

Dissertation on

**“A STUDY TO EVALUATE THE ROLE OF
DACRYOCYSTOGRAM IN PATIENTS WITH CHRONIC
DACRYOCYSTITIS”**

Submitted in partial fulfillment of requirements of

M. S. DEGREE

BRANCH – III (OPHTHALMOLOGY)

**GOVT. RAJAJI HOSPITAL &
MADURAI MEDICAL COLLEGE
MADURAI**



The Tamilnadu Dr. M. G. R. Medical University

CHENNAI, TAMIL NADU

APRIL 2015

Madurai - 20, 23. 09. 2014

CERTIFICATE

This is to certify that this dissertation titled “**A STUDY TO EVALUATE THE ROLE OF DACRYOCYSTOGRAM IN PATIENTS WITH CHRONIC DACRYOCYSTITIS**” is a bonafide record of research work done by **Dr. R. PRIYADHARSINI**, Post Graduate resident in the Department of Ophthalmology, Madurai Medical College, and Madurai.

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DECLARATION

I, **Dr. R. PRIYADHARSINI** solemnly declare that this dissertation titled “**A STUDY TO EVALUATE THE ROLE OF DACRYOCYSTOGRAM IN PATIENTS WITH CHRONIC DACRYOCYSTITIS**” was done by me.

I also declare that this bonafide work / a part of this work were not submitted by me / anyone else, for any award, for Degree / Diploma to any other University / Board either in India / abroad. This is submitted to The Tamilnadu Dr. M. G. R. Medical University, Chennai in partial fulfillment of the rules and regulation for the award of Master of Surgery Degree Branch -III (Ophthalmology) to be held in April 2015.

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PART ONE

INTRODUCTION

Most of the patients come to our eye department with complaints of intermittent conjunctival hyperemia and epiphora that may occur due to anterior segment or ocular adnexal pathology with the latter often being under evaluated .

Chronic /Acute dacryocystitis is one of the commonest pathologies involving lacrimal drainage system with chronic dacryocystitis being most common than acute dacryocystitis.

Among the causes of epiphora, the most important are

- 1) Congenital-punctal atresia, diverticulum or fistula (from sac to nose or cheek), nasolacrimal duct obstruction, agenesis.
- 2) Acquired-punctal stenosis due to age-related atrophic processes, chronic inflammation, cicatricial conjunctival disease, systemic chemotherapeutic agents.
- 3) Infection-post herpetic infection (herpes simplex, varicella zoster); bacterial infection (e.g., Actinomyces, Chlamydia).

4) Inflammation- dacryoliths, Wegener granulomatosis, sarcoidosis, allergy, hay fever, atopy.

Others being intranasal processes, trauma, facial bone fractures, intrinsic tumor, compression or invasion and occlusion by adjacent tumor, a scarring process that may be surgical related or non - surgical, foreign body and irradiation.

Epiphora occurs due to over production of tears or by insufficient draining of tears that may be due to a partial obstruction or total obstruction or atony of the lacrimal drainage system.

Dacryocystogram enables us to investigate about the functional anatomy of the lacrimal draining system and is mostly done in patients with complaints of epiphora.

Dacryocystogram precisely helps us to determine the site of a block and also stenosis involving the excretory duct and also provides appropriate details evaluating the indication of surgery and also decision about the type of surgery that has to be performed.

Dacryocystogram was performed in this study by linear tomography. This is relatively harmless, easy to perform, and is of low cost, providing us a high resolution image to demonstrate the etiological causes for the lacrimal duct obstruction.

Hence a need for this study to emphasize the need for initial dacryocystogram in starting appropriate treatment in the management of dacryocystitis.

ANATOMY OF THE LACRIMAL DRAINAGE APPARATUS

Anatomy

The lacrimal drainage system consists of the following structures:

1 **The lacrimal puncta** - are situated at the posterior border of the eyelid margin, at the junction of the lateral five-sixths bearing the lashes (pars ciliaris) and the medial one-sixth which are non-ciliated (pars lacrimalis).

Normally they face slightly inwards. They can be visualized by slightly everting the medial end of the eye lids. Treatment of epiphora caused by punctal causes like stenosis or malposition is straight forward.

2 **The lacrimal canaliculi** – they initially pass for about 2 mm from the margin of lid vertically (ampullae). And then it passes in medial direction and then run horizontally measuring about 8 mm running up to the level of the lacrimal sac.

The common canaliculus is formed by the union of the superior and the inferior canaliculus most frequently which

opens into the lacrimal sac at its lateral wall. Each canaliculus may also open into the sac separately in some individuals. A small flap of mucosal (valve of Rosen Müller) lies at the site of junction of the common canaliculus with the lacrimal sac thereby preventing reflux of tears into canaliculi.

3 **The lacrimal sac-** measures about 10–12 mm length and is located in the lacrimal fossa which is being formed by the lacrimal bone and the frontal process of the maxilla and is bound by the anterior lacrimal crest and the posterior lacrimal crests.

The lacrimal sac is separated from the middle meatus of the nasal cavity by the lacrimal bone and maxillary bones frontal process.

In a dacryocystorhinostomy (DCR) after removing a part of bony wall an anastomosis is created to communicate the nasal mucosa and the lacrimal sac hence bypassing an obstruction situated at the level of nasolacrimal duct.

4 **The nasolacrimal duct** – measures approximately 12–18 mm in length is the continuation of the sac inferiorly. It runs downwards and then angulates slightly laterally and posteriorly

and then opens into the inferior nasal meatus, which is situated just below and lateral to the inferior turbinate.

The duct opening is covered by a fold of mucosa called the valve of Hasner. Obstruction of the duct may lead to distension of the lacrimal sac secondarily.

Physiology

Tears normally secreted by the lacrimal gland, both main lacrimal gland and accessory lacrimal gland, which passes across ocular surface. By evaporation some amount of aqueous part of the tear film is being lost which is related to blink rate, palpebral aperture size, humidity and ambient temperature. The remaining tear fluid drains by the following means:

- 1 Flow of tears along the upper marginal strip and the lower marginal strip, and then enter into the upper canaliculus and the lower canaliculus by capillary suction.

- 2 Each blink, the pretarsal part of orbicularis oculi will compress ampullae, and then shortens and the horizontal canaliculus is compressed and the puncta is moved medially.

Simultaneously, lacrimal part of orbicularis oculi, that is attached with the fascia of lacrimal sac, will contract and then compresses the lacrimal sac, which thereby creates a positive pressure leading to flow of tears down via nasolacrimal duct and then into the nasal cavity.

- 3 When eyes open the pretarsal part of orbicularis oculi will relax, canaliculi and the lacrimal sac will expand which by creating negative pressure- which being, assisted by suction and capillarity, will draws the tears into the empty lacrimal sac from eye.

Causes of watering eye:

Epiphora is defined as overflow of tears, which may be caused by:

1 Hyper secretion- secondary to ocular surface disease or ocular inflammation .Mostly in these cases watering will be associated with symptoms of underlying cause and treated medically in most of the cases.

2 Defective drainage of tears by compromised lacrimal drainage system. This is being exaggerated by a windy and cold atmosphere least evident in a dry warm room.

Caused by:

A) Lacrimal puncta malposition (e.g. due to lid ectropion).

B) Obstruction involving the lacrimal drainage system, from the lacrimal puncta up to the level of nasolacrimal duct.

C) Lower lid laxity, facial nerve palsy leading to orbicularis oculi muscle weakness may also cause lacrimal pump failure secondarily.

D) Blockage of flow of tears into nose:

a) Most of the infections and inflammations involving the lacrimal sac are usually secondary to the blockage of

flow of tears at the junction between lacrimal sac with the nasolacrimal duct or a point distal to it.

b) A cast formed in the lacrimal canaliculus or lacrimal sac may occur secondary to infection by Streptothrix (Actinomyces), which can also cause chronic canaliculitis and epiphora.

Chronic Dacryocystitis

Under normal circumstances, the lacrimal sac mucosa being highly resistant to microbial infection but in dacryocystitis there is inflammation involving the nasolacrimal sac most commonly caused by obstruction or infection involving the nasolacrimal duct.

The normal conjunctival sac flora contains staphylococcus epidermidis, diphtheroids, staphylococcus aureus, lactobacillus, propionibacterium. These organisms are generally saprophytic but have the potential to become pathogenic when the normal defense mechanism is altered.

Chronic dacryocystitis is more common than acute, and has several clinical presentations namely

1. Catarrhal: found to have intermittent conjunctival hyperemia and watering, with discharge (mucoïd) that is being sterile normally.

2. Mucocele of lacrimal sac: due to stagnation of tears collected and there is associated dilation of lacrimal sac, with mucoid content in it.

3. Chronic suppuration: chronic conjunctivitis with epiphora is present, with erythema involving the lacrimal sac area externally. There is regurgitation of purulent material with pressure over sac area. Microorganisms are often being isolated from these materials.

4. High incidence of fistula formation.

Complications:

- Chronic recurrent conjunctivitis affecting mostly the caruncle and nearby conjunctiva. Chronic dacryocystitis being a cause for unilateral conjunctivitis in most of the cases.
- Lacrimal abscess.
- Lacrimal fistula –following rupture or drainage of lacrimal abscess.
- The secretion from the lacrimal sac is mostly infectious and serves as a constant source of infection to eye with the risk of developing a non-healing corneal ulcer (in patients with corneal abrasion).
- Orbital cellulitis, orbital abscess, facial cellulitis and rarely thrombosis of cavernous sinus.
- Chronic dacryocystitis patients are prone to develop infection (endophthalmitis) following intraocular surgery (cataract and glaucoma) if untreated prior to surgery. Hence the lacrimal sac syringing should be done prior to any intraocular surgery.

Management:

Conservative management- Oral antibiotics, parenteral antibiotics are necessary for the treatment of severe cases, especially if cellulitis or orbital extension is present. Lacrimal syringing with antibiotic solution.

Incision and drainage -localized abscess involving the lacrimal sac and adjacent soft tissues requires incision and drainage.

Surgical management involves DCT/DCR.

INVESTIGATIONS

The investigations necessary for evaluating patients with epiphora are (However not all these steps are needed since the diagnosis may become apparent with some of the more simple initial tests alone.)

History:

Careful history taking is more essential for arriving proper diagnosis. History about onset (present since birth), any injury scar, previous surgery, allergy and occupation is also essential.

A unilateral watering eye is more commonly associated with an obstructive process, although duct obstructions can occur bilaterally.

Patient may complaint of excess tearing which may present as tears running down the patient's cheek(s), requiring frequent rubbing or patient have diminished visual acuity.

Slit-lamp examination:

Careful examination of patient's eyelids and then the lacrimal puncta for the eyelids normal apposition to the globe without evidence of any ectropion or entropion.

The lacrimal puncta will also be patent and similarly positioned. If the puncta appear wide open, pouting, with discharge-the medial canthus should be examined for infection.

Pressure over lacrimal sac area :(ROPLAS TEST)

The medial canthus is palpated over the lacrimal sac area and then observed for regurgitation of clear/ mucoid / mucopurulent discharge through either of the puncta or fistula.

A distended sac with regurgitation of mucus or pus usually indicates chronic dacryocystitis, with obstruction involving the nasolacrimal duct.

Irrigation of lacrimal canaliculus:

The irrigating technique involves syringing with a 5-mL syringe and an irrigating cannula or a 26-gauge blunt needle to

flush the saline via lower punctum into the lacrimal canaliculi, lacrimal sac, nasolacrimal duct and finally into the nose

Syringing of saline into lower punctum reveals severe or complete block involving the nasolacrimal duct or the lacrimal sac with regurgitation of saline through upper punctum. The regurgitated saline will be clear or mucopurulent material may accompany with it. That is suggestive of obstruction involving the lacrimal sac or the nasolacrimal duct and associated stasis of tears in the sac.

With syringing further when saline flow occurs into the nose usually indicates that there can be an incomplete obstruction involving the lacrimal system's membranous conduit or atonic sac.

However it does not help to rule out a partial obstruction or a functional block, where normal flow may not occur despite absence of obstruction even in the presence of normal pressure of tear flow.

When the lower canaliculus is irrigated, if the saline flow does not occur into the nose or regurgitation does not occur from

the upper punctum and resistance in the form of rise in pressure is noted, the obstruction is probably at the level of the lacrimal common canaliculi.

PROBING

Probing is useful in adults mainly as a diagnostic modality to locate the obstruction site of the lacrimal system and also the length of the patent part of the lacrimal system can also be approximately determined in this method, and hence helps to select the appropriate corrective procedure for management.

The interpretation can be either 1) hard stop (or) 2) Soft stop.

1 **A hard stop:** occurs when the cannula has entered into the lacrimal sac. It happens when it comes to a stop about the level of the medial wall of lacrimal sac, and through which the rigid lacrimal bone is felt as a hard structure.

This helps to exclude the complete obstruction involving the lacrimal canalicular system.

2 **A soft stop** occurs when the cannula has stopped at the level of or proximal to the junction of the lacrimal sac and common canaliculus (about the level of the lacrimal sac's lateral wall).

DYE (FLUORESCEIN) TESTS

Dye drainage tests:

Fluorescein dye disappearance test is carried after ruling out infection or any anatomical abnormalities of the lacrimal system .The procedure involves instillation of a drop of 2% sodium fluorescein into the cul-de-sac of the lower conjunctiva.

If little or no dye is left after 5 minutes, the lacrimal passage is normal. In the presence of obstruction, a large amount of residual dye remains causing spill over of the dye over the lid margin and on to the cheek.

Jones dye test:

Primary dye test (Jones No. 1 test):

After instillation of nasal spray-phenylephrine 1% or oxymetazoline and lidocaine 4% or tetracaine 2% .With the help

of a nasal speculum and a headlight the nasal floor is inspected for dye and also to position the cotton swab.

Fluorescein 2% drop is instilled and the nose examined after 10 minutes. The patient can be instructed to lean forward for about 10 minutes before inspecting the swab.

The interpretations of the test are as follows:

1) Positive: fluorescein staining of the nasal pack indicates patent lacrimal drainage system. This implies that the epiphora is primarily due to tear hyper secretion and hence no further testing is usually required.

2) Negative: absence of fluorescein staining of the nasal pack indicates failure of lacrimal pump mechanism or a partial obstruction. Then the secondary dye test has to be performed

Secondary (irrigation) test:

Helps to differentiate partial obstruction from lacrimal pump failure, based upon whether the instilled fluorescein of primary test has entered into lacrimal sac.

After instillation of topical anaesthetic agent, any residual fluorescein present is washed out. Then with saline lacrimal drainage system is being irrigated after placing a cotton bud into nose

a) Positive:

When the fluorescein-stained saline has been recovered from the nose, usually implies that the fluorescein has entered the sac and thus **confirms the functional patent nature of the upper part of the lacrimal drainage pathway**. Thus inference is partial obstruction of the nasolacrimal duct.

b) Negative:

When the saline recovered is not stained /nasal pack is not stained it indicates that the fluorescein has not entered into the sac. This indicates partial obstruction of the upper part of the lacrimal passage or a lacrimal pump failure.

Contrast Dacryocystogram (DCG):

Technique

Dacryocystogram is radio graphical imaging of the lacrimal passage done by injecting contrast substance into the lacrimal passage via a cannula. The procedure is relatively a simple procedure being inexpensive, and also gives us adequate information regarding anatomy of the lacrimal drainage system and also the adjacent structures.

The two forms of contrast media used for dacryocystogram are

1) oil-based contrast:

Produces high quality of images than water-soluble dyes. While injecting them, special care should always be taken before injecting to prevent extravasation of any contrast into the surrounding soft tissue which will cause severe inflammatory reaction.

2) Water based dye:

After obtaining a proper written consent, trial films are taken initially. This helps to visualize any abnormal bony defects

or any other surrounding abnormalities and these are useful in subtraction dacryocystogram.

The various imaging views include:

Anteroposterior view, Reese view, lateral projection, poster anterior view, and Water's view. **Caldwell view is one of the basic imaging modality for the adequate visualization of the lacrimal drainage system optimally.**

Under adequate topical anesthesia, bilateral lower lacrimal punctum are dilated with a blunt Nettleship punctum dilator. The dilator is first inserted vertically and rotated to about 90 degrees towards the nose, with the canaliculus maintained in a stretched condition in the lateral direction to maintain the canaliculus and the punctum in a straight line.

The punctal dilator is then withdrawn and any debris inside the sac is cleared out by flushing the saline. Contrast media is then filled in a syringe carefully, avoiding air bubbles formation.

The lacrimal cannula is then attached to a syringe or to the catheter if fluoroscopy has been planned. The size of the catheter

is about 20-30cm long to protect the practitioner's hands from the exposure of radiation

The cannula is then inserted inside the canalicular system in the same manner as that of a punctal dilator. Then 0.5 to 1.0 ml of the contrast (ultra-fluid lipiodol) is injected slowly and steadily into the lower canaliculi simultaneously to both sides. Excess dye is removed from the lids prior to imaging to avoid obscuration of the details.

At first the films are taken in Caldwell's poster anterior frontal projections and then immediately on the lateral view. Further imaging is done after 5 minutes, 15 minutes and then in the sitting position for evaluating the lacrimal sac and the duct dimensions with the effect of gravity in the physiological state.

Magnification can be adjusted adequately to improve visualization of fine details dacryocystogram performed under fluoroscopy helps to obtain a dynamic visualization of dye traversing the nasolacrimal drainage system

Dacryocystogram is the gold standard modality for imaging lacrimal drainage system. However the imaging of the surrounding bony structures and the soft tissues are not clearly visualized. Hence DCG is usually combined with other forms of imaging like CT or MRI to get adequate information regarding the surrounding structures also.

The combined modalities like Macro Dacryocystography together with CT and MRI, distension, subtraction also provides better visualization including the surrounding structures and fistula if any.

Interpretation of DCG:

Normal dacryocystogram:

Normally the use of low viscous and aqueous type of contrast media shows the out lining of the lacrimal canaliculi.

The reflux of dye is usually minimal and also there may be minimal or no associated pooling of the dye inside the lacrimal drainage system. There occurs free flow of dye into the nasal cavity.

The canaliculi will be visualized as dye outlined structure joining the lacrimal sac at its lateral wall after the union of the two canaliculi to form the common canaliculus.

The normal lacrimal sac is visualized as a **uniform` C` shaped** dye outlined structure without any undulations or any filling defects and **appears to be a smooth and then gently curved structure with laterally facing concavity of the sac.** The antero-posterior width is usually larger comparing to transverse diameter of the sac.

A constriction is normally visualized at the level of junction between lacrimal sac and the duct due to the splitting of the orbicularis muscle fascia around the duct.

Nasolacrimal duct also has two constrictions

- 1) At the proximal third called the valve of Krause and
- 2) Valve of Taillefer present in the lower one third in the intraosseous portion of the nasolacrimal duct. Then the nasolacrimal duct widens and opens into the nasal cavity.

Abnormal Dacryocystogram:

The passage of dye inside the lacrimal system injected through the catheter helps to diagnose the pathology based on the different interpretations as follows:

1. When there occurs failure of the dye to reach the inferior meatus, usually indicates the presence of an anatomical obstruction of the lacrimal passage and the level of obstruction can be visualized.
2. Physiologic dysfunction of the lacrimal sac / lacrimal pump failure or the presence of a mild incomplete or partial anatomical obstruction may present with a normal picture associated with complaints of epiphora.
3. The presence of residual contrast in sac region or in the duct in the late radiographic images or poor emptying of the sac helps to diagnose the functional nasolacrimal duct obstruction (FNLDO)
4. Dacryocystogram is also very useful in the identification of abnormal passages like diverticula, fistulae and also the filling

defects which may occur due to lacrimal calculi or foreign bodies or polyps or tumors of the sac. The existence of abnormal super numeric canaliculi can also be clearly interpreted.

5. Whenever there occurs normal imaging of the lacrimal canaliculi with failure of the dye passing into the lacrimal sac or into the nasolacrimal duct indicates the presence of block being mostly at the level of common canaliculus.

6. The presence of obstruction involving the level of the junction of the sac with the duct, presents with a picture of dilated sac with failure of the dye to reach the nasolacrimal duct or into the nose, even in the delayed films.

7. The presence of obstruction at the nasolacrimal duct usually presents with the picture of dilated lacrimal sac, which may be associated with presence of dye in the nasolacrimal duct, but failure of the dye to reach the nose.

The level of obstruction involving the lacrimal passage are classified into –

1) High - involving the canaliculi or at the level of sinus of Maier, usually diagnosed by probing

2) Middle - at the level of the lacrimal sac neck region to the lower end of bony canal or the proximal portions of the nasolacrimal duct

3) Low - involving the lower third of the nasolacrimal duct and is most commonly seen in the infants - congenital dacryostenosis.

8. Dacryocystogram should also be carefully evaluated for assessing the amount of reflux of dye through the upper lacrimal canaliculi, its size and shape of lacrimal sac and also about its length and caliber of the nasolacrimal duct and further the presence of any form of filling defects or any abnormal passage like diverticulae or fistulae.

9. Finally, subjective analysis of the abnormal dacryocystogram is done to detect and locate the area where the

main “hold up” occurring at lacrimal canalicular system - at level of the lacrimal sac/ the duct junction/ within the lacrimal duct.

10. Advanced modalities of imaging like the dacryocystogram with the digital subtraction imaging helps to eliminate the presence of confusing shadows due to bones and thus helps to exactly identify the original morphology of the lacrimal sac.

11. Dacryocystogram images taken in cases of failed cases of Dacryocystorhinostomy help us to identify the pooling of the dye in the region of middle meatus and also obstructions like strictures involving the ostium.

12. The DCG is also useful postoperatively to assess the patency and hence the success of dacryocystorhinostomy or dacryocystectomy. It can also be done routinely prior to any surgery involving the lacrimal system because of its minimally invasive nature.

13. A small and a shrunken sac is usually indicative of cases of long-standing infections and inflammations involving the sac.

14. The conditions involving the adjacent structures like that of the Para nasal sinuses, the anomalies of nasal septum, hypertrophied nasal turbinate , osteomyelitis of the surrounding bones, the conditions of the surrounding nasal and the orbital bones following trauma- fractures, tumours involving the bone or the surrounding soft tissues can also be identified.

Contrast material – omnipaque.

Properties

Non-ionic radiographic contrast medium, water soluble, organic, with low osmolality, iodinated compound.

Chemical Composition:

Omnipaque (iohexol) is being available as sterile, free of pyogen, colour of the solution being pale yellow to colourless. The available iodine concentration being: 180 mg /ml, 240 mg /ml, 300 mg /ml, and 350 mg /ml.

Each milliliter solution of iohexol contains 1.21 mg of tromethamine and 0.1 mg of edetate calcium disodium with pH

between 6.8 and 7.7 with hydrochloric acid. All solutions are sterilized by autoclaving without any preservatives added to it.

Pharmacokinetics:

Iohexol does not normally cross the blood-brain barrier to any significant extent. It is excreted unchanged by the kidneys, mainly by glomerular filtration; tubular secretion plays a minor role, and a very small quantity (1-2%) is excreted via the bile.

About 80-90% of the injected dose is excreted in the first 24 hours, with peak urine concentrations occurring in the first hour. The elimination half-life of iohexol in the blood and urine was about 20 minutes, with no specific accumulation in any other organ examined.

Adverse effects:

Serious reactions and or fatalities are only seen on very rare occasions.

- dizziness, headache,

- nausea, vomiting,

- maculopapular rash,
- urticaria, pruritis,
- flushing, sneezing, nasal congestion,
- rhinitis, lacrimation, conjunctivitis,
- bronchospasm,
- anaphylactic shock,
- cardiac arrhythmias,
- angioneurotic edema.

Contraindication:

- Manifest thyrotoxicosis.
- History of serious reaction to omnipaque.

Special warnings and special precautions for use:

Positive history of allergy, asthma, or untoward reactions to iodinated contrast media indicates a need for special caution. Premedication with corticosteroids or histamine H1 and H2 antagonists might be considered in these cases.

Iodinated contrast media may provoke anaphylactoid reactions or other manifestations of hypersensitivity. A course of action should therefore be planned in advance, with necessary drugs and equipment available for immediate treatment, should a serious reaction occur.

For patients with multiple myeloma, diabetes mellitus, renal dysfunction, adequate hydration should be assured before and after contrast media administration.

Care should be taken in patients with

- Serious cardiac disease
- Pulmonary hypertension
- Acute cerebral pathology
- Epilepsy
- Renal impairment
- Diabetes mellitus
- Paraproteinemias (myelomatosis and waldenstrom 's macroglobulinemia)

- Hyperthyroidism
- Goiter

Extravasation of contrast media may on rare occasions give rise to local pain, edema, which usually recedes without sequel. However inflammation and even tissue necrosis have been seen. Elevating and cooling the affected site is recommended as routine measures.

OBSERVATION – TIME:

After contrast medium administration the patient should be observed for at least 30 minutes, since the majority of serious side effects occur within this time. However, delayed reactions may occur.

PREVENTIVE MEASURES:

- Identification of high risk patients.

- Hydration must be adequate prior to the procedure. If needed intravenous fluid infusion started before the procedure and continued till the contrast agent has been excreted by kidney.
- Postponing a repeat contrast medium examination in case of extravasation of contrast media.

Treatment of generalized anaphylactoid reaction:

- Stop contrast injection,
- Maintain airway, oxygen supply by mask ,suction sos
- Soluble hydrocortisone 500-1000 mg i.v.,
- Epinephrine 1:1000 solution
 - 0.2-0.4 mL subcutaneously for severe allergic reactions.
 - In extreme emergency 0.1 mL per minute, appropriately diluted, may be given intravenously until desired effect is obtained. Do not exceed 0.4 mL.
 - In case of cardiac arrest 0.1-0.2 mL appropriately diluted, may be given intracardially.

- In hypotension (carefully monitor blood pressure)
 - Phenylephrine hydrochloride 0.1-0.5 mg appropriately diluted, by slow intravenous injection or infusion or
 - Norepinephrine bitartrate 4 mL of 0.2% solution in 1,000 mL of 5% dextrose by slow drip infusion.
 - Sodium bicarbonate 5%: 50 mL i.v., every 10 minutes as needed to combat post-arrest acidosis.
- Atropine 0.4-0.6 mg i.v., to increase heart rate in sinus bradycardia. May reverse 2nd or 3rd degree block.

TO CONTROL CONVULSIONS:

Diazepam 5-10 mg slowly i.v. titrating the dose to the response of the patient or Phenobarbital sodium may be injected i.v., or i.m., at a rate not in excess of 30 to 60 mg/minute. Depending on the patient's response a total dose of 200- 300 mg may be required. The dose may be repeated in 6 hours if necessary.

TREATMENT-SURGICAL DECISION INFLUENCED BY DACRYOCYSTOGRAM:

- Cases with normal functional passage reveals the position and contour of lacrimal sac , its junction with nasolacrimal duct , end of the duct into the nasal cavity , the dye as it pools in the floor of nose and in nasopharynx and delayed picture showing empty lacrimal sac can be visualized .

Antibiotic syringing with observation is done in those patients

- Canalicular obstruction involving medial part is treated by canaliculodacryocystorhinostomy; involving lateral part is treated by conjunctivodacryocystorhinostomy.
- Cases with large distended sac with obvious obstruction at duct sac junction, on applying gentle pressure over the distended sac, the dye appears to pass readily into the NLD and into nasopharynx .Here patency of lacrimal passage was thus established despite mucocele .

These patients can be put on conservative management with systemic and topical antibiotic and thorough ENT examination.

- Atonic sac is diagnosed when patent nasolacrimal passage with distended sac is seen on DCG but fluid regurgitate on applying pressure over lacrimal sac area.

Dacryocystorhinostomy can be performed in these patients

- Cases with shrunken small sac, with normal punctum and canaliculus - DCR are avoided.
- Cases with distended or shrunken sac with fistula dacryocystectomy with fistulectomy or DCR with fistula excision can be performed. Fistulous dacryocystitis cases with signs of predominant acute infection, firstly, acute symptoms should be regressed by medical therapy before proceeding on with the treatment by excision of fistula, conventional dacryocystorhinostomy and then bicanalicular silicon tube intubation.
- NLD obstruction which is complete is managed by DCR. Incomplete or partial obstruction managed by stenting of lacrimal system with silicon intubation, or balloon dilatation . For severe case DCR can also be performed.

- Physiological obstruction of the lower end of the duct due to nasal polyp, hypertrophy of inferior turbinate bone, nasal septum deviation managed by treating causative factor.
- Failed DCR cause for failure is identified as stricture and stenting with silicon intubation can be performed.
- Dacryolithiasis within the lacrimal sac can be managed by mechanical removal of stone along with DCR.
- Persistent symptom even after performing DCT reveal residual sac on DCG, then re-exploration of sac can be done.
- Dacryocystogram gives an idea of layout of sac in patient with lid injuries and in fracture orbit for repair. Patent canaliculus with large size of sac suggests external DCR with silicon intubation will be helpful.
- Lacrimal sac tumour without bony erosion is managed by dacryocystectomy; those extending beyond the sac need lateral rhinostomy and subtotal maxillectomy.

Conventional Dacryocystorhinostomy DCR:

Conventional dacryocystorhinostomy DCR is mostly indicated for obstruction that occurs beyond the medial opening of common canaliculus.

Principle of this surgery involves creating anastomosis from the lacrimal sac to the middle nasal meatus nasal mucosa.

Procedure:

About local anaesthetic agent infiltrated around proximal portion of lacrimal system and the upper and lower part of the eyelids medially. Another 5 ml is injected in nose submucosally. The lateral wall of the nose is packed with gauze.

The skin incision is made about 12 mm of curvilinear shape just at a position below medial canthal tendon.

The dissection being continued in subcutaneous plane down on to the periosteum of inferior rim of orbit.

Lacrimal fossa is visualized and a small osteotomy is created in the lacrimal bone. A hemostat can be used to create a large bone window-and hence the excised portion has a bite of

tissue consisting of lacrimal bone and nasal mucosa done with DCR bone punch.

Upper and the lower puncta are then dilated with the punctum dilator. Bowman probe is passed into the lacrimal sac via the canaliculi with the probe tip at times seen through the osteotomy.

The lacrimal sac is then opened with the forceps and intubated with a Crawford silicone tube and grasped with a hook and then retrieved via the nose and then secured with a knot.

Posterior flap of nasal mucosa is sutured with posterior flap of lacrimal sac using 6-0 vicryl or catgut, and then the anterior flap is sutured.

Medial palpebral ligament is sutured back to periosteum.

After attaining hemostasis the wound is then closed with 6-0 absorbing suture.

Excellent results with success rate of about 90%.

Causes for failure of dacryocystorhinostomy include:

- 1) Inadequate position and inadequate size of the ostium,
- 2) Obstruction involving common canaliculus that may be unrecognized,
- 3) **The ‘sump syndrome’**-the surgical opening at the lacrimal bone is too high and also too small. Thus there is a dilated lacrimal sac located lateral to and just below the level of inferior margin of ostium, hence secretions collect there, which is unable to reach the ostium and then into the nasal cavity.

Complications:

Haemorrhage, cutaneous scarring, cellulitis, injury involving the medial canthal structures, and the cerebrospinal fluid rhinorrhea if subarachnoid space is entered inadvertently.

Endoscopic DCR

Advantages over the conventional DCR include

- 1) lack of skin incision,

- 2) minimal blood loss
- 3) shorter operating time,
- 4) Low risk of leakage of cerebrospinal fluid.

Disadvantages include –

1. Success rates lower than conventional DCR,
2. Difficulty in reverse probing and then also in examining the opening of the common canaliculus in cases with obstruction involving proximal part of canaliculi.
3. Additional procedures may be needed for adequate visualization such as deviated nasal septum correction.

COMPLICATION:

Major complications include bleeding into the orbit and lacerations of the inferior canaliculus.

Minor complications include emphysema or ecchymosis of cheek, burning involving the skin of nostril, and exposure of orbital fat.

Patients are instructed not to sneeze or blow their nose with their mouth open for a period of at least 14 days following surgery.

Contra - indication

- 1) Children up to 1 year,
- 2) Acute infections (e.g., dacryocystitis).

Endonasal laser DCR

Performed with the Holmium: YAG / KTP laser. This procedure is a relatively rapid which is usually performed under local anaesthesia. Hence it is particularly suitable for the elderly patients.

Indications:

- Distal nasolacrimal duct obstruction
- Revision surgery for failed external DCR
- Acute dacryocystitis
- coagulopathy
- unfit for general anesthetic

Contraindications:

- Lacrimal sac pathology
- Tumor involving lacrimal system
- Thick bone following nasoethmoid trauma
- Wegener's granulomatosis

Success rate is about 70% only, it does not prejudice to the patient, since normal anatomy is not disrupted. Hence subsequent surgical intervention is also possible in the case that fails.

Complications:

- Stenosis
- Synechia formation
- Migration of stent
- Sump syndrome
- Granulation tissue
- Cutaneous fistula
- Hemorrhage

Balloon dacryocystoplasty:

Dacryocystoplasty have been used mostly in congenital nasolacrimal duct obstruction in children and with partial nasolacrimal duct obstruction in adult's .Dacryoliths occur due to obstruction of flow of tears, it can be removed during the procedure. Success rate is approximately 50% in adults.

Lester Jones tube

Primary tube insertion:

Indication

- Proximal canalicular obstruction is extensive, that may be a congenital one or following, infections such as trachoma, herpes simplex or radiation.
- Occasionally Lester Jones tube can be used in a non-functioning system due to pump failure, but the lacrimal system is patent in case of facial nerve palsy being long standing.

Secondary tube insertion:

Following a previous DCR surgery, may also be needed for patent but non- functioning but patent DCRs and in cases where recurrent canalicular obstruction is difficult to open.

Stent placement:

Stent implantation is done using special nasolacrimal duct polyurethane stent in a retrograde manner

Indication

Total obstruction of nasolacrimal drainage system, refusal of surgical procedure and unfit to general anesthesia.

Dacryocystectomy (DCT):

Procedure involving surgical removal of entire lacrimal sac.

The indications for dacryocystectomy (DCT):

- Excision of lacrimal sac tumors. Prior to the development of DCR surgery, chronic dacryocystitis was treated by dacryocystectomy (DCT), where the lacrimal sac and any fistulae present were excised.

- Recurrent dacryocystitis following inflammatory causes like Wegener's granulomatosis are prone to develop nasocutaneous fistula after DCR surgery or recurrent chronic dacryocystitis without watering.

PROCEDURE:

- 1) Anaesthesia: local infiltration anaesthesia using 3 ml of lidocaine hydrochloride 2% with adrenaline 1/100 000 is injected into the medial canthal region in adults
- 2) Curved or straight incision about 8 mm long is made medial to medial canthus.
- 3) Skin and orbicularis is separated by blunt dissection and Muller's speculum inserted.
- 4) Medial palpebral ligament is exposed and disinserted to expose anterior lacrimal crest
- 5) From anterior lacrimal crest, periosteum is separated and along with it lacrimal sac is dissected from floor by lacrimal sac dissector.
- 6) Dissection of fundus of lacrimal sac and identification of sac by introducing lacrimal probe.

- 7) Fundus and canalicular attachment is severed. Then lacrimal sac is dissected totally and severed from the nasolacrimal duct.
- 8) Curettage of diseased tissue from bony NLD by lacrimal scoop.
- 9) Suturing deep layer by 6-0 vicryl and then skin sutured with 6-0 silk.

DCT may be considered less invasive than dacryocystorhinostomy (DCR) because lacrimal bone and nasal mucosa are not violated.

REVIEW OF LITERATURE:

- In a study by Michael J Wearne et al on 32 patients (45 lacrimal systems) with mean age was 62 years; among them 59% were male. Abnormal morphology was detected with lacrimal drainage scintigraphy by 95% and using Dacryocystography in 93% of systems.

Combining scintigraphy with Dacryocystography increased the sensitivity up to 98% with detailed anatomical and physiological information, in routine practice, more reliable is to do the dacryocystogram at first and perform lacrimal scintigraphy only if initial contrast radiography is normal

A case that appears to be normal on Dacryocystography and abnormal in lacrimal scintigraphy is mostly of significant value and thus demonstrates a functional block.

- In a study by S.R.K.MALIK et al revealed that dacryocystogram in normal subject helps in establishing the normal radiological appearance and its dimension.

In their study they observed that females **are affected most commonly** than male due to anatomically narrowed lumen of the naso lacrimal passage in female.

Female showed preponderance in forties while peak incidence for male occurred in late twenties.

Side of obstruction most commonly involved being left side than right side. Information about the level of obstruction, the shape and the size of the lacrimal sac and presence of any associated fistulae and diverticula will be of great help in proper management of a patient with epiphora, in order to reduce the risk of failure following surgery.

- In a study by F C Francisco et al on Retrospective observational study on 500 consecutive patients of 1000 lacrimal ducts were seen in their Radiological Clinic, in those patients suspected to have naso lacrimal duct obstructions. Among the studied, 121 were men (24.2%) and 379 were women (75.8%). Thus females are affected most commonly than male.

Their age varied from 2 years to 93 years, with higher incidence among sixth decade.

Among those examined 148 (29.6%) of the examinations were normal; in 298 (59.6%) the obstructions were unilateral and in 54 (10.8%) they were bilateral.

The most (251) of the obstructions were at the valve of Krause, which thus proved to be statistically significant value ($p=0.009$). This site of obstruction was being predominance in women ($p=0.013$). In the site of obstruction most commonly involved being the valve of Hasner.

Mostly the obstruction was total in 378 valves –with 86 in men and 292 in women and the obstruction was partial in 28 valves -10 in men and 18 in women.

All patients with bilateral alterations had total obstruction and it was partial in 9.4% among the 298 cases of unilateral obstruction. This difference was mostly being significant ($p=0.000$).

Other findings included sinusitis, osteomas, bone fractures, fistulae, diverticulum, and lacrimal stones.

- In a study by Agarwal ML et al, he assessed 30 patients of dacryocystitis with Dacryocystography using conventional radiography.

He concluded that **the main obstruction site was at the junction between the lacrimal sac and the nasolacrimal duct** and, secondly, in the nasolacrimal duct.

- In a study by Schellini SA et al on Dacryocystography in adult lacrimal system evaluation .He evaluated 100 patients by using Dacryocystogram with liposoluble contrast. In their study radiograph was obtained only after the injection of contrast medium ensuring that the radiation dose was being lower.

They reported that the assessment of the radiological examination was being inconclusive in 19 patients because of unsatisfactory quality of the technique used.

Among the analyzed patients 75% of the patients were female .In then **the most common site of obstruction being the point of transition between lacrimal sac and the nasolacrimal duct.**

In their study non-ionic water soluble iodine contrast medium was being used, since it is homogenous, pH similar to tears, non-irritative, low viscosity.

Liposoluble contrasts are being eliminated at slower rate than water soluble one and prone to form granuloma hence not used most commonly.

- In a study by Dr. Pervez Ahemed Siddiqui et al entitled "Chronic Dacryocystitis – It's Evaluation And Management By Various Investigative And Diagnostic Test" revealed dacryocystogram as investigating tool in the management of chronic dacryocystitis. The study was being conducted in 100 cases of chronic dacryocystitis in 131 eyes. Among them female patients being 76 and 34 male patients, with chronic dacryocystitis involving the right eye in 37% and the left eye being involved in 32% and bilateral involvement was reported in 31%.

Right side involved more frequently than left side and female are affected in larger proportion than male. Chief presenting complaints among these patients were mostly epiphora

in 46 %, epiphora with presence of swelling in 18%, epiphora with mucopurulent or purulent discharge in 21%, 15 % of them reported with epiphora and mucopurulent or purulent discharge with swelling.

In this study on syringing revealed regurgitation of fluid from same lower punctum in 22.90% of patients and regurgitation of fluid from opposite upper punctum in 77.10%. Dacryocystography helps us to identify complete block of nasolacrimal passage in 78.8% of them and incomplete or partial blockage of nasolacrimal passage in 21.2%.

More precisely it delineate the site of block, the most common site of block being valve of Krause then next being valve of Hasner blocked and common canaliculi junction block was reported in 16.79%.

In this study on analyzing the morphology of sac revealed presence of normal lacrimal sac in 12.21%, enlarged or distended lacrimal sac in 74.80%, lacrimal sac being fibrosed in 12.97%.

Hence this study **on dacryocystogram enable us to understand it as a safe modality of investigation in locating**

anatomical region of block in the nasolacrimal passage and helps us in planning appropriate procedure of management.

- Veirs (1955) found in his study chronic dacryocystitis incidence being twice common in left side comparing to right side.
- In a study by N Sood¹, A Ratnaraj¹, G Balaraman¹, HN Madhavan (1967) on chronic dacryocystitis - a clinico-bacteriological study observed inflammation of the lacrimal sac as a disease of adults, excluding congenital dacryocystitis.

Majority 72% of their cases were over the age group of 40 years. The higher incidences of chronic dacryocystitis in females have been stressed by many authors in their study (Summerskill found females 70% affected and Traquair found females 83% affected).

In their study lesser number of female patients (63.3%) was affected. Since the number of cases included was only 139, references were also made to the cases with chronic dacryocystitis seen in the department six months period prior to the time of starting this study. Thus they had an incidence of

62% in females and an incidence of 38% in males was found among 246 total cases.

They observed that both right and left side was being affected in an equal proportion.

Watering was the major presenting complaint among 49.3% and 17.1% of the patients had presented with the complaint of regurgitation of pus on pressing near the inner canthus area. Among them 11 patients had dacryocystectomy done earlier and came for relief of regurgitation of pus. On history taking, it was found all had symptom of epiphora

Acute exacerbation of simple chronic dacryocystitis was reported in 12.3% of cases. Among 11.6% the presence of dacryocystitis was detected only as an incidental finding in hypopyon corneal ulcer cases on performing syringing.

There were no symptoms in 4.8% cases and the dacryocystitis was being diagnosed on performing routine syringing prior to cataract surgery. Incidence was in a higher percentage among males (36.7%) patients than reported earlier in 139 adults of chronic dacryocystitis. On performing cultures of

lacrimal sac fluid during the first time staphylococci, diphtheroids, *Pseudomonas aeruginosa*, pneumococci, *mima polymorpha*, *mima polymorpha* has been described from the majority of cultures.

- In a study by Weber AL1 et al, observed that dacryocystogram, computed tomography, MR imaging and nuclear scintigraphy, optimally evaluates the diseases of the lacrimal system.

They selected dacryocystogram to define anatomy, including lumen architecture of lacrimal drainage system in various pathological conditions inflammatory disease (dacryocystitis), dacryoliths, dacryoceles and congenital developmental abnormalities.

Dacryocystogram provides additional information in malignant and benign tumors, principally to differentiate an extrinsic lesion from intrinsic lesion. CT is also indicated for delineating palpable mass lesions like benign and malignant tumors, cysts, and diseases, involving Para nasal sinuses, secondarily affecting the lacrimal apparatus. They also found that MR imaging has some limited application but is also useful

to differentiate solid mass from fluid within the lacrimal sac, to delineate tumor extension from the lacrimal sac into the nearby nasolacrimal duct and their spread to anatomic structure surrounding the lacrimal sac and nasolacrimal duct.

MR imaging with contrast enhancement (gadolinium) should be used in conditions like suspected tumors and to separate a solid mass from cyst. In patients with epiphora but without any demonstrable anatomical abnormalities on Dacryocystography, nuclear scintigraphy is helpful. The drawback of radiological method was their inability to identify the histopathology of malignant and benign tumour.

- Guzek JP et al (1997) in his study examined 15 patients with epiphora to assess the weaknesses and strengths of selected clinical tests and radiological lacrimal tests in them. All patients were subjected to undergo Jones testing, followed by the dye disappearance test then canalicular probing performed then lacrimal scintigraphy, and macrodacryocystography done.

They analyzed the result based on the grading system by the dye disappearance test by three ophthalmologists. Nuclear medicine specialist and radiologist evaluated lacrimal

scintigraphy and macrodacryocystography findings. Final assessment made by panel of three ophthalmologists using a scoring system that evaluated the data analyzed.

They observed the Jones I test results were negative when dye was recovered from the nose and hence the epiphora was due to hyper secretion. If no dye was recovered from the nose, obstruction was not always present then Jones I test result was inferred as positive.

It was inferred that obstruction was always present if associated strongly abnormal findings interpreted on the dye disappearance test results. In identifying canalicular obstruction canalicular probing was more reliable comparing to scintigraphy. **Nasolacrimal outflow obstruction was confirmed by Dacryocystogram in cases with marked stenosis of the lacrimal sac or duct.** A normal study on Dacryocystogram reveals functional obstruction in some patients.

They in their study inferred that in patients with epiphora due to partial or functional nasolacrimal outflow obstruction more than one lacrimal test may be needed for arriving a definitive diagnosis and appropriate management.

- In a prospective comparative study by Ş. ARI et al (2013) on analyzing the outcomes of surgical management in the fistulous dacryocystitis cases with associated nasolacrimal duct obstruction (NLD) .Included 22 patients (14 female, and 8 male) with fistulous dacryocystitis and these patients were divided into 2 groups as congenital (Group I) and then acquired (Group II) groups. They underwent excision of fistula together with external dacryocystorhinostomy (DCR) and then bicanalicular silicon tube intubation was being performed followed by medical therapy (topical and parenteral antibiotics). Then these two groups were compared with one another other in terms of duration of preoperative medical therapy, silicone tube extubation time, follow-up time period, and then surgical outcomes.

In their study they analyzed Group I including 7 patients with recurrent dacryocystitis following probing and 5 patients with acute dacryocystitis compared with Group II which comprises of 8 patients of acute dacryocystitis and 2 patients of recurrent fistulous dacryocystitis. The mean lengths of preoperative medical therapy duration was being 14.1 ± 6.5 days

for Group I and mean length of preoperative medical therapy duration was being 11.9 ± 2.5 days for Group II. The extubation of the silicone tube was performed after a period of 4.5 ± 1.2 months in Group I and in Group II after 4.6 ± 1.1 months. These patients were being followed up for duration of 13.5 ± 4.8 months in Group I and for duration of 14.3 ± 3.7 months in Group II.

Thus there was no significant difference between the two groups in time of extubation of the silicone tube, length of preoperative medical therapy, and follow-up time P value > 0.05 and hence not significant. In the postoperative period, patency of the nasolacrimal drainage system was assessed by irrigation of the lacrimal ducts and by using fluorescein dye stain. All those patients who underwent surgical treatment were being treated successfully.

Hence fistulous dacryocystitis cases with associated the obstruction involving the NLD can also be treated by fistula excision ,with external dacryocystorhinostomy (DCR) and then bicanalicular silicon tube intubation.

- In a prospective stud by MUNK et al (1989) comparison of water-soluble and oil-based contrast agents in dacryocystogram.

Results analyzed based on the image quality and the level of patient discomfort during examinations with water-soluble contrast and then followed by oil based contrast agents.

The water soluble contrast agent used were iohexol, iopamidol and 52.7% diatrizoate meglumine and 26.9% iodipamide meglumine being compared with lipiodol the iodized oil-based contrast agent.

From 41 consecutive patients, 55 dacryocystogram was obtained. The procedure was at first performed with a water-soluble contrast agent, then it was repeated with oil based contrast agent .Distention technique was then used with conventional radiography. The levels of discomfort of patients were being evaluated as none, mild, moderate, and severe. The images obtained were evaluated by two radiologists separately, blinded to them water-soluble contrast agent was employed, and then the images were graded on the five-point scale.

They observed that most of **the images obtained using oil based contrast agent were found to be significantly better than those images obtained with other water soluble contrast agents** .P value is less than 0.02

They observed that the quality of image obtained deteriorated as the concentration of iodine in the contrast agent decreases. They in their study concluded that in most of the instances, oil based contrast agent lipiodol is the contrast agent of choice in regard with both the highest level of patient comfort and also in greatest conventional radiographic image quality among the other contrast agents that is being compared with it.

- In a prospective study by Imtiyaz A et al on repeat dacryocystorhinostomy with silicone tube intubation in cases of failed DCR, they found dacryocystogram as investigating technique to identify the cause for DCR failure.

It localizes the obstruction site and in most cases reveals other pathology such as sequestered ectasias of the sac or dacryoliths.

They randomly selected 40 patients for repeat DCR surgery as they had the constant complaint of watering and then discharge following previous DCR surgery done 6 months to 2 years before. Their age varied from 22 years to 56 years.

In the study group 14 male patients and 26 female patients included .In male patient 10 had the pathology on right side and 4 had the pathology on left side. Of the 26 female patients, 17 had right sided involvement and 9 had left side involved.

A dacryocystogram was performed before surgery using 76% urograffin in all these patients, it revealed the most probable cause of failure of the previous surgery and then acted as guide during the repeat surgical procedure.

On performing DCG in the 40 study patients revealed that, in 37 patients, beyond the canalicular end no dye could be seen. Thus **revealing a dense fibrous tissue which was obstructing the common canalicular end or the bony ostium.**

In other 3 patients, dye appeared too seen in an intact lacrimal sac, which revealed thus during previous surgery, the sac has not been opened, thus revealing us the causes for DCR failure.

Repeat surgery was performed in all these patients .Among

8 patients had an obstruction at the level of common canalicular end which was being confirmed by lacrimal probing and in 29 patients a dense fibrous scar closing the bony ostium was found.

In those 3 patients where an intact sac found on dacryocystogram, the surgeon during prior surgery anastomosed the superficial muscular fibers with the anterior nasal mucosal flap .during repeat surgery fresh anastomosis created between the anterior nasal mucosal flap and a freshly created anterior lacrimal sac flap.

Thus DCG helps in diagnosing the pathology for failure and level of obstruction was also revealed. Based on their findings meticulous surgical repair can be performed.

**NORMAL
DACRYOCYSTOGRAM**



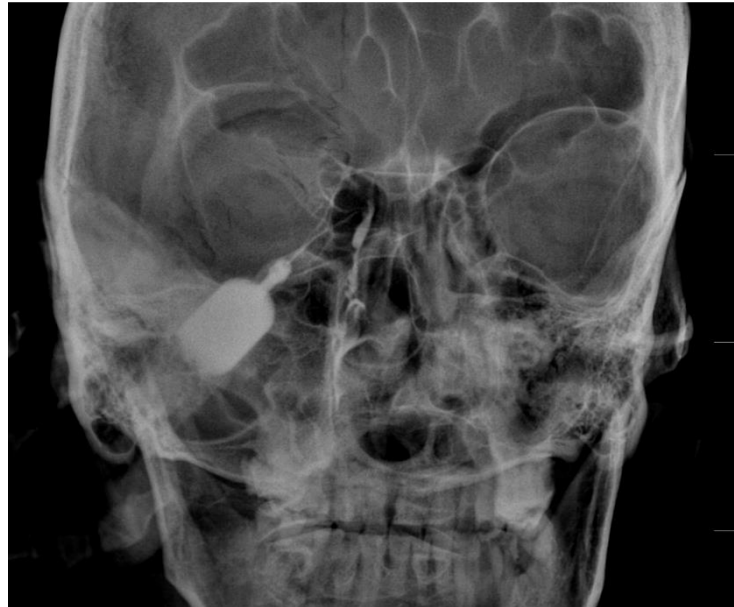
**DACRYOCYSTOGRAM SHOWING
IRREGULAR SAC**



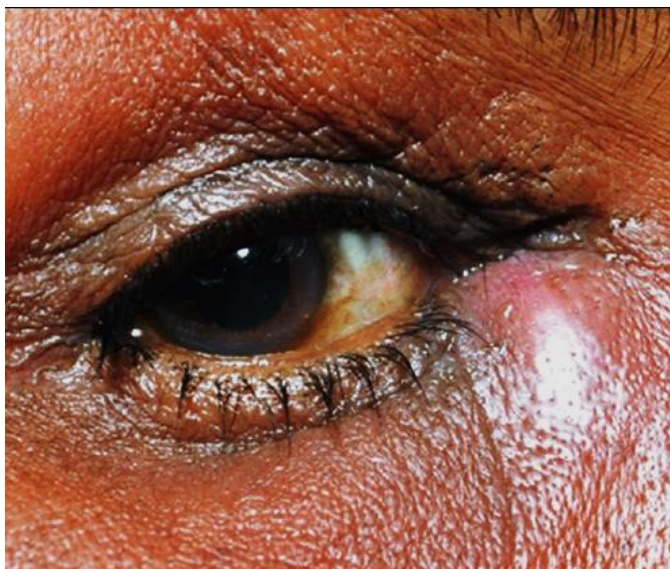
**DACRYOCYSTOGRAM SHOWING
DISTENDED SAC**



**DACRYOCYSTOGRAM SHOWING
FIBROSED SAC**



CHRONIC DACRYOCYSTITIS



**ACUTE EXACERBATION OF CHRONIC
DACRYOCYSTITIS**



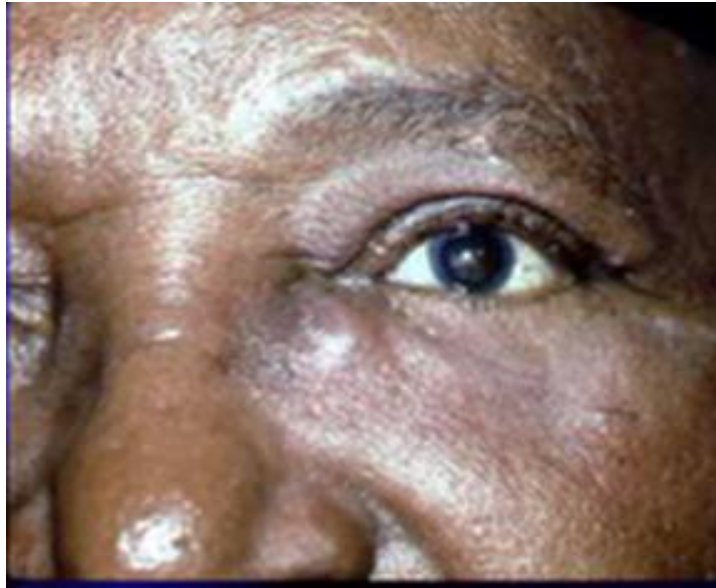
**CHRONIC DACRYOCYSTITIS WITH
MUCOPURULENT DISCHARGE**



LACRIMAL SAC ABSCESS



**CHRONIC DACRYOCYSTITIS WITH
MUCOCELE OF SAC**



**CHRONIC DACRYOCYSTITIS
WITH EXTERNAL FISTULA**



NASOLACRIMAL DUCT SYRINGING



POST DACRYOCYSTECTOMY



PART TWO

AIMS AND OBJECTIVES OF THE STUDY

1. To assess the site of obstruction of lacrimal passage.
2. To aid in the diagnosis and management of lacrimal passage pathology.
3. To reveal the anatomy of passage and the changes due to disease.
4. To aid in the diagnosis of diverticula, fistulae and filling defects caused by stones or tumours.

MATERIALS AND METHOD:

STUDY DESIGN: Prospective Observational Study

This study is to be conducted among 40 patients with Chronic Dacryocystitis attending our department as outpatient as well as inpatient the wards of our Govt. Rajaji Hospital, Madurai.

Subjects shall be evaluated for entry into the study if they are 12 years of age or older. Subjects believed to fulfill all eligibility criteria, and none of the exclusion criteria, will be invited to participate in the study.

STUDY PERIOD: 6 Months (April 2014 to September 2014)

SELECTION OF STUDY SUBJECTS:

A total of 40 patients attending as outpatient and in the wards of the Department of Ophthalmology, Govt. Rajaji Hospital, Madurai who satisfy the inclusion criteria .

INCLUSION CRITERIA:

1. Patients diagnosed with chronic dacryocystitis.
2. Recurrence of disease after surgery (Dacryocystectomy)
3. Age > 12 years & < 70 years.

EXCLUSION CRITERIA:

1. Pregnant Patients.
2. Patients not consenting for the study.
3. Hypertensive with BP > than 140 / 90 mm of Hg.
4. Age < 12 years & >70
5. Immunocompromised patients.
6. History of anaphylaxis.
7. Allergy to contrast drugs.

FINANCIAL SUPPORT: Nil

ETHICAL COMMITTEE CLEARANCE: Obtained

TECHNIQUE: DACRYOCYSTOGRAM

- Explain the procedure to the patient and then get informed consent.
- Wash your hands properly.
- Wear hand gloves and then mask.
- Ask the patient to lie in supine position.
- Apply a drop of topical anesthetic agent into patient palpebral apertures of both the eyes.
- Dilate the inferior punctum with a Nettle ship punctum dilator.
- inject approximately 1-2ml non- ionic contrast (iohexol) water soluble into both lacrimal systems.
- Skiagrams were then taken immediately following the injection in the Poster anterior view and then in the oblique view.

INTERPRETATION OF DACRYOCYSTOGRAM:

Normal Dacryocystogram:

The dye reflux is minimal and there is no pooling of dye anywhere in the lacrimal passage and flows freely into the nasal cavity. The canaliculi are outlined joining the lateral wall of sac after uniting to form common canaliculi.

The lacrimal sac has uniform C shape outline with no undulations or filling defects in it. There are mainly two constrictions, the valves of Krause being in the proximal third and the Taillefer in the lower third. This is followed by the nasolacrimal duct which opens into the nasal cavity.

The delayed films taken later show emptying, filling defects which mark stones, residual pooling,. The delayed picture taken in the sitting posture also gives effect of gravity in draining

Abnormal Dacryocystogram:

The behavior of dye that was injected into the catheter gives different interpretations. They are namely

1. Failure of the injected dye to reach the nose indicates an anatomical obstruction in the lacrimal drainage system, the site of obstruction is evident.
2. A normal dacryocystogram in the presence epiphora indicates a mild incomplete anatomic block or physiologic dysfunction.
3. The diagnosis of functional nasolacrimal duct obstruction (FNLDO) is made when there is poor emptying, such that residual contrast is present in the lacrimal sac or nasolacrimal duct on the delayed radiograph.
4. Dacryocystography is also helpful in the diagnosis of diverticula, fistulae and filling defects caused by stones or tumors. The presence of super numeric calculi is well counted and identified.

5. Imaging of the canaliculi with dye but failing to pass into the lacrimal sac or nasolacrimal duct implies obstruction at the level of common canaliculi.
6. Obstruction at level of the lacrimal sac–duct junction usually results in a well dilated sac with no dye reaching the duct or nose, even on delayed films.
7. Obstruction involving the nasolacrimal duct will show dilatation of the lacrimal sac, with dye in the nasolacrimal duct, but not reaching the nose.
8. Dacryocystogram is also then carefully evaluated to assess the grade of reflux from the upper canaliculi, the size of the lacrimal sac (mm) and the nasolacrimal duct caliber (mm) and comments made on the presence of any filling defects or diverticulae.
9. Finally, a subjective estimate is made for each abnormal dacryocystogram to determine whether the area of chief “hold up” lies in the canalicular system, at the lacrimal sac/duct junction, or within the nasolacrimal duct.

10. Dacryocystogram with digital subtraction radiography can eliminate confusing bone shadows to identify the exact morphology of the sac outlined.

11. Dacryocystogram of failed Dacryocystorhinostomy surgery can help us to see pooling of dye in middle meatus and also stricture of ostium.

STATISTICAL METHODS

The data collected are entered in the data collection form and Plotted in a properly prepared excel sheet. Data analysis was done Using Epidemiological information package 17.

Using this software, frequencies, mean, percentages, Standard Deviations and 'p' value were calculated.

For qualitative variables Yate's test was used. A 'p' value less than 0.05 is being taken as a significant relationship.

ANALYSIS

Data will be spread in excel sheet and analyzed using simple descriptive statistics.

RESULTS

40 patients with chronic dacryocystitis were included in this prospective study.

1) DEMOGRAPHIC PATTERN

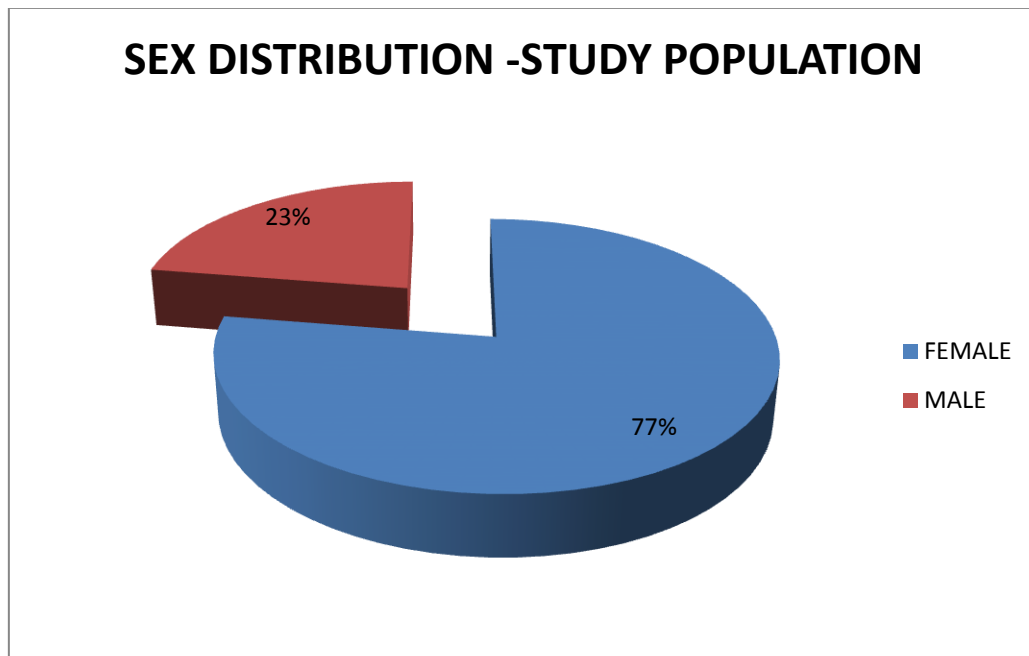
Table 1 - showing sex preponderance

Gender	No. of patients	Percentage %
MALE	9	22.5%
FEMALE	31	77.5%
TOTAL	40	100%

Incidence of chronic dacryocystitis is found to be more common among females. Among the 40 patients, 9 were male and 31 were female. There was a female preponderance.

Male – female ratio was 1:3.4. and 77.5% among females

CHART 1 -showing the sex distribution of chronic dacryocystitis



This is attributed to narrow lumen of lacrimal passage in females.

P value = 0.007 and hence significant

Table 2 - showing age distribution

Age group (in years)	No.of patients	Percentage
30 -40	9	22.5%
41-50%	2	5%
51-60%	13	32.5%
60-70%	16%	40%
TOTAL	40	100%

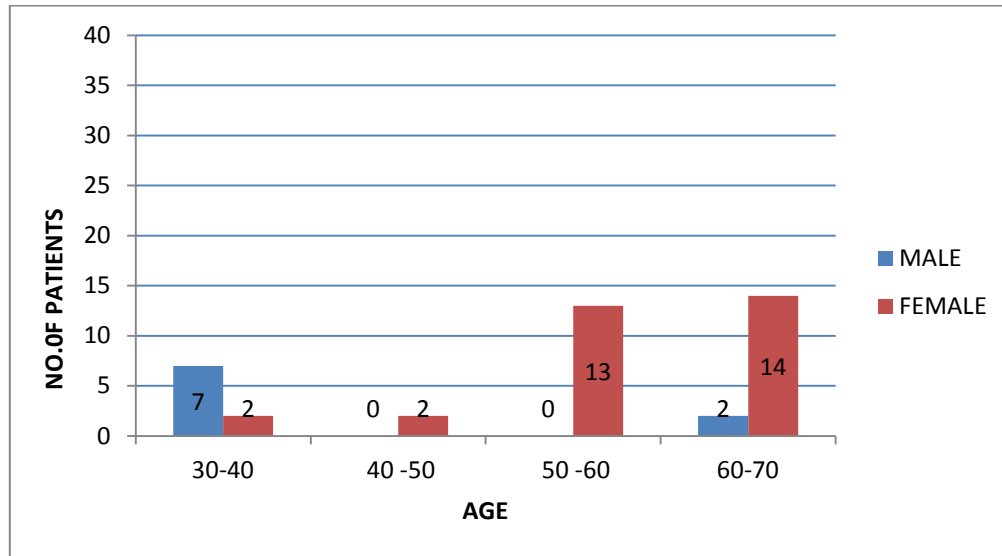
Incidence of chronic dacryocystitis is found to be more common in the age group 50 -70 years - 72.5%

The incidence of chronic dacryocystitis in female increases to a maximum in sixth to seventh decade.

Among male patients the highest incidence of chronic dacryocystitis occurred in late thirties.

P value <0.001 and hence significant.

CHART 2 - showing the age distribution



2) CLINICAL PARAMETERS:

Table 3 - showing Laterality

Side affected	No.of. Patients	Percentage
RIGHT	11	27.5%
LEFT	29	72.5%
Total	40	100%

Among 40 patients with chronic dacryocystitis, left side was being affected in a higher incidence comparing to right side. Left side being involved in 72.5%.

P value =0.031 and hence significant

CHART 3 - showing the laterality

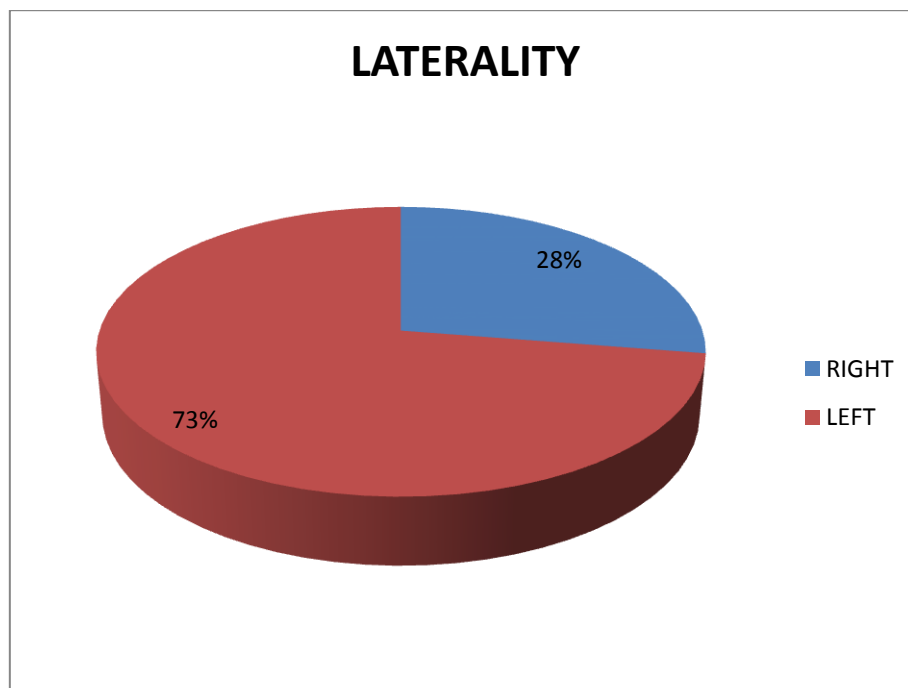


Table 4 - showing Presenting Complaints

Presenting complaints	No.of.Patients	Percentage
Watering	16	40%
Watering with swelling	11	27.5%
Watering with discharge	9	22.5%
Watering with swelling with discharge	4	10%
TOTAL	40	100%

Watering was the major presenting complaint in patients with chronic dacryocystitis (40%) followed by associated swelling (27.5%), few of them presented with discharge associated with watering and swelling (10%).

CHART 4 - showing Presenting Complaints

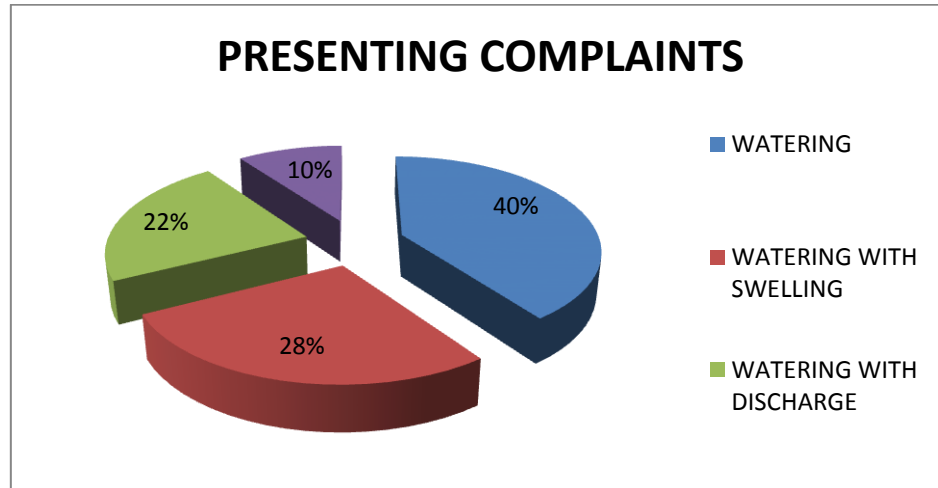


Table 5 - showing results of Syringing

Syringing	No.of patients	Percentage
Regurgitation of clear fluid through same punctum	2	5%
Regurgitation of clear fluid through opposite punctum	5	12.50%
Regurgitation of mucopurulent Fluid	23	57.50%
Partial regurgitation of mucous	10	25%
Total	40	100%

On lacrimal syringing regurgitation through same punctum is suggestive of site of obstruction at the canaliculus.

Regurgitation through opposite punctum indicates the probable site of obstruction being common canaliculus.

Regurgitation of mucopurulent material indicates complete nasolacrimal duct obstruction. Partial regurgitation of mucous indicates partial nasolacrimal duct obstruction.

Chart 5- showing results of Syringing

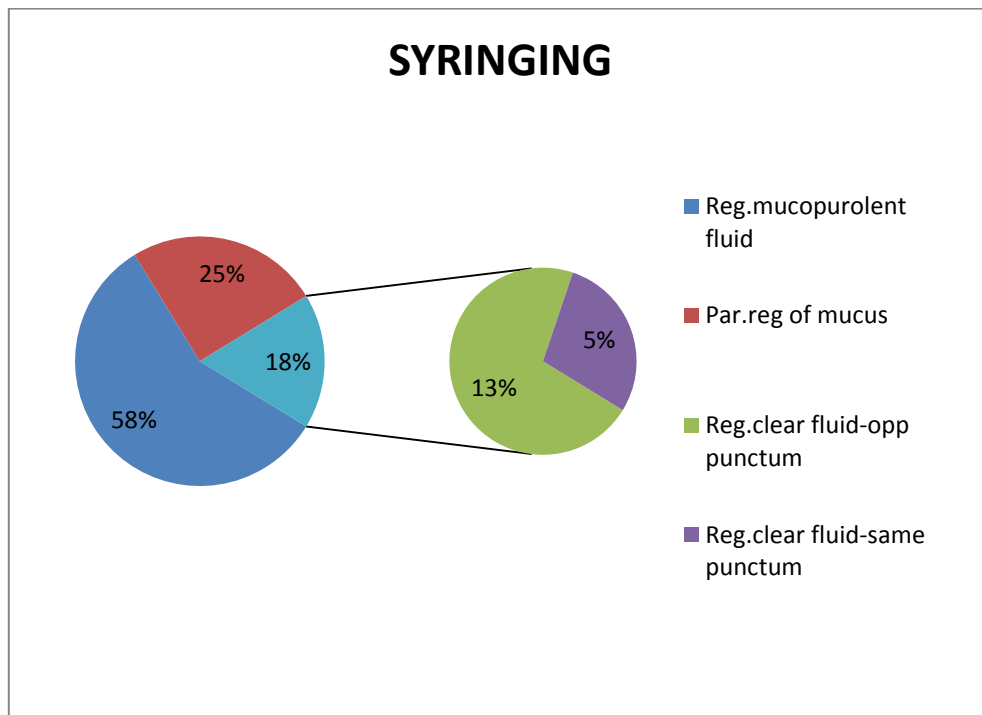


Table 6 - showing Level of block detected during dacryocystogram

Level of block	No.of patients	Percentage
Canalicular block	2	5%
Nasolacrimal duct block	38	95%
Total	40	100%

Level of block detected during dacryocystogram:

During dacryocystogram, 95% i.e. maximum number of cases had block at the level of nasolacrimal duct followed by canalicular block in 5%.

Probably due to their lumen being narrow predisposing to obstruction. P value < 0.001 and hence significant

Chart 6- showing Level of block during Dacryocystogram

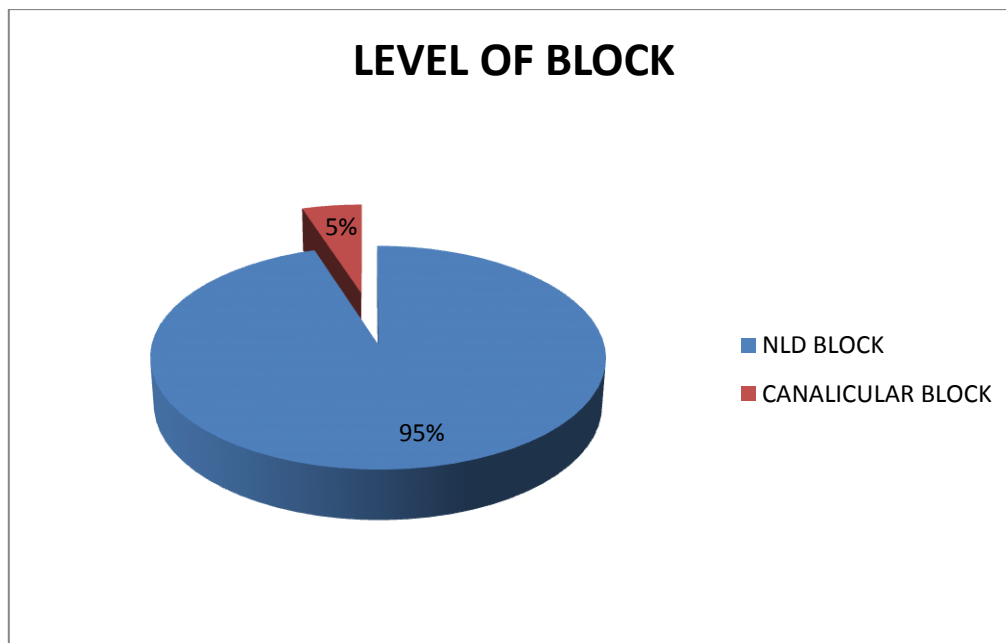
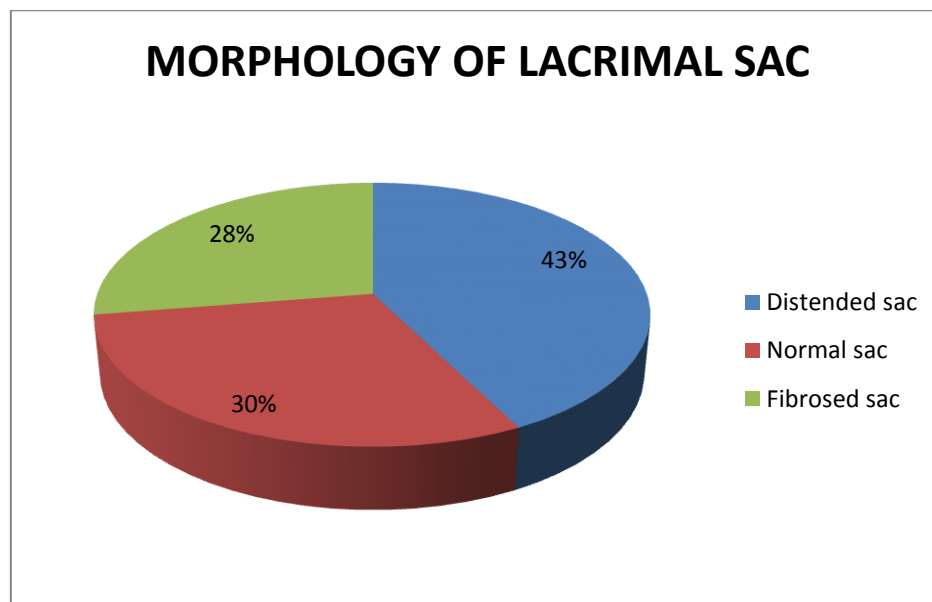


Table 7 - showing Morphology of sac on Dacryocystogram:

Morphology of sac	No. of patients	Percentage
Normal sac	12	30%
Distended sac	17	42.5%
Fibrosed sac	11	27.5%
TOTAL	40	100%

Chart 7- showing Morphology of sac on Dacryocystogram



On dacryocystogram, distended sac was found in maximum number of cases (42.5%), followed by normal sac in 35%, the rest being fibrosed irregular sac (22.5%).

Table 8 - showing Type of block

Type of block	No. of patients	Percentage
Partial block	10	25%
Total block	30	75%
<hr/>		
Total		

Complete or total block is more common being 75% when compared to partial block 25%.

Chart 8 - showing Type of block

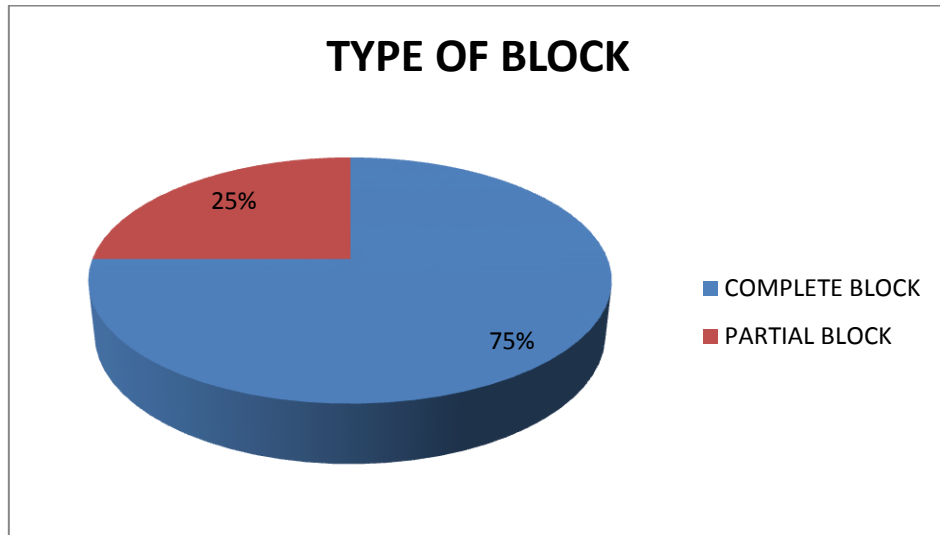


Table 9 - showing associated findings on Dacryocystogram

Associated findings	No. of Patients
Fistula	2
Residual sac	1
Dacryolithiasis	0

Associated findings on Dacryocystogram:

Dacryocystogram delineate the altered tract being external in two patients. Residual lacrimal sac following incomplete excision of sac in patient for whom DCT have been performed earlier made out. Dacryolithiasis was also detected.

Table 10 - showing Complications of Dacryocystogram

Complications	No. of Patients
Bad taste	2
Irritation, burning sensation	1
Scarring of punctum	0
Granulomatous inflammation in subcutaneous tissue	0
False impression of polycystic sac	0

Complications of Dacryocystogram:

- Complications though rare include bad taste when contrast agent reached the tongue while swallowing in two patients.
- Transient irritation and burning sensation for few minutes only in one patient.

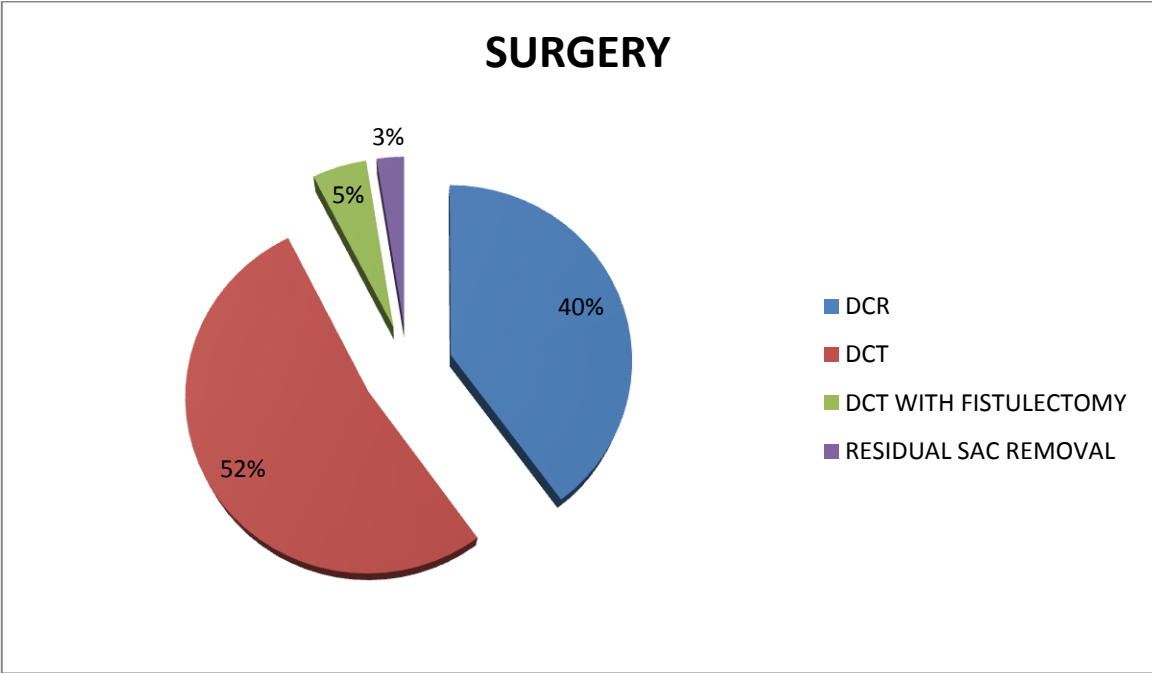
Table 11 – showing surgical decision based on Dacryocystogram

Surgery	No.of patients	Percentage
DCT	21	52.5%
DCR	16	40%
DCT WITH FISTULECTOMY	2	5%
RE EXPLORATON OF SAC	1	2.5%
TOTAL	40	100%

Surgical decision based on Dacryocystogram:

Based on dacryocystogram findings dacryocystectomy was advised in maximum number of cases (55%), followed by dacryocystorhinostomy (40 %).excision of fistulous tract along with dacryocystectomy was performed 5% of them.

Chart 9 –showing surgical decision based on Dacryocystogram

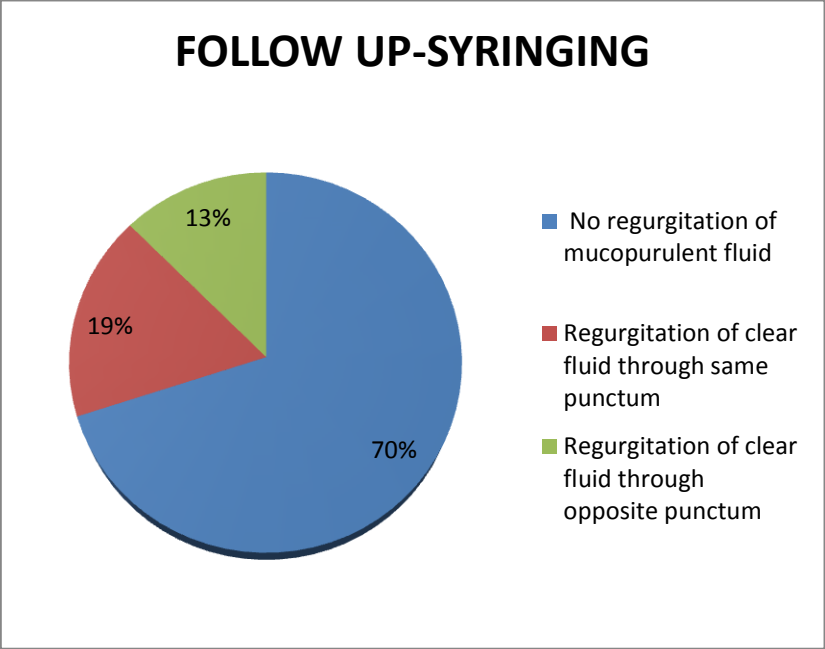


Surgical decision is made on the basis of level of obstruction and condition of sac and associated findings age of the patient.

Table 12- showing follow up & outcome:

Outcome -syringing	No.of patients	Percentage
No regurgitation of mucopurulent fluid	28	70%
Regurgitation of clear fluid through same punctum	7	17.5%
Regurgitation of clear fluid through opposite punctum	5	12.5%
Total	40	100%

Chart 10- showing follow up & outcome:



Syringing performed in the follow up period show the following interpretation. P value < 0.001 and hence significant.

Summary

- ❖ 40 cases presented with chronic dacryocystitis were included in this study.
- ❖ Average age of presentation of chronic dacryocystitis in the study was between 50-70 years. Among female maximum in sixth to seventh decade 16 (40%) patients.
- ❖ Most of the patients in this study were female 31 (77.5%), male 9 (22.5%)
- ❖ About 29(72.5%) people among 40 patients of dacryocystitis had left sided involvement and right side in 11 (27.5%) patients.
- ❖ During initial presentation 16 (40%) patients had watering, 11(27%) patients had watering with swelling, 9(22.5%) patients had watering with discharge, and 4 (10%) patients had watering with swelling with discharge as presenting complaints.
- ❖ Among 40 patients on syringing 23(57.5%) patients was found to have regurgitation of mucopurulent fluid ,10 (25%) patients was found to have partial regurgitation of

mucous,5(12.5%) patients had regurgitation of clear fluid through opposite punctum on syringing with normal saline, 2 (5%) patients regurgitation of clear fluid through same punctum.

- ❖ On performing dacryocystogram in 40 cases, level of block was found to be at nasolacrimal duct in 38 (95%) patients and canalicular block in 2(5%) patients.
- ❖ On assessing morphology of sac 17(42%) patients had distended sac, 12(30%) patients had normal sac and 11(28%) patients had fibrosed sac.
- ❖ Complete block was found in 30 (75%) patients and partial block in 10(25%) patients.
- ❖ Associated findings present include fistulous tract in 2 patients and residual sac in 1 patient.
- ❖ Complication of dacryocystogram found to be least and transient including irritation in one patient and bad taste in two patients.
- ❖ Among the 40 patients DCT was performed in 21 patients, DCR in 16 patients, CT with fistulectomy in 2 patients, re exploration of sac in one patient.

- ❖ On follow up syringing after surgery no regurgitation of mucopurulent fluid was noticed in 28 patients, regurgitation of clear fluid through same punctum was noticed in 7 patients and regurgitation of clear fluid through opposite punctum was noticed in 5 patients.

DISCUSSION

40 patients of chronic dacryocystitis were studied who were between 12 – 70 years of age of both sex are included. Most patients with chronic dacryocystitis manifested with complaints of intermittent conjunctival hyperaemia and epiphora.

All patients were subjected to fluorescein dye disappearance test, and then primary and secondary Jones test followed by syringing of the lacrimal passage was performed with normal saline in all those cases.

Conventional dacryocystogram was performed in all these patients by injecting radiographic contrast material, non-ionic water soluble contrast medium (Iohexol) under local anesthesia to localize the exact site of obstruction, whether these obstructions are unilateral or bilateral, condition of the lacrimal sac, correlating these above findings with gender, age group, and other factors.

Thus surgical decision is made based on the findings of dacryocystogram for better surgical outcome.

Patients who are suffering from Acute dacryocystitis, suffering from systemic disorder (uncontrolled HT), having

allergy and hypersensitivity to contrast media, were not included for dacryocystogram

Demographic pattern:

In this study 77.5% of chronic dacryocystitis patients were females; this is attributed to narrow lumen of lacrimal passage among females. P value = 0.007% and hence significant.

Most studies on chronic dacryocystitis have shown preponderance among female of 75% - 80%. Schellini et al 2005 evaluated 100 patients by DCG using liposoluble contrast and found approximately 75% were female.

Female to male ratio in this study was found to be 3.4:1 this is similar to study conducted by Pervez et al. (3.1:1).

This study showed female preponderance among fifth to seventh decade (87%) higher than among younger age group (13%). According to a study conducted by Malik SRK et al (1969) female preponderance was found to be maximum in fourth decade, which was followed by gradual decline in late decades.

Laterality:

In this study left side is involved in 29 (72.5%) cases followed by right side in 11 (27.5%) cases. P value = 0.031% and hence significant. According to a previous study conducted by Malik SRK et al (1969) also showed left side being most commonly involved by 70% than the right side lacrimal passage (30%).

Presenting Complaints:

In this study watering was the presenting complaint in majority of patients with chronic dacryocystitis(40%), 27.5% presented with watering with swelling and least presentation being watering with swelling with discharge in 10% of them.

Most studies on chronic dacryocystitis showed watering as major presenting complaint in 40-50% of them. In the study conducted by Pervez et al also watering was the presenting complaint in 46% followed by watering with swelling in 18%. Shivareddy P et al 1955 in his study also had similar findings.

Syringing:

In this study majority of them had regurgitation of mucopurulent fluid on syringing with normal saline 57%, followed by regurgitation of clear fluid through opposite punctum in 12.5% and least being regurgitation of clear fluid through same punctum in 5% of them.

But in the study conducted by Pervez et al majority of them had regurgitation through upper punctum in 80% of cases.

Level of block:

In this study the most common site of block being nasolacrimal duct (75%) followed by canalicular block. The lumen of NLD being slightly tortuous and irregular leads to stasis of secretion and as a consequence stenosis occurs. P value < 0.001% and hence significant.

Agarwal et al (1961) in his study concluded that major obstruction site was a junction of lacrimal sac with nasolacrimal duct followed by nasolacrimal duct obstruction.

Type of block:

According to this study complete block (75%) was found in majority of patients than incomplete or partial block (25%).

This is in favour with findings of study by Pervez et al which also shows complete block [77.86%] more common than partial block [22.14%]. Most studies show complete block around 70 – 80 % being more common followed by incomplete block. Also in favour with study by Nahata et al [1964].

Morphology of sac:

In this study on observing the morphology of sac - 30 % showed nearly normal sac ,28 % showed small irregular fibrosed sac and 42% showed distended sac.

This is similar to findings as in the study of Pervez et al; enlarged sac was found to be in higher proportion than normal sac. Study by Malik SRK et al [1969] also showed distended sac in majority of patients with chronic dacryocystitis.

Associated findings:

In this study two patients had external fistula, none had internal fistula. Residual sac was noticed in one patient following DCT. There were no cases of filling defect, diverticula, lacrimal stone, and bone fracture.

Study by Francisco et al [2007] found associated other radiological findings which include 4 cases of external fistula;

none had internal fistula, 2 cases of lacrimal stone, and 4 cases of diverticula. In his study Malik et al (1969) also found 7 cases of external fistula and 14 cases of diverticula.

Complication of Dacryocystogram:

On post examination following dacryocystogram, 2 cases found to have bad taste and one patient found to have irritation and burning sensation which being only transient only for less than 10 minutes. After 30 minutes, on examination following dacryocystogram there is no persistence of bad taste or irritation.

In his study Pervez et al also found one patient complaining of bad taste, flushing and also one patient complaining of burning sensation, irritation, and dryness. None had serious adverse reaction, no scarring of punctum, or granulomatous inflammation in subcutaneous tissue and no false impression of polycystic sac.

We chose non - ionic water soluble contrast medium, as it is of low viscosity, being homogenous with a pH between 6 and 7.4 similar to normal tears and it is of good miscibility with body fluid. There was no false impression of polycystic sac as it occurs while using a liposoluble contrast since the oil does not

mix well properly with lacrimal secretion. Though water soluble contrast was used in our study and acquisition of image was by using digital X-ray, no examinations were found to be inconclusive in our study.

In his study Schellini et al used liposoluble contrast for acquisition of image and found examination was inconclusive in 19 patients and elimination rate was found to be slower when the duct are being altered.

Treatment:

Based on dacryocystogram findings surgical decision was made in this study. Dacryocystectomy was advised in 21%. Dacryocystorhinostomy was advised in 16%. For two patients with fistula dacryocystectomy with fistulectomy was done, for a patient with persistent residual sac following dacryocystectomy done earlier re exploration of sac was done.

When sac morphology is altered due to chronic inflammation leading to fibrosis it is better to avoid DCR and DCT can be performed in those patients. Those patients with normal sac morphology without proximal obstruction of punctum and canaliculus, DCR are performed.

Follow up and outcome:

Outcome after surgery on follow up with syringing showed no regurgitation of mucopurulent fluid in majority of cases. Hence it is evident from the findings derived from this study that dacryocystogram is a safe investigating modality in hands of skilled ophthalmologist and radiologist.

Dacryocystogram is easy to perform, harmless and it provide good imaging quality at a much lower cost and exposure to radiation being at a much lower rate than compared to CT. In our opinion it can be performed safely presuming that every patient suffering from dacryocystitis has to undergo DCG after syringing.

It aid us to localize the level of block ,changes in the morphology of sac and lacrimal duct, at times the etiological factor for epiphora can be diagnosed based on it.Enabling us to meticulously plan the treatment for chronic dacryocystitis in a much better fashion, there by better outcome following surgery can be achieved without recurrence (Pervez et al).

CONCLUSION

Patients with chronic dacryocystitis should be done a thorough history taking - drug allergy, any previous surgery. Complete evaluation including visual acuity, duct syringing and dacryocystogram performed.

Initial dacryocystogram was more reliable in demonstrating the anatomy of lacrimal passage and identifying the level, type of block, morphology of lacrimal sac and associated findings. Better diagnostic tool in deciding the plan of management for patients with chronic dacryocystitis.

PART THREE

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PROFORMA

1. Name of the patient:

2. Age:

Sex:

IP / OP No:

3. Address:

Contact No's:

4. History of DM / HT / IHD / CRF / ENT Disease / Bronchial

Asthma / Others:

5. Drug Allergy if any:

6. History of any previous surgery done:

7. Present symptoms & duration:

8. Ocular examination:

OD

SIDE

OS

LIDS

CONJUNCTIVA

CORNEA

ANT. CHAMBER

LENS

VITREOUS

RETINA

VISUAL ACUITY

IOP

DUCT

OTHERS

9. Dacryocystogram:

Done on: _____ at: _____

Reference No: _____

OD

SIDE

OS

MORPHOLOGY OF SAC

LEVEL OF OBSTRUCTION

PARTIAL / TOTAL

ASSOCIATED FINDINGS

10. Complication of Dacryocystography:

11. Treatment done:

12. Follow up and outcome:

MASTER CHART

S.NO	NAME	AGE	SEX	SIDE	COMPLAINTS	SYRINGING	DCG			TREATMENT	OUTCOME	FOLLOW UP	
							LEVEL OF BLOCK	MORPHOLOGY OF SAC	TYPE OF BLOCK				ASSOCIATED FINDING
1	ALAGAR	32 M	L	W	PM	NLD	F	PB	F	NIL	DCT-F	NR	45
2	MAHALAKSHMI	42 F	L	W	PM	NLD	N	PB	-	NIL	DCR	NR	50
3	ANDI	36 M	L	WSD	RMP	NLD	D	TB	-	NIL	DCR	NR	38
4	KALYANI	65 F	R	WSD	RMP	NLD	D	TB	-	NIL	DCT	NR	41
5	KOVLIPILLAI	65 M	L	WD	RMP	NLD	F	TB	RS	NIL	Res ex sac	NR	42
6	LAKSHMANAN	38 M	L	W	PM	NLD	N	PB	-	NIL	DCR	NR	51
7	RAMAYEE	67 F	R	WD	RMP	NLD	D	TB	-	NIL	DCT	NR	39
8	INDRANI	51 F	L	W	PM	NLD	N	PB	-	NIL	DCR	NR	40
9	MALLIGA	53 F	L	WS	RMP	NLD	D	TB	-	NIL	DCR	NR	52
10	PALANIAMMAL	68 F	L	WD	RCO	NLD	F	TB	-	NIL	DCT	RCO	46
11	PANDI	38 M	R	W	RCO	NLD	F	TB	-	NIL	DCT	RCO	43
12	PANDISELVI	55 F	L	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	47
13	PONAMMAL	60 F	L	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	36
14	SANGEETHA	33 F	R	W	RCO	NLD	N	TB	-	NIL	DCR	RCO	54
15	SARASU	51 F	L	W	RMP	NLD	N	TB	-	NIL	DCR	NR	56
16	SHANTHA	52 F	L	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	44
17	RAMKUMAR	34 M	R	W	RMP	NLD	N	TB	-	NIL	DCR	NR	48
18	KALLAI	65 M	L	WD	RMP	NLD	D	TB	-	NIL	DCT	NR	28
19	KARUPAYEE	67 F	L	WDS	RMP	NLD	D	TB	-	NIL	DCT	NR	49
20	SUNDAMMAL	57 F	L	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	53
21	RAKKU	68 F	L	WD	PM	NLD	N	PB	-	BT	DCR	RCS	29
22	PARVATHI	66 F	R	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	32
23	PONNUTHAI	60 F	L	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	33
24	SIVANANDI	39 M	L	W	PM	NLD	N	PB	-	NIL	DCR	RCS	34
25	PARAMESHWARI	63 F	R	WS	RMP	NLD	D	TB	-	NIL	DCT	AS	24
26	KALAIVANI	51 F	L	W	PM	NLD	F	PB	F	NIL	DCT-F	RCS	30
27	KARUMI	69 F	L	WDS	PM	NLD	D	PB	-	NIL	DCT	RCS	35
28	SURAMMAL	65 F	R	WD	RCO	NLD	F	TB	-	NIL	DCT	RCO	25
29	PAVUNTHAI	53 F	L	W	RCS	CB	F	TB	-	NIL	DCT	RCS	37
30	KRISHNAN	36 M	L	W	RMP	NLD	N	TB	-	NIL	DCR	NR	26
31	PAPPA	61 F	R	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	27
32	RAJALAKSHMI	54 F	L	W	PM	NLD	N	PB	-	BT	DCR	NR	38
33	CHELLAMAL	68 F	R	WD	RMP	NLD	F	TB	-	NIL	DCT	NR	20
34	ANNATHAL	67 F	L	WS	RMP	NLD	D	TB	-	NIL	DCT	NR	43
35	PANJU	59 F	L	WS	PM	NLD	D	PB	-	NIL	DCR	RCS	22
36	LAKSHMI	58 F	R	W	RCS	CB	F	TB	-	IR,BS	DCT	RCS	28
37	SHANTHI	41 F	L	W	RMP	NLD	N	TB	-	NIL	DCR	NR	45
38	SOUNDAMMAL	67 F	L	WD	RCO	NLD	F	TB	-	NIL	DCT	RCO	31
39	RAJAMMAL	65 F	L	WD	RMP	NLD	F	TB	-	NIL	DCT	NR	55
40	SELVI	34 F	L	W	RMP	NLD	N	TB	-	NIL	DCR	NR	32

KEY TO MASTER CHART

SEX: M-male; F-female;

SIDE: R- Right; L-Left;

PRESENTING COMPLAINTS:

W- Watering,

WS-watering with swelling,

WD- watering with discharge,

WSD- watering with swelling with discharge

DUCT SYRINGING:

RS-Regurgitation of clear fluid through same
punctum,

RO-Regurgitation of clear fluid through opposite
punctum.

RMP- Regurgitation of mucopurulent fluid.

PM- Partial regurgitation of mucous.

LEVEL OF BLOCK:

NLD- Nasolacrimal duct block,

CB-Canalicular block.

MORPHOLOGY OF LACRIMAL SAC:

N-Normal sac,

F- Fibrosed sac,

D-Distended sac.

TYPE OF BLOCK:

PB-Partial block,

CB-Complete block.

ASSOCIATED FINDINGS:

F-Fistula,

RS- Residual sac.

COMPLICATION OF DCG:

BT-Bad taste,

IR- BS- Irritation burning sensation

TREATMENT:

DCT-Dacryocystectomy,

DCR-Dacryocystorhinostomy,

DCT-F- Dacryocystectomy with fistulectomy.

Rec Ex Sac- Re exploration of sac.

OUTCOME –

AS- ASymptomatic,

R- Recurrence of symptoms.

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