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Research Paper

Evaluation of The Surgical Outcome And Operating Time in Primary Endonasal Endoscopic Dacryocystorhinostomy (Dcr)

Medical Science

Keywords : Kerrison Punch , Powered Drill, Endoscopic Dacryocystorhinostomy Dcr

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ABSTRACT

This retrospective study describes and evaluates the surgical outcome and operating time of powered (drill) and non-powered (Kerrisons punch) in primary endoscopic dacryocystorhinostomy (DCR). Forty patients who had undergone primary endoscopic DCR at a tertiary care center, Skims Medical collage Bemina from last six years,for correction of lacrimal system obstruction were investigated. The surgical technique involves elevation of a nasal mucosal flap, full sac exposure using either power drill or kerrison punch,and shaping of the mucosal flap to cover denuded bone and juxtapose exposed sac mucosa. Both kerrions punch and drill are wildly used in endoscopic DCR with non –conclusive knowledge abut differences in operative details as well as on the outcome. The aim of this study is to compare the surgical outcome and operating time of powered (drill) and non-powered (Kerrisons punch) in primary endoscopic dacryocystorhinostomy (DCR). The mean duration of follow-up was 11.7 months. Procedure success rate among drill group was 94 % vs. 89 % in kerrsions punch powered drill group (p = .0.74), while complications for both groups were statistical not significant (p = 0.5). The mean operating time among kerrison punch group was significantly lower than in powered drill group (49 min vs. 84 min, p <0.05).Kerrison punch showed significant reduction in operating time when compared to powered drill for endoscopic DCR. No statistically significant difference was found between both groups regarding procedures' success rate and complication.

INTRODUCTION

Dacryocystorhinostomy (DCR), which has been performed for the past hundred years, is a surgical procedure by which lacrimal flow is diverted into the nasal cavity through an artificial opening made at the level of the lacrimal sac. The operation can be carried out using either an external or endonasal surgical approach. The external approach was popularized first and became the surgery of choice for most ophthalmologists, until recently (1). Since its first description by McDonough and Meiring (2), endoscopic DCR has been gaining popularity, largely due to technological advances in endoscopes and other modern instruments of rhinologic surgery (3).

The most common cause of a surgical failure in endoscopic DCR is obstruction of the neo-ostium by granulation tissue or synechia that forms post-operatively . Most previously-described endoscopic DCR procedures involve a small opening at the medial wall of the lacrimal sac, and sacrifice nasal and lacrimal sac mucosa during the procedure. Inadequate exposure of the lacrimal sac, due to limited resection of bone and excessive and unnecessary removal or injury of surrounding nasal and lacrimal sac mucosa, and, hence, exposure of bone around a small neo-ostium, appear to contribute to obstruction of the neo-ostium by granulation tissue (4,5). Several modalities and adjuncts such as kerrison punch ,powerd drill, and lasers have been described in endoscopic DCR with the aim of improving operative technique and success rate .Both kerrison punch and powered drill are widely used in endoscopic DC R with slowly expanding knowledge about the differences in operative details as well as in the surgical outcome (6).Our objective is to evaluates the surgical outcome and operating time of powered (drill) and non-powered (Kerrisons punch) in primary endoscopic dacryocystorhinostomy (DCR).

MATERIALS AND METHODS

At our institution, from last six years 40 patients 12 (30%) male and 28 (70%) female underwent endoscopic DCR. 22 (55%) left sides and 18 (45%) right sides for chronic epiphora. Patients' ages ranged from 10 – 60 years with a mean age of 35 years. All patients were evaluated by an ophthalmologist before surgery. Pre-operative evaluation consisted of a standard examination that included lacrimal irrigation, conventional dacryocystography, and/or dacryoscintigraphy. The nasal cavity was examined and the need for additional nasal surgery (i.e., septoplasty, middle turbinate reduction) also was determined pre-operatively. Twenty four cases were done using powered drill technique and sixteen utilizing kerrison punch. Postoperative follow-up had a mean duration of 11.7 (range 6–18) months both groups.

Patient's demographics & descriptive statistics

		Overall		Instrument used			
		Powered Drill		Kerrison punch			
Age	Range	10–60 Years		10–60 Years		10-60 Years	
	Mean	35-years		38-Years		41- Years	
Gender	Male	12	30%	08	20%	04	10%
	Female	28	70%	16	40%	12	30%
Lateral-ization	Right	18	45%	10	25%	08	20%
	Left	22	55%	14	35%	08	20%
Geo-graphi-cal	Urban	06	15%	04	10%	02	05 %
	Rural	34	85%	20	50%	14	35%

The overall success rate was 92%.The success rate for powered drill group was

94%, compared with 89%, for kerrison punch group. The mean operating time of surgery in the powered drill group was 84 min compared to 49 min in the kerrison punch group.

