A COMPARATIVE STUDY OF EXTERNAL DACRYOCYSTORHINOSTOMY USING SINGLE FLAP, DOUBLE FLAP AND INTRACYSTIC IMPLANT (PAWAR) DACRYOCYSTORHINOSTOMY TECHNIQUES

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INTRODUCTION

Dacryocystitis is a common eye disease in ophthalmic practice. The condition is usually unilateral and occurs secondary to obstruction of the nasolacrimal duct. Patients present with watering of the eyes and swelling in the lacrimal sac area due to accumulation of mucopurulent or purulent discharge. Chronic tear stasis or secondary infection occurring in this condition can lead to acute exacerbation of chronic dacryocystitis, mucocele, chronic conjunctivitis, corneal ulcer, endophthalmitis, orbital cellulitis, lacrimal abscess and fistula.

External Dacryocystorhinostomy is established as an effective surgical treatment for complete nasolacrimal duct obstruction in adults consistently yielding success rate in excess of 90%\(^2\). Dacryocystorhinostomy is the operation of choice for relieving symptoms because it enables drainage of tears to bypass the obstruction in the nasolacrimal duct. The failure rate is reported to be 11-28% with average being 9.4% which necessitates improving the existing technique. However various modifications have been developed with the goal of attaining the best possible post-surgical outcomes\(^3\). Failure rate in external DCR is attributed to many factors like common canalicular obstruction, scarring within the anastomosis, closure of osteotomy site by the membrane, adhesion or synechiae formation between ostium and middle turbinate or a deviated nasal septum or malposition of the ostium. The two most frequent causes of DCR failure are common canalicular obstruction and closure of osteotomy site. These common causes of failure have been quoted as end results of fibrous tissue growth, scarring and granulation tissue formation which sometimes forms an occluding membrane obstructing the new drainage channel. Therefore some authorities postulated that, intubation of the nasolacrimal system during DCR, may prevent closure or scarring of the osteotomy or stenosis of the common canaliculus and so improve the success rate\(^5-10\).

In external dacryocystorhinostomy various techniques may be used but in this study we compared the outcomes of the 3 techniques –

1. Single flap technique
2. Double flap technique
3. Using intracystic implant (PAWAR)

Dacryocystorhinostomy (DCR) creates a fistula between the lacrimal sac and nasal cavity\(^15\). Lacrimal passage operation can be traced back to the sixth ruler of the first dynasty of Babylon in 1800 B.C.\(^16\). In 1904 AddeoToti was the first to propose the technique of external DCR, his steps were to expose the lacrimal sac by an external incision, remove the medial wall, punch out a piece of bone with hammer and chisell, resect a corresponding area of nasal mucous membrane and sew up the external wound\(^19, 20\).

**Keywords:** DCR – Dacryocystorhinostomy, Intracystic Implant, LPI – Lacrimal passage irrigation, Epiphora

MATERIALS AND METHODS

**Study Design** – Prospective and comparative study

**Study Period** – November 2013 – October 2015

**Place of Study** – Department of Ophthalmology, VSS Medical College And Hospital, Burla

**Inclusion Criteria** –
- Patients diagnosed with chronic dacryocystitis having more than 3 years of age

**Exclusion Criteria** –
- Patients having contraindications for DCR like
  - Granulomatous condition of sac (tuberculosis, syphilis, sarcoidosis etc)
- Malignancies of sac or involvement of sac in malignancy
- Rhinosporidiosis of sac
- Nasal condition like atrophic rhinitis, severe DNS
- Blocked canaliculus and stenosed punctum

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**METHODOLOGY SAMPLE SIZE**

79 cases in 77 patients were distributed in 3 groups randomly –

**Group 1** – 30 cases in 29 patients in single flap group

**Group 2** – 30 cases in 30 patients in double flap group

**Group 3** – 19 cases in 18 patients in Pawarintracystic implant group

All the selected patients underwent a detailed assessment with standard interview on medical history and ocular examination. Lacrimal passage irrigation test was performed.

