The dacryocystitis has been known from the earliest times owing to its grosser manifestations involving abscesses and fistulae on the face. In the middle of the first century A.D., however, disease of the tear passages is mentioned in the literature. The gross pathological manifestations were shown to depend on inflammation not of the tissues generally but of the nasolacrimal canal, these manifestations taking three forms - acute, chronic and hydropsies or ulceration.

Incidence - Several features in the incidence of inflammation of the lacrimal sac are of importance.

Age - Apart from the special case of dacryocystitis in the new-born which depends upon development anomalies, the disease affects preferentially adults over middle life, being relatively rare in children and adolescents, the highest incidence is in the 5th decade, but it also occurs in advanced age.

The sex incidence is important, while the disease in the newborn affects both sexes equally, its occurrence among adults is in the ratio of 75 - 80% females to
25 - 30% males, a significant difference stressed by every authority. It is usually said that this very striking predilection for the female is due to a narrower lumen of the bony lacrimal canal (Meller, 1929; Ruiz Barranco and Martinez Roman, 1966 and others) which Heinonen (1920) associated with a high nasal index and although this explanation is not universally accepted, no other adequate reason has been advanced. The suggestions that women are more prone to the disease because they weep more often than men, or because they blow their noses less heartily, both of which tendencies might be construed to favour the stagnation of tears are hardly impressive.

Racial and geographical incidence appear to be of some significance. Thus the disease is rarer among Negroes than Whites, a circumstance which may be associated with sex incidence since radiological examination shows that in the former the canal is shorter, wider, less sinuous and is provided with a larger ostium (Santos-Fernandez, 1903-21). According to Truc (1900-26) disease is more common among Whites in tropical countries than in temperate climates.

Social incidence has been noted by most writers, a feature not seen in the congenital condition, for the majority of adult cases is found among those to whom cleanliness is not important.
A hereditary and familial tendency has been observed on many occasions since its annotation by Mackenzie (1840) in two sisters, it is usually transmitted as a dominant characteristic by both males and females to children of either sex but variations in the mode of transmission occur. As we shall see, the probable clue to the hereditary tendency is structural configuration.

There are probably many factors which tend to initiate or influence this process, to most of which has at one time or another been ascribed a primary role in the etiology of the disease.

1. **Anatomical factors** — There is little doubt that structural constrictions of the lacrimal passages play a considerable part in the incidence of the disease. These may be associated with the mucosa, wherein a lack of complete canalization particularly at the lower end of the canal is the cause of congenital dacryocystitis. Acting to a lesser degree the same process frequently leads to the formation of folds in the mucus membrane or results in a small ill-functioning inferior opening, either of which tends to produce a condition of chronic stasis or even if any degree of tumescence is indeed, a complete obstruction (Schaeffer, 1920). It is probable that the somewhat rare cases of dacryocystitis occurring in children are due to this cause (Granstrom, 1938). The osseous canal also suffers considerable variations
and may be so narrow that, although the naso-lacrimal duct enclosed within may be permeable, the slightest intumescence would lead to occlusion.

The Sondermann's (1923) examination of 'normal' cadavers showed that marked constrictions by folds occurred in the lacrimal duct in 40% and moderate constrictions in 29% while only 31% had a normal lumen. Narrowing of the osseous canal has been found in cases of dacryocystitis and tends to occur with a flat nose and a narrow face (Weinoven, 1920; Seidenari, 1947), but is seen particularly if the lacrimal bone is undeveloped and the maxilla compensates for this deficiency (Whitnall, 1912). Moreover, the development of a spur on either the anterior or posterior lacrimal crest or the presence of a well-developed hemular process may constrict the entrance to the canal (Zabel, 1900; Onodi, 1913). These bony defects and deformities are frequently hereditary and account for some of the more marked cases of the familial transmission of the disease (Gualdi, 1930; Vogt, 1930).

2. Neighbouring Infections - There is little doubt that the spread of infection from neighbouring structures frequently determines the onset of inflammation, particularly in those cases wherein anatomical peculiarities predispose to stasis. Disease of the neighbouring bones and tissues may spread to the sac in a small number of cases wherein the etiology is clear, it is more
controversial how frequent and important is the spread from the nose and sinuses on the one hand, and from the conjunctiva on the other.

Most discussion has arisen around the question of nasal disease since the source of infection was originally suggested by Planter (1724) and was stressed by Schirmer (1877) and Kuhnt (1891–95), it is known that inflammatory changes usually start and are more marked in the lower reaches of the lacrimal passage and it is probable that in a large number of cases their incidence is determined by the direct spread of infection from the nose. It seems equally probable, however, that nasal disease is not the sole factor in the etiology, but that it usually requires a favourable soil for its extension. It cannot by itself, for example, explain the social and sex incidence of dacryocystitis, nor can it be regarded as invariably present.

