

Original Research Article

Merits of Kerrisons punch over powered drill in endonasal DCR

Shahnaz Sheikh, Vikrant Vilas Vaze, Anushree Bajaj*, Bhalachandra

Department of ENT, Dr. Ulhas Patil Medical College, Jalgaon, Maharashtra, India

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***Correspondence:**

Dr. Anushree Bajaj,

E-mail: bajajnanushree@yahoo.co.in

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ABSTRACT

Background: DCR is an operation used to treat nasolacrimal duct obstruction. Various types of DCR are conventional, endonasal/endoscopic DCR and endolaser DCR. Several modalities like Kerrison punch and powered drill are used in endoscopic DCR to improve success rate, reduce complications and shorten operative time. Aim of the study were, to compare the advantages of non powered Kerrison punch over powered drill regarding time in endoscopic DCR and to compare the advantages of non powered Kerrison punch over powered drill regarding complication rate in endoscopic DCR

Methods: The study was carried out at ENT department of Dr. Ulhas Patil Medical College and hospital Jalgaon from March 2017 to July 2018. Total of 61 patients were included in the study (35 Kerrison punch and 33 drill).

Results: A total of 68 endoscopic DCRs. Procedure success rate among Kerrison punch group was 88.00% vs 91% in drill group. The complications for both groups were statistically not significant ($P=0.91$). The mean operating time among Kerrison punch group was significantly lower than in drill group 80 vs. 135 min ($P=0.0001$).

Conclusions: Kerrison punch showed significant reduction in operating time when compared to drill for endoscopic DCR. No statistically significant difference was found between both groups regarding procedures, success rate and complications.

Keywords: Kerrison, Drill, DCR, Endoscopic dacryocystorhinostomy

INTRODUCTION

DCR is considered as the standard treatment to chronic nasolacrimal duct obstruction. Indications of endoscopic DCR are failure of conservative treatment, chronic dacryocystitis and failure of conventional DCR. External DCR was first as described long back by Totimore than a century ago.^{1,2} The endonasal approach was first introduced in 1983 by Caldwell.³ With the advent of nasal endoscope and functional endoscopic sinus surgery endoscopic DCR gained popularity in early 1990s.^{4,5} Mc Donough et al introduced endonasal DCR in its present form and during the last two decades results have been similar to external approach with reduced morbidity.⁶ Wormald described powered endoscopic DCR with full sac exposure.⁷ Although external DCR is still regarded as gold standard, endoscopic DCR is evolving an equally

effective alternative in the recent past. Lacrimal system starts with lacrimal gland situated in a pad of fat in the dorsal lateral part of orbital cavity and drain is in the conjunctival sac via many excretory ducts.⁸ The tear film serves as blanket of moisture over corneal surface preventing dryness of eye. Tears are spread over conjunctival lining by the blinking action of upper and lower eyelids, tears collect in medial canthal segment of eye where lacrimal duct is situated, orbicularis oculi acting on the medial canthal ligament including the lacrimal muscle, pump the lacrimal fluid in the upper puncta 30% and lower 70% during contraction stage of muscle.⁹ 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.⁹ Again contraction of orbicularis oculi and lacrimal muscle and also minimum contribution of

gravity compress the fluid collected in the sac to the nasolacrimal duct situated anterolateral wall of nose, passing ant to middle turbinate and opening in the inferior meatus of nose. Tarsal palates and tarsal fibres keep the puncta opening directed towards conjunctival lining in the lacrimal lake area.¹⁰ So epiphora can also result whenever eyelids is in abnormal positions. Blockage of NLD whether intraluminal or extraluminal causes decreased outflow of lacrimal fluid and resultant states of secretions causes inflammation of NLD as well as lower sac area. Recurrent blockage of NLD ultimately leads to complete adhesion and permanent blockage resulting in dacryocystitis. External DCR was the gold standard method even after the endoscopic approach had been described, because of limited technology at that time with a success rate ranging between 80 and 100%.¹¹ Endoscopic DCR has several advantages over external DCR like no external incision, shorter recovery time, maintenance of lacrimal pumping mechanism and lower postoperative morbidity.¹² Several modalities and adjuncts such as Kerrison punch, powered drill, and lasers have been described in endoscopic DCR with the aim of improving operative technique and success rate.¹¹ Both Kerrison punch and powered drill are widely used in endoscopic DCR with slowly expanding knowledge about the differences in operative details as well as in the surgical outcome.¹³

METHODS

The study was conducted on patients underwent endoscopic DCR procedure at DUPMC Jalgoan from March 2017 to July 2018. Total of 79 patients were included for the study including both males and females.

Exclusion criteria: Exclusion criteria are Posttraumatic lacrimal obstruction, congenital cases, cases with combined other sinonasal procedures (septoplasty, turbinate procedures, sinus surgery), cases were both drill and kerisson used together and cases with follow up less than three months.