The patients were informed about the procedures, all the possible outcomes and complications. Written consent of the patient was taken. All the patients were evaluated by the otorhinolaryngologists and their advice was taken regarding the condition of the nasal cavity and nasal mucosa. Investigations like complete hemogram, fasting and post prandial blood glucose, serum HIV, HBsAg, HCV, bleeding time & clotting time tests were done.

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**ANAESTHESIA**

Local infiltrating anaesthesia is preferred but in case of paediatric and uncooperative patients general anaesthesia was given. Nasal pack was given in all the patients. All the patients were given injection tranexamic acid preoperatively.

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**INCISION**

Incision site was marked with methylene blue prior to giving incision. A curved incision was made 15 mm long beginning just below the medial palpebral tendon and 3 mm to the nasal side of medial canthus, passing vertically for 5 mm, then curving downwards and laterally along the anterior lacrimal crest.

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**DISSECTION OF SAC**

Incision is deepened by splitting orbicularis muscle so that the whole of anterior lacrimal crest is well exposed to view. Cat paw retractors were applied to have a wide field of view and to secure hemostasis. With the help of lacrimal sac dissector the sac was separated and was guarded by lacrimal sac guard to avoid any injury to the sac. With the help of the bone gouge the periosteum was elevated from the lacrimal fossa and 3 mm anterior to the anterior lacrimal crest. The bony ostium to be formed was marked by trephine with pin and then formed by trephine without pin. The bony ostium was enlarged by the bone punch and was extended posteriorly upto posterior lacrimal crest; upwards upto the upper margin of the medial palpebral tendon and downwards to the opening of nasolacrimal duct. The edges were trimmed in a regular fashion for smooth margin of bony ostium. Care was taken not to injure the nasal mucosa.

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**PREPARATION OF SAC AND MUCOSAL FLAPS**

Double Flap Technique - A Bowman’s probe passed through the upper canaliculus indicates the position of common canaliculus and the related part of the medial sac wall. Through the punctum viscoelastic substance mixed with trypan blue was injected in the sac to distend it. A vertical full thickness incision was given on the medial wall of the sac with 15 no. BP blade or crescent knife. Leakage of the visco elastic substance mixed with trypan blue indicated full thickness incision on the sac wall. A probe was passed into the lumen of sac to verify its patency and to separate any intramural adhesions. Medial wall was incised horizontally near fundus and below to form both anterior and posterior flaps.
The nasal mucosa was incised horizontally in the upper and lower limit of the oval opening of ostium. These horizontal incisions were joined by a vertical incision which was made 4 mm anterior to posterior lacrimal crest forming anterior and posterior flaps.

Single Flap Technique – In this technique the vertical full thickness incision was given on the medial wall posteriorly such that after giving two horizontal incisions as above a single large anterior flap was prepared. The anterior flap was made by giving incision in the same way as that of double flap technique. The small posterior flaps were trimmed.

The horizontal incisions on the nasal mucosa was given the same way as in double flap technique. The vertical incision was given close to the posterior margin of the bony ostium and a single large anterior mucosal flap was lifted. The anterior flap was prepared giving the same incision like in double flap technique and excising the posterior flap thus leaving behind only anterior flap.

In double flap technique the posterior nasal flap was sutured with the posterior lacrimal sac flap with 6’0 vicryl. The anterior flaps of both nasal and lacrimal mucosa was sutured with the vicryl and the mucosal tunnel was formed.

In single flap technique either the large single flaps prepared were sutured with each other with 6’0 vicryl. In the other case after excising the posterior flaps the remaining anterior flaps were sutured with 6’0 vicryl.

The patency of the tunnel formed in both techniques was checked by lacrimal syringing with normal saline and looking for oozing of the saline through the wound.

The wound was closed in anatomic layers with 6’0vicryl for muscle and 5’0 silk for skin. Proper hemostasis was secured. Nasal pack was kept and removed after 24 hours.