Procedure success and operating time according to the equipment of endoscopic DCR

		Overall(n = 24)	Powered drill (n = 16)	Kerrison punch	p value
Success rate		92%	94%	89%	0.72
Operating time (Minutes)	Range	40-180	54-180	40-86	<0.05
	Mean	64	84	49	

Reported intraoperative and postoperative complications were all minor and included intranasal synechiae in three cases, eye/cheek bruise in four cases, and nostril burn in two cases. Com-

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paring the two groups it was not statistically significant (p = 0.5).

Minor complications of endoscopic DCR

	Powered Drill	Kerrison punch
	(n = 24)	(n = 16)
	n	n
Intranasal synechiae	2	1
Eye/Cheek bruise	3	1
Nostril burn	2	0
Total	7	2

DISCUSSION

For DCR, the endoscopic approach has several advantages over the external approach: 1) it is less traumatic and, thus, shortens the hospital stay; 2) a facial scar is avoided; 3) there is no disruption of the medial canthal tendon, which consequently enables preservation of lacrimal pump function; 4) access to the sac is direct through the lacrimal bone, avoiding double-side dissection of the sac; and 5) it is excellent in controlling tissue and, thus, results in less trauma to the nasal mucosa. Conversely, disadvantages are: 1) the surgical field may be limited because of bleeding; 2) there is an occasional need for septoplasty or removal of the middle turbinate; and 3) there appears to be increased likelihood of granulation tissue formation, resulting in stenosis and, thereby, obstruction of the opening. Previously described, conventional endoscopic DCR techniques generally involved limited opening of the sac, yielding frequent obstruction of the neo-ostium by granulation tissue, an outcome which explains the higher failure rates (7). 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 intra-operatively will remain patent after healing process; but found no statistically valid correlation between the size of the bony opening and the final size of the healed intranasal ostium [8]. 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 (7, 8). Other literature, however, showed a relationship between the size of the bony ostium created during DCR surgery and the outcome of the procedure. The creation of the bony window can be achieved by many technical variations including powered drill, kerrison bone punch, radio-surgical 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(9)

The value of non-traumatic procedure is an emerging concept in endoscopic DCR. The main idea of this concept is to avoid using instruments and tools that might increases the tissue trauma within the surgical field [10]. Trauma could be in form of excessive mechanical force as when using powered drill or can be transmitted heats from cautery and laser assisted instruments. While using powered drill, temperature could reach up to 70 °C at the tip during drilling with possibility of causing local edema and tissue reaction in the postoperative period [11, 12]. Avoiding trauma in this narrow anatomical site will increase chances of first-intention healing process with less formation of scarring and granulation tissue, which ultimately may reduce risk of closure of previously surgically opened lacrimal sac and soft tissue window . In addition, presence of the drill's rotating shaft within narrow surgical corridor may add some risk to damage nearby tissue . Other disadvantages of powered drills or other high techniques instruments include the possibility of damage to orbital wall or lamina papyracea leading to orbital fat prolapse or penetration to the ethmoidal sinus or skull base with CSF leakage [11]. Nevertheless, with favorable result of non-traumatic endoscopic DCR in theory, published results in the literature showed comparable outcome for drill and punch endoscopic DCR [13–14].

The use of advanced tools like drills is not necessary to increase the success rate for endoscopic DCR in general . Our current study showed similar result, where procedure success rate among kerrison punch group was 89% vs. 92% in the powered drill group (p = 0.74) .summary of some previous studies success rates.

Comparison between success rates of our study and previous similar studies

Author	Country	Instrument used	Success rate (%)
Ben Simon, et al. [6]	USA	Kerrison punch	84
Kim, et al. [8]	Korea	Kerrison punch	90.5
Codere, et al. [10]	Canada	Kerrison punch	98
Graz-Cabrerizo, et al. [13]	Spain	Kerrison punch	83
Naraghi, et al. [14]	Iran	Kerrison punch	95
Current study	Skims Medical Collage Bemina J&K India	Kerrison punch	89
		Drill	94

Operating time is a valuable factor in health care economics, ranges approximately from 750 to 2200 dollars per hour operating time in USA & Europe (15). In addition, less operating time may accomplish increased surgical efficiency, volume of performed cases, and reduction of patient's waiting list, especially in high volume setting centres 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 suctioning after that to remove generated bony dust, with meticulous use to prevent any injury to surrounding vital structures (16).

Our overall rate of minor complication between the powered versus non powered group showed no statistical difference and was generally similar to some previous studies on endoscopic DCR . A recent article from Germany by Horn et al. reported a minor complication rate of 10 % (17). Rahman et al. reported a minor complication rate of 23.8 % (18) The limitations of this study are mainly the retrospective design of the study and the moderately small sample size.

Conclusion

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

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