Investigations: Detailed history, physical examination, endoscopic evaluation, and CT scan PNS. Diagnosis of

nasolacrimal duct obstruction was made by classical symptomatic presentation along with fluorescein dye test, and syringe test. All the operations were performed under local anesthesia. For the osteotomy part of surgery, two different instruments were used to remove the bone of maxillary frontal process. In the first group, the drill was used, while in the second group the Kerrison punch was utilized to get sufficient exposure of the lacrimal sac see Figure 1. Standard silicone stent was used to stent the lacrimal canaliculi. Operating time represents the duration from lateral nasal mucosal incision till the stent is secured. All the surgeries were performed or under direct supervision of two senior surgeons with comparable experience and training. Postoperatively, outpatient standardized follow up were scheduled at one week then 1, 3, 6 and 12 months. Further follow up was individualized as per patient care especially those requiring the other side to be done. Three criteria were used to judge success of operation, the patient expressed improvement of epiphora, a positive fluorescent test, and patent fistula during endoscopic examination. The independent two-sample t-test was used to assess significance between the variables and a value of $p < 0.05$ was taken as statistically significant with a confidence interval level of 95%.



Figure 1: Kerrisons punch and powered drill

RESULTS

A total of 68 endoscopic DCRs were performed on 61 patients. Thirty nine patients were women and 22 were men, with a mean age of 45 years (Table 1).

Table 1: Patients demographics.

| | | Total | Drill | Kerrisons punch |
|-----------------------|--------|----------|----------|-----------------|
| Age (years) | Range | 12-90 | 12-90 | 15-75 |
| | Mean | 46 | 48 | 41 |
| Gender | Male | 22 (36%) | 14 (42%) | 11 (36%) |
| | Female | 39 (64%) | 20 (58%) | 19 (64%) |
| Eye affected | Right | 31 (45%) | 16 (54%) | 14 (46%) |
| | Left | 35 (54%) | 14 (46%) | 17 (54%) |
| Stent removal (weeks) | Range | 0-48 | 0-48 | 1-20 |
| | Mean | 9.5 | 12 | 8 |
| Follow up (months) | Range | 3-24 | 3-24 | 3-19 |
| | Mean | 8.2 | 7.03 | 9.93 |

Table 2: Success rate and operating time according to the equipment of endoscopic DCR.

| | | Overall | Powered drill (n=33) | Non powered (n=35) | P value |
|-----------------------|-------|---------|-------------------------|-----------------------|---------|
| Success rate | | 88.10 | 90.10 | 86.77 | 0.825 |
| Operating time | Range | 22-205 | 22-205 | 25-120 | 0.0001 |
| | Mean | 98.65 | 135 | 80 | |

All the patients were local residents. All patients failed syringing and fluorescein testing. No surgery was done during the acute phase. 33 cases were done using drill and 35 utilizing Kerrison punch. Postoperative follow-up had a mean duration of 8.2 (range=3-24) months both groups. The mean time for stent removal was 9.5 weeks for both the groups. The overall success rate was 88.10% compared with 91.88% for Kerrison punch group. The mean operating time of surgery in the drill group was 135 min compared to 80 min in Kerrison punch group. Reported intraoperative and postoperative complications were all minor and included: intranasal synnache in six cases, stent accidental fall out in eight cases and eye/cheek bruise in six cases, nostril burn in three cases. There was no record of any major complications. Table 1 shows comparing the two groups it was not statistically significant ($p=0.53$).

DISCUSSION

External DCR was considered superior procedure compared to endoscopic approach classically, but in the last years there were significant improvements in the techniques of Endoscopic DCR.¹⁴ These improvements are the result of evolution in surgical instruments, improvement in endoscopic equipment and growing surgical experience.¹⁵ Osteotomy and creation of the bony lacrimal window is a crucial step during endoscopic DCR, a previous study reported that sometimes only 2% of the original stoma created intraoperatively will remain patent after healing process, but found no statistically valid correlation between the size of bony opening and the final size of healed intranasal ostium.¹⁶ Creation of a large bony stoma does not mean successful procedure since minimization of intraoperative tissue damage and postoperative scarring is another key point of success.¹⁷ Other literature, however showed a relationship between the size of bony ostium created during DCR surgery and the outcome of procedure.¹⁸ The creation of the bony window can be achieved by many technical variations including drill, Kerrison bone punch, radiosurgical electrodes, and lasers. Each instrument has been well described in literature with different results and consequences, but comparison between those instruments and surgical outcome is still non conclusive. The value of non-trumatic procedure is an emergency concept in endoscopic DCR. The main idea of the concept is to avoid using instruments and tools that increase the tissue trauma within the surgical field.¹⁹ Trauma could be in the form of excessive mechanical force as when using powered drill or can be transmitted heat from cautery and

laser assisted instruments. While using drill, temperature could reach up to 70°C at the tip during drilling with possibility of causing local edema and tissue reaction in postoperative period.^{20,21} The use of advanced tools like drills is not necessary to increase the success rate for endoscopic DCR in general.¹⁷ Our current study showed similar results, where procedure success rate among Kerrison punch group was 88.00% vs. 91.00% in powered drill group. Our results showed that there is a statistically significant difference between operating time for endoscopic DCR using the drill compared with Kerrison punch. Powered drill need more time for setup, irrigation during drilling, and suction after that to remove the generated bony dust, with meticulous use to prevent any injury to surrounding structures.²² Our overall rate of minor complications 18% between the powered versus non powered group showed no statistical difference and was similar to some previous studies on endoscopic DCR. A recent article from Germany by Horn et al, reported a minor complication rate of 10 percent.²³