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PAWARINTRACYSTICIMPLANT DACRYOCYSTORHINOSTOMY TECHNIQUE35,36
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The positioning, anaesthesia and the skin incision is same as that of conventional DCR (single flap and double flap technique). The sac is exposed and a vertical incision around 3 - 4 mm long is made in the anterior wall of the lacrimal sac. The ostium is created by using any of the instruments described above, in the lower part of the lacrimal fossa through the posterior wall of the sac. The instrument passes through the posterior wall of the lacrimal sac, lacrimal bone and nasal mucosa. The instrument points towards posterior, medial and lower direction. A sterilized implant is loaded on the introducer and the implant is introduced through the anterior opening of the lacrimal sac in to the nasal cavity negotiating the postiornasomedical wall of the lacrimal sac and newly fashioned ostium. It is placed in such a way that it points towards posterior, medial and lower directions similar to the direction of mastoid gouge. The wider portion (collar) lies in the cavity of the sac and the other end in the middle meatus or lower meatus of the nose. The position of the implant was checked by normal saline injected through the funnel of the implant and observing air bubbles from the nostril via the Implant. The position of the implant was confirmed visually also by inspecting the nostril by using nasal speculum. The pointed portion of the implant should project in the nasal cavity. The sac and surgical field is irrigated with normal saline. The anterior wall of sac is closed with 6’0 vicryl. The wound is closed with 6’0 vicryl in layers. The function of implant may be tested immediately after the closure on table itself. The punctum is dilated using punctum dilator and syringing performed using 2 CC syringe with lacrimal canula and normal saline.

In all the cases (single flap, double flap and intracysticimplant ), the operating time was calculated using a watch from skin incision to skin closure. The amount of bleeding was calculated by counting the numbers of blood soaked gauge pellets after the wound closure.

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POSTOPERATIVE CARE
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Patient is kept on intravenous ceftriaxone and intramuscular diclofenac for 3 days. Topical antibiotic ointment was applied locally on the wound for one week. Decongestant (xylometazoline) nasal drops were instilled in the nostril of operated side 3 times in a day for one week.

On postoperative day 1 surgical dressing was done for all the operated patients. The nasal packs were removed gently. Syringing was done with normal saline and antibiotic solution and patency of the lacrimal passage was checked.

Syringing was done further on day 3, day 7, 1 month, 3 month and 6 month and patency of the lacrimal passage was noted. On every visit patients were asked about the relief of symptoms.
STATISTICAL ANALYSIS

Categorical patients are expressed as number of patients and percentage of patients and compared across the 3 groups using Chi Square Test for Independence of Attributes. Continuous variables are expressed as Mean Standard Deviation and compared across the 3 groups using ANOVA test. The statistical software SPSS version 20 has been used for analysis. An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it has been considered as significant.

OBSERVATION

TABLE 1 - Age Distribution

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Minimum age in years</th>
<th>Maximum age in years</th>
<th>Mean age in years</th>
<th>Std. Deviation</th>
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<td>79</td>
<td>7</td>
<td>61</td>
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TABLE 2 - Sex Distribution

<table>
<thead>
<tr>
<th>Sex</th>
<th>Single Flap (%)</th>
<th>Double Flap (%)</th>
<th>PICI (%)</th>
<th>Total (%)</th>
<th>SF vs DF</th>
<th>SF vs PICI</th>
<th>DF vs PICI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SF</td>
<td>DF</td>
<td>SF</td>
<td>DF</td>
<td>SF</td>
<td>DF</td>
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<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>F</td>
<td>21 (70)</td>
<td>17 (56.67)</td>
<td>10 (52.63)</td>
<td>48 (60.76)</td>
<td>0.284</td>
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<td>M</td>
<td>9 (30)</td>
<td>13 (43.33)</td>
<td>9 (47.37)</td>
<td>31 (39.24)</td>
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<td></td>
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<tr>
<td>Total</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>19 (100)</td>
<td>79 (100)</td>
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### TABLE 3 – Amount Of Intraoperative Bleeding

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<tr>
<th>Intra Operative Bleeding</th>
<th>Type Of Operation</th>
<th>Total (%)</th>
<th>SF vs DF</th>
<th>SF vs PICI</th>
<th>DF vs PICI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Flap (%)</td>
<td>Double Flap (%)</td>
<td>PICI (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(MILD)</td>
<td>(MOD)</td>
<td>(SEV)</td>
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<td></td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>13 (68.42)</td>
<td>13 (16.46)</td>
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<tr>
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<td>28 (93.33)</td>
<td>24 (80)</td>
<td>6 (31.58)</td>
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<td>2 (6.67)</td>
<td>6 (20)</td>
<td>0 (0)</td>
<td>8 (10.13)</td>
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<tr>
<td>Total</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>19 (100)</td>
<td>79 (100)</td>
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### TABLE 4 – Post Operative Day 1 LPI Findings

<table>
<thead>
<tr>
<th>D1 LPI</th>
<th>Type Of Operation</th>
<th>Total (%)</th>
<th>SF vs DF</th>
<th>SF vs PICI</th>
<th>DF Vs PICI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Flap (%)</td>
<td>Double Flap (%)</td>
<td>PICI (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
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<td>1 (5.26)</td>
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<tr>
<td>PRESENT</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>15 (78.95)</td>
<td>75 (94.94)</td>
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<td>REG</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (15.79)</td>
<td>3 (3.8)</td>
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<tr>
<td>Total</td>
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<td>30 (100)</td>
<td>19 (100)</td>
<td>79 (100)</td>
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### TABLE 5 – POSTOPERATIVE DAY 3 AND 7 LPI FINDINGS

<table>
<thead>
<tr>
<th>D3 and 7 LPI</th>
<th>Type Of Operation</th>
<th>Total (%)</th>
<th>SF vs DF</th>
<th>SF vs PICI</th>
<th>DF Vs PICI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Flap (%)</td>
<td>Double Flap (%)</td>
<td>PICI (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>2 (6.67)</td>
<td>0 (0)</td>
<td>1 (5.26)</td>
<td>3 (3.8)</td>
<td>0.150</td>
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<tr>
<td>PRESENT</td>
<td>28 (93.33)</td>
<td>30 (100)</td>
<td>15 (78.95)</td>
<td>73 (92.41)</td>
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<tr>
<td>REG</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (15.79)</td>
<td>3 (3.8)</td>
<td></td>
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<tr>
<td>Total</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>19 (100)</td>
<td>79 (100)</td>
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### TABLE 6 – Post Operative 6 Month LPI Findings

<table>
<thead>
<tr>
<th>6 MNTH LPI</th>
<th>Type Of Operation</th>
<th>Total (%)</th>
<th>SF vs DF</th>
<th>SF vs PICI</th>
<th>DF Vs PICI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Flap (%)</td>
<td>Double Flap (%)</td>
<td>PICI (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1(5.27)</td>
<td>1(1.26)</td>
<td>0.554</td>
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<tr>
<td>PRESENT</td>
<td>28 (93.33)</td>
<td>29 (96.67)</td>
<td>13(68.42)</td>
<td>70(88.61)</td>
<td></td>
</tr>
<tr>
<td>REG</td>
<td>2(6.67)</td>
<td>1(3.33)</td>
<td>5(26.31)</td>
<td>8(10.13)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30(100)</td>
<td>30(100)</td>
<td>19(100)</td>
<td>79(100)</td>
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</table>

### TABLE 7 – Operating Duration

<table>
<thead>
<tr>
<th>Type Of Operation</th>
<th>Single Flap</th>
<th>Double Flap</th>
<th>PICI</th>
<th>Mean ± Std. Deviation</th>
<th>SF vs DF</th>
<th>SF vs PICI</th>
<th>DF vs PICI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative Time In Mins</td>
<td>42.83 ± 6.65</td>
<td>57.33 ± 8.28</td>
<td>30.26 ± 6.12</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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</table>

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**DISCUSSION**

In the present study of ‘A Comparative Study of External Dacryocystorhinostomy Using Single Flap, Double Flap and Intracystic Implant (Pawar) Dacryocystorhinostomy Techniques’, 79 eyes of 77 patients with Epiphora or chronic dacryocystitis presenting or
referred to Department of Ophthalmology at VSS Medical College and Hospital, Burla Sambalpur, from November 2013 to October 2015 were selected randomly and divided into three groups

**Group 1** – 30 cases in 29 patients undergoing single flap dacryocystorhinostomy

**Group 2** – 30 cases in 30 patients undergoing double flap dacryocystorhinostomy

**Group 3** – 19 cases in 18 patients undergoing Pawarintracystic implant dacryocystorhinostomy

**AGE DISTRIBUTION**

In the present study, maximum number of cases belonged to the age group of 30-60 years (88.60%). The average mean age of our study was 42.47±11.11 years.

Saipur et al3 in their study included patients of overall age group 18-82 years with the average mean age of 41 years3. Zaman et al26 in a study of 120 patients had most of the patients in the age group of 40-60 years.

Baldeschi, Nardi et al25 had studied on 45 consecutive patients (mean age 62 years, range 34–79), presenting with unilateral obstruction of the lacrimal drainage system distal to the internal ostium of the common canaliculus.

In this study mean age of patients in single flap, double flap and Pawarintracystic implant group is 44.73 ± 7.71, 42.07 ± 10.6 and 39.53 ± 15.51 years respectively. It is very clear from the above comparison that chronic dacryocystitis is a disease of predominantly older age group.

The difference of our study from Baldeschi et al study is most probably due to the fact that they have taken population >34 years and not included younger population.

**SEX DISTRIBUTION**

In the present study, females outnumbered the males in all the 3 groups and overall the female to male ratio is 1.55.

NLDO is more common in middle aged and elderly females. It has been suggested that the menstrual and hormonal fluctuations and a heightened immune status as factors that may contribute to the disease process. These may explain the prevalence in the middle-aged and elderly females. Hormonal changes that bring about a generalized de-epithelisation in the body may cause the same within the lacrimal sac & duct 68.

An already narrow lacrimal fossa in women predisposes them to obstruction by the sloughed off debris. Axial maxillo-facial CT scans showed women having a smaller bony diameter at the level of lower fossa and middle naso lacrimal duct compared to men. The adult inferior bony fossa increased in size with age in both men and women, while middle naso-lacrimal duct increased in size in men only68.

Duggal P, Chakravorty S, Azad RK, Mohan C in their study showed that 87.8 % of the patients undergoing DCR were females with males forming a meager 12.1%, which is a significant difference33.

Zaman et al.26 in their study of 120 patients had female to male ratio of 2.07.

**SUCCESS RATE**

In the present study the procedure is successful when the lacrimal drainage pathway is patent at 6 month postoperatively and there is subjective relief of preoperative symptoms. In this study the lacrimal passage irrigation is done on postoperative day 1, day 3, day 7, 1 month, 3 month and 6 month. The trend of patency of the pathway is observed. The final conclusion of outcome is decided after 6 months by asking the patients about the relief of preoperative symptoms and performing the lacrimal passage irrigation test.

On day 1 LPI, all cases in single flap and double flap group have patent lacrimal drainage pathway. However in Pawarintracystic implant group 3(15.79%) cases has regurgitation of clear fluid through the upper and same punctum and 1(5.26%) patient had partially patent pathway as little amount of clear regurgitant came through the upper punctum and patient also felt the postnasal drip. On
comparing the outcomes between the three groups, the success rate was significantly poor in Pawarintracystic implant group than both single flap and double flap group. However the outcome of single flap and double flap group has no significant difference.

On day 3 LPI, in single flap group 2(6.67%) cases had partially patent drainage pathway and rest all the 28(93.33%) cases had patent pathway. However in double flap group all the patients had patent lacrimal drainage pathway. In Pawarintracystic implant group the findings were same as on postoperative day 1. On comparing the finding, the outcome of Pawarintracystic implant was significantly poor than the double flap group. However the outcome of single flap and double flap group was comparable and no significant difference was noted. No significant difference between the outcome of single flap and Pawarintracystic implant group was noted.

On 6 month LPI, the outcome of single flap and double flap group was same as 3month LPI findings. In Pawarintracystic implant group 5 cases had regurgitation and 1 case had partially patent on LPI. On comparing the outcome of LPI at 6 month, single flap and double flap group had comparable results but the outcome of Pawarintracystic implant was significantly poor than double flap group.

The subjective relief of symptoms followed the LPI test results in single flap and double flap group but in Pawarintracystic implant 6(31.58%) cases complained persistence of symptoms. Comparing the relief of symptoms the single flap and double flap group had comparable results. However relief of symptoms was significantly lesser in Pawarintracystic implant group than both single flap and double flap groups.

Takahashi, Yasuhiro et al 28 stated external dacryocystorhinostomy without flap anastomosis(93.0%) had a surgical outcome similar to that of double-flap anastomosis(93.2%).

- According to BurcuDirim et al 30, anastomoses of only anterior flaps or both anterior and posterior flaps have similar success rates; suturing only anterior flaps is easier to perform and shortens the operative time
- Serin D et al31 stated , DCR with double-flap anastomosis has no advantage over DCR with only anterior flaps.
- Emrah M, Seydi O et al32 stated surgical success rate of double flap group was 95.2%, and 95.4% on the single flap group. The success rates were not found to be statistically different between two groups of patients (P value > 0.05).
- Chaudhari A, Chaudhari P et al38in their comparative study of conventional and Pawar DCR stated that Pawar implant surgery is very safe, less pain full, less time consuming surgical option for DCR surgery.
- Batalia S39 stated that success rate of Pawarintracystic implant DCR was comparable with external conventional DCR
- Reddy et al.1 suggested success rate of the procedure was 85%.

In this study the success rate of single flap and double flap DCR technique was 93.33% and 96.67%. The success rate of Pawarintracystic implant DCR procedure was 68.42% at 6 month follow up which was significantly lesser than both single flap and double flap technique.

The outcome of both single flap and double flap DCR is comparable with other studies and the outcome difference was not significant. The outcome of Pawarintracystic implant DCR was very less as compared to other studies may be due to 70 ,71

1. Nasal clogging of implant
2. Injury to both walls of sac leading to intrasac fibrosis and intrasacsynechiae which lead to clogging of proximal part of implant
3. Foreign body reaction and granuloma formation as no material is 100% biocompatible
4. This procedure and implant violates the pressure dynamics of the sac because the sac cannot generate sufficient pressure to drain the resultant lacrimal fluid (<10% of total tear drained through the eye) into the narrow pathway of the implant.
5. Extrusion of the implant
6. Absence of any guideline and tests for the proper placement of the implant
7. Nasal mucosal non perforation and tenting

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**OPERATING DURATION**

In this study mean operating time for single flap, double flap and Pawarintracystic implant procedure was 42.83 ± 6.65, 57.33 ± 8.28 and 30.26 ± 6.12 minutes respectively. Comparing the operating time, there was a significant difference between single flap, double flap and Pawarintracystic implant DCR procedure.
Gupta S, Mengi RK stated that the procedure was completed in less than 30 minutes.

Chaudhari et al stated that Pawar implant surgery is very safe, less painfull, less time consuming surgical option for DCR surgery.

Batalia SC in his study stated that the intracystic implant DCR hardly takes 20 minutes.

Operating time finding in this study matches with the literature.

CONCLUSION

Keeping abreast the thorough evaluation and observations in our study of managing chronic dacryocystitis, we have come to the following conclusion-

Double flap technique remains the gold standard with a minimal failure rate of 3.33%

Surgical outcome of single flap technique is comparable to double flap technique and the success rate is 93.33%. However considering the minimal time consumed for surgery and less bleeding intraoperatively, one can prefer this procedure for treating chronic dacryocystitis.

Unfortunately, Pawar intracystic implant technique, though very innovative and enticing, the success rate is quite discouraging (68.42%). However less intraoperative bleeding and less time taken for surgery is encouraging.

LIMITATIONS OF THIS STUDY

- The sample size taken was comparatively small.
- Follow up period in this study is 6 months which is less. The longer follow up of the patients will further help in understating the cause of failure and outcome of the procedure on long term basis.
- The procedures were not performed by a single surgeon so the operating time and operating duration varied widely from surgeon to surgeon.

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