The incriminated lesions are numerous. Mechanical obstruction is frequently found, particularly an enlargement of flattening of the inferior turbinate which may almost obliterate the anterior part of the meatus and may cause a local rhinitis, implicating the opening of the duct (Harmer, 1915; Bilancioni, 1921; Sondernann, 1923; Post, 1928 and others). Similarly, a deflection of the septum may compress the inferior turbinate against the lateral nasal wall (Kofler, 1919–30; Stenger, 1920; Bockstein, 1926).
In this connection, it is interesting that suppurative dacryocystitis has followed packing of the nose (Ruttin, 1916; Kofler, 1919-30). Congestive and hypertrophic conditions of the mucosa, whether vasomotor or inflammatory, may similarly cause a varied degree of obstruction at the lower end of the canal, exceptionally a nasal polyp or a neoplasm acts in a similar manner.

Inflammatory conditions, whether chronic nasal catarrh or the more acute and suppurative infections, may spread into the lower part of the duct particularly if the ostium is freely open. Finally, atrophic conditions in the nose frequently figure in the aetiology, particularly osseous, the destruction of the mucosa leaving a patentous ostium, not only permitting ready extension of the disease upwards but allowing the direct entrance of infective secretion into the duct on blowing the nose (Franceschetti, 1935). Heilmann (1899), for example, found 136 cases of atrophic rhinitis among 352 cases of dacryocystitis.

Sinus disease has undoubtedly a close relation with lacrimation inflammation, here again some advocates of this particular source of infection has undoubtedly over stressed their case. Some authors admitted little or no relationship (West, 1926; Döckstein, 1926; Diggle, 1927 and others), while others claimed that sinusitis and dacryocystitis co-existed in too large a proportion of cases to be coincidental and that the latter frequently
cleared up on the relief of the nasal condition (Peters, 1905-13) 50% of cases of suppurative dacryocystitis with fistula, Khunt (1914) 68% of all cases of dacryocystitis with certain and 23% with probable sinus disease. Brunzlow (1920), 63.5% and 22%, Cordero (1934) 46% certain, 33% probable, Garfin (1942) 55%. It is probably that the infection spreads either by venous or lymphatic pathway, by contiguity or by continuity, lacunae in the lacrimal bone sometimes allow direct continuity between the ethmoids and the sac, the wall of the lacrimal fossa and the upper part of the duct being pneumatized by ethmoid cells or the lacrimal bone, which is frequently paper thin, becoming absorbed by age, caries or pressure, while the pericystic tissues, rich in lymphocytes and heavily vascularized, form a readily traversable bridge between two.

Conjunctival infection constitutes a third method of direct spread, but all the evidence points to its rarity. Expecting infiltrating diseases, such as, trachoma, there is little evidence that infection from above figures largely in the aetiology of inflammation below the canaliculi.

3. General infections and general disease are occasionally responsible for the onset of dacryocystitis, as is indicated by the occurrence of inflammation during the course of influenza, scarlet fever, diphtheria, chickenpox (Margaillan and Morenom, 1923; Mukherjee et al,
1969 and others). We shall see also that infections such as tuberculosis may become established through blood infection.

4. The factor of excessive lacrimation has at various times been given a place in the aetiology of dacryocystitis, an increased secretion of tears leading to stagnation with a tendency to atony of the sac, thus resulting eventually in chronic irritation, inflammation and a weakening of resistance to organismal attack.

5. As a rarity a dacryocystitis may be excited by a foreign body in the sac such as a ciliun entering through the canaliculus (Rehr, 1894) or a body introduced through the nose (Malgat, 1890) but as a role in such cases the tolerance of the tissues in the more noteworthy feature.

A very rare clinical form is chronic peridacryocystitis, originally described by Cirincione (1890) and called pericystic tumour by Jocqs (1900) and pre-lacrimal tumour by Rollet (1900). Clinically it appears as a chronic abscess in the perilacrimal space leaving the lacrimal passages themselves patent (Wright, 1938). The infection may originate in the wall of the sac, or it may be formed in a diverticulum of the sac (Terson, 1903; Markovichelakis, 1964); alternatively, it may arise from a neighbouring perisositis or sinusitis.
The diagnosis of chronic dacryocystitis usually depends on the symptoms of epiphora in the investigation of which an obstruction is found in the lacrimal passages and the fluid regurgitated into the conjunctival sac on syringing is seen to contain shreds of mucous or pus. In the more advanced cases the regurgitation of mucous or pus on pressure is diagnostic but in the latent forms, particularly when epiphora is not marked or has become un-noticed because of its long standing, it may be more easily missed, in these cases the pressure of unilateral chronic and intractable conjunctivitis should always arouse suspicion. In the absence of local inflammatory symptoms, however a simple stenosis can not be differentiated with certainly unless some discharge is seen or unless repeated conjunctival swabs, despite treatment reveal a constantly reinforced infection.

A mucocoele is the commonest swelling at the site of the sac but may require to be differentiated from a tumour or a cold abscess, tuberculosis or syphilis, by exploratory operation and biopsy; a radiological examination may help. Dermoid and sebaceous cysts are more superficial and leave the lacrimal passage patent. A mucocoele of the paranasal sinuses is more common source of difficulty, particularly arising from an anterior ethmoid cell or the frontal sinus, but these usually present above the medial palpebral ligament. In these