CONCLUSION

No significant difference was found between the powered drill and non powered groups in terms of success rate and complications. Non powered Kerrison punch showed significant reduction in operating time compared to powered drill for endoscopic DCR

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REFERENCES

1. Roper-Hall MJ, editor. Stallards eye surgery.7. London: Butterworth; 1989: 138.
2. Mostter HP. Toti operation on lacrimal sac. *Laryngoscope.*1921;31:284.
3. Caldwell GW. Two new operation for obstruction of vation of canaliculi, and an incidental description of a new laryngeal probe. *Ny Med J.* 1983;57;581.
4. Stananberger H. Endoscopic endonasal surgery; concepts in treatment of recurring rhinosinusites, surgical technique. *Otolaryngeal Head Neck Surg.*1986;94(2):147-56.

5. Kennedy DW. Functional endoscopic sinus surgery technique. *Arch otolaryngol.* 1985;111(10):643-9.
6. McDonough M, Meiring JH. Endoscopic transnasal dacryocystorhinostomy. *J Laryngol Otol.* 1989;103(6):585-7.
7. Wormald PJ. Powered endoscopic dacryocystostomy. *Laryngoscope.* 2002;112:69-72.
8. Clemente D, editor. *Grays Anatomy of human body.* Philadelphia: Lea and Febiger; 1985.
9. Kassel EE, Schatz CJ. Lacrimal apparatus. In: Sompn, Curtain HD (eds). *Head and neck imaging, Vol 3. Chapter 10.* St. Louis: Mosby; 1996: 1129-1183.
10. Bartlett JD, Jaanus SD. Clinical ocular pharmacology. Butterworth-Heine, editor. St. Louis; 2008.
11. Ben Simon GJ, Joseph J, Lee S, Schwarcz RM, McCann JD, Goldberg RA. External versus endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction in a tertiary referral centre. *Ophthalmology.* 2005;112(8):1463-8.
12. Herzallah I, Alzuraiqi B, Bawazeer N, Marglani O, Alherabi A, Mohamed SK, et al. Endoscopic Dacryocystorhinostomy (DCR): a comparative study between powered and non-powered technique. *J Otolaryngol Head Neck Surg.* 2015;44:56.
13. Wormald PJ, Tsirbas AAFPSA, Fraco. Powered endoscopic dacryocystorhinostomy. *The lacrimal system.* New York: Springer; 2006: 223-235.
14. Wormald PJ. Powered endonasal dacryocystorhinostomy. *Laryngoscope.* 2002;112:69-71.
15. Gurler B, San I. Long term follow up outcomes of non-laser intranasal endoscopic dacryocystorhinostomy: how suitable and useful are conventional surgical instruments? *Eur J ophthalmol.* 2004;14(6):453-460.
16. Linberg JV, Anderson RL, Bumsted RM, Barreras R. Study of intranasal ostium external dacryocystorhinostomy. *Arch Ophthalmol.* 1982;100(11):1758-62.
17. Kim SY, Palik JS, Jung SK, Cho WK Yang SW. No thermal tool using methods in endoscopic dacryocystorhinostomy: no cauter, no drill, no illuminator, no more tears. *Eur Arch Otorhinolaryngol.* 2013;270(10):2677-82.
18. Welham RA, Wulc AE. Management of unsuccessful lacrimal surgery. *Br J ophthalmol.* 1987;711:52-7.
19. Cedere F, Denton P, Corona J. Endonasal dacryocystorhinostomy: a modified technique with preservation of the nasal and lacrimal mucosa. *Ophthalmic Plast Reconstr Surg.* 2010;26(3):161-4.
20. Badilla J, Dolman PJ. Cerebrospinal fluid leaks complicating orbital or oculoplastic surgery. *Arch Ophthalmol.* 2007;125(12):1631.
21. Chang DJ. The No Drill technique of anterior clinoidectomy. A cranial base approach to the paraclinoid and parasellar region. *Neurosurgery.* 2009;64(3):96-106.
22. Razavi ME, Noorollahian M, Eslampoor A. Non-endoscopic mechanical endonasal dacryocystorhinostomy. *J Ophthalmic vision Res.* 2011;6(30):219.
23. Horn IS, Tittmann M, Fischer M, Otto M, Dietz A, Mozet C. Endonasal nasolacrimal duct surgery: a comparative surgery of two techniques. *EUR Arch Otorhinolaryngol.* 2014;271(7):1923-31.

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