ORIGINAL ARTICLE

Efficacy of Local Anesthesia during External Dacryocystorhinostomy with 1:200,000 Adrenaline Versus 1:50,000 Adrenaline

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ABSTRACT

Purpose: To compare the efficacy of local anesthesia during Dacryocystorhinostomy using xylocaine with 1:200,000 adrenaline versus with 1:50,000 adrenaline.

Study Design: Quasi experimental study.

Place and Duration of Study: DHQ Hospital, Dera Ismail Khan, from January to December 2019.

Material and Methods: We compared two different formulations of local anesthesia during Dacryocystorhinostomy in terms of efficacy of per-operative pain, bleeding and effectiveness of anesthesia. 50 patients fulfilling our inclusion criteria were divided in two groups each containing 25 patients. In group A patients underwent Dacryocystorhinostomy under local anesthesia using Bupivacaine and the commercially available xylocaine with 1:200,000 adrenaline while patients in the group B underwent surgery using Bupivacaine, Xylocaine with 1:50,000 adrenaline. Per-operative pain, bleeding and effectiveness of anesthesia were measured on a numeric scale. Means of pain score, bleeding score and anesthesia effectiveness score were computed and were compared.

Results: In group A, 84% patients were females and 16% were male. In group B, 80% were females and 20% were males. Mean age of patients was 41.04 ± 6.84 and 40.80 ± 8.563 years in group A and B respectively. Mean pain score in group A was 2.20 while in group B was 1.72. Mean bleeding score in Group A was 1.84 while in group B was 1.24. Mean Anesthesia effectiveness score in group A was 2.08 while in group B was 2.76.

Conclusion: Local anesthesia with concentrated adrenaline (in patients with no cardiac disease or other major co-morbidity) provides a better control of per-operative pain, bleeding and better anesthesia.

Key Words: Dacryocystorhinostomy, Epiphora, Xylocaine, Bupivacaine, Anesthesia, Nasolacrimal duct obstruction, Adrenaline, Epinephrine.

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INTRODUCTION

Epiphora is one of the most common complaints presenting to the ophthalmology department, and one of the most common reasons for referral to the oculoplastic units. Persistent epiphora can be attributed to reflex tearing or poor tear outflow. The latter can be associated with naso-lacrimal duct obstruction (NLDO) which can be congenital, acquired or idiopathic[1]. Treatment of epiphora due to congenital NLDO is therapeutic lacrimal probing if spontaneous resolution does not occur beyond nine month of age[2].

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Unlike congenital nasolacrimal duct obstruction in which lacrimal probing and syringing has a high success rate, acquired nasolacrimal duct obstruction in adults gets minimal benefit from probing and syringing in terms of treatment[3]. Most of the patients need surgical intervention to overcome the obstruction[4].

External Dacryocystorhinostomy (DCR) was introduced in 1904 by a French Ophthalmologist, AdeoToti[5]. Since then different ophthalmologists have developed various techniques for this procedure. External DCR remains the most commonly performed surgery for this purpose and is considered a gold standard technique[6]. Success rate of external DCR is upto 91% as compared to 63 – 75% for endonasal DCR[7].

External DCR is not performed routinely in private sector hospitals. This procedure is mostly performed in public sector hospitals. To deal with large number of patients with complaint of epiphora presenting to public sector hospitals, it is often required to perform this procedure in local anesthesia (LA). There are certain drawbacks of performing this procedure in LA[8]. The most problematic per-operative complication during external DCR is bleeding from the highly vascular nasolacrimal apparatus, which prolongs the surgical time and reduces patient comfort. Another troublesome complication during the surgery is ineffective analgesia. To overcome these complications various techniques have been employed like use of a vasoconstrictive agents e.g. adrenaline, raising the head end of the table, good nasal packing or using cautery[9]. Use of adrenaline along with the local anesthetic has beneficial effects in terms of reduced per-operative bleeding and more concentration of the local anesthetic at the place of interest[10].

In this study we intend to compare two different concentrations of adrenaline used along with local anesthetic, in terms of their beneficial outcomes in the form of reduced pain, per-operative bleeding and effectiveness of anesthesia.

MATERIAL AND METHODS

This study started after approval from the ethical committee of DHQ Hospital Dera Ismail Khan. 50 patients presenting to the outpatient ophthalmology department who were diagnosed as cases of primary nasolacrimal duct obstruction were selected. Patients suffering from any kind of cardiovascular disease, acute infection, having history of previous DCR and those not willing to participate in the study or refusing surgery under local anesthesia were excluded from our study. All the patients were adults from 18-60 years old. Patients participating in our study were divided in two groups. First 25 patients booked for DCR surgery were allocated to group A, next 25 patients during study period were allotted to group B.

All the patients had complete ophthalmic examination before surgery. General physical health of the patients was also assessed in terms of hypertension and diabetes. Those having uncontrolled hypertension and poor glycemic control were excluded from our study.

Patients in group A underwent DCR under local anesthesia i.e. 5 ml anesthetic formulation made by 2.5 ml of 2% Bupivacaine and 2.5 ml of commercially available 2% xylocaine, with 1:200,000 adrenaline (0.005 mg/ml); whereas those in group B had their surgery done under local anesthesia with 2.5 ml of 2% Bupivacaine, 2.4 ml of 2% Xylocaine and 0.1 ml of 1:50,000 adrenaline (0.02 mg/ml). Injection of local anesthetic was given at three points; Supratrochlear block, infra-trochlear block and 10 mm from medical canthus. No sedative or Intra muscular analgesics were used in any case.

Except for the concentration and formulation of local anesthesia, there was no difference in the surgical technique in both groups and all surgeries were performed by the same surgeon. Per-operative pain, bleeding and effectiveness of anesthesia were noted in both the groups and were compared. Scoring of Pain, bleeding and anesthesia effectiveness was done using the scoring table shown below (table 1). Pain was assessed on a numeric scale by asking the patient during the procedure and postoperatively. Per-operative bleeding was scored on the basis of number of gauze packs (one gauze pack contain 10 gauze pieces) used during procedure. Effectiveness of anesthesia was measured in terms of number of doses required during the surgery. Data was recorded in excel spreadsheets and analyzed using SPSS version 20. Descriptive statistics were used to describe the data. Means of pain score, bleeding score and anesthesia effectiveness score for both groups were compared.

RESULTS

In group A, 21 (84%) patients were females and 4 (16%) were males. In group B 20 (80%) patients were

females and 5(20%) were males. Mean age of patients in group A was 41.04 ± 6.84 years and in group B was 40.80 ± 8.563 years.

Epiphora with discharge was the chief presenting complaint in the patients of both the groups. Regurgitation test was positive in all the patients of both the groups. Intra operative complications were failure to suture nasal mucosa and lacrimal sac flaps in one patient of group A because of damage to lacrimal mucosa during osteotomy. Most common post-operative finding was periorbital swelling followed by ecchymosis. Descriptive statistics of pain, bleeding and effectiveness of anesthesia scores of the group A and B are shown in table 2.

Table 1: *Scoring of pain, bleeding and effectiveness of anesthesia.*

Grade of pain	**Score**
No pain	0
Mild pain	1
Moderate pain (controllable)	2
Severe pain (un- controllable)	3
Bleeding	**Score**
Minimal (2 gauze packs used)	1
Moderate (2-5 gauze packs used)	2
Massive (more than 5 gauze packs used)	3
Effectiveness of anesthesia	**Score**
No additional dose required	3
Control with 1 additional dose	2
Control with >1 additional dose	1

Table 2: *Pain, bleeding and anesthesia in group A and B.*

	Group A					**Group B**			
	N	**Min**	**Max**	**Mean**	**Std. Dev**	**Min**	**Max**	**Mean**	**Std. Dev**
Pain	25	1	3	2.20	.500	1	3	1.72	.542
Bleeding	25	1	3	1.84	.473	1	2	1.24	.436
Anesthesia Effect	25	1	3	2.08	.640	2	3	2.76	.436

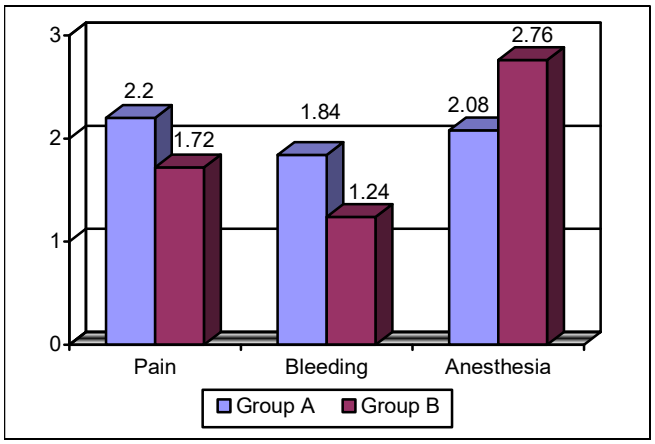

Fig. 1: Difference in pain, bleeding and anesthesia between group A and B.

DISCUSSION

External DCR is the gold standard procedure for NLD blockage in adults. This procedureis not performed routinely in private sector hospitals. Because of this reason there is increase burden of NLD blockage patients presenting to public sector hospitals. Because of long surgical booking time and increased burden of patients, it is often required to perform this procedure in local anesthesia (LA).

Xylocaine 1%–2% without and with adrenaline (1:100,000 or 1:200,000) is available commercially. It is the local anesthetic most commonly used for surgical procedures[11]. Addition of adrenaline decreases systemic absorption and also provides good anesthesia and better control of bleeding[11]. Xylocaine is mostly given in a preparation combined with Bupivacaine, which is a long acting local anesthetic[12].

It has been observed by Shoroghi *et al.* that increasing the concentration of adrenaline during dermatologic surgery reduces the surgical time and also reduces the per-operative bleeding[13]. Adrenaline in a concentration of 10µg/mL (1:100,000) in the local anesthetic is under use for different oculoplastic procedures[14]. There is no enough evidence available on its use in a concentration of 20 µg/mL (1:50,000) in ophthalmic surgery.

Adrenaline in a concentration of 20 µg/mL (1:50,000) is used for many day care dental procedures. The maximum recommended dose (MRD) of adrenaline in LA formulations for healthy adults is 0.2 mg per visit[15]. Based on this recommendation, the maximum safe dose of Xylocaine in mL with adrenaline 20µg/mL (1:50,000), is 10 mL[16]. In our study 6 patients (n = 25) in group B received 10 mL of

xylocaine w/adrenaline 20 µg/mL (1:50,000). No patient required more than 1 dose of local anesthetic.

It is important to mention that adrenaline has a relatively narrow therapeutic window[17]. Adverse effects which can occur include restlessness, agitation, anxiety, tremulousness, headache, dizziness, pallor, palpitation, and tachycardia. These side effects have been reported even with the administration of recommended therapeutic doses[18]. In our study no major side effects were noted. Complaint of headache and tachycardia was noted in a few patients, but it was attributed to be post-surgical effect.

In high-risk cardiac patients lower dose of adrenaline is recommended. It ranges from 0.02 – 0.05 mg[19,20]. In our study patients with cardiac disease were excluded.

Patients in group B in our study had better analgesia as compared to group A. This resulted in short duration of surgery and more patient satisfaction. The control of bleeding was also better in group B, which provided benefit in terms of better tissue identification and surgical results. There was also low incidence of post-operative periorbital ecchymosis in group B patients.

Limitation of this study was that it was a single centre study with small sample size. Patients with co-morbid conditions were excluded in this study. Multi-centre studies with large sample size are required to report safety profile of adrenaline use is high concentration with local anesthesia.

CONCLUSION

Use of more concentrated adrenaline during external DCR is an effective measure in terms of reducing per-operative complications in patients who have no significant contraindications to the use of concentrated adrenaline.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board.

Conflict of Interest

Authors declared no conflict of interest.

Authors' Designation and Contribution

Dr. Muhammad Sharjeel; Senior Registrar: *Data collection, manuscript review.*

Dr. Mehr-un-Nisa; Postgraduate Trainee: *Manuscript writing and review.*

Dr. Usama Iqbal; Postgraduate Trainee: *Manuscript writing, Data analysis, Data entry.*

Dr Rafay Razzaq Wattoo; Consultant Ophthalmologist: *Manuscript writing, Literature review, final review.*

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