probably due to small bony osteum formation and high chances of inadvertent injury to nasal mucosa there are lesser success rate compared to kerrison punch group. Contrary to that due to narrow surgical space chances of lacrimal flap loss is more in Kerrison punch group during engaging the bone at the junction of lamina papyracea of ethamoid and lacrimal bone. There are also few chances of injury to nasal mucosa also.

It is important to know that the surgery of the lacrimal sac is not without complication. Loss of vision due to orbital haemorrhage[14] or orbital cellulitis[15] has been reported. There might be a complication leading to corneal ulceration due to trauma at the time of surgery.

In our case series we did not found any serious complications except reactionary haemorrhage one in each group and one case of late wound infection that may be due to poor wound hygene.

Conclusion

Kerrison punch showed marginally higher success rate compared to lacrimal trephine but slightly higher operating time for external DCR. Injury to nasal mucosa is more common with Lacrimal trephine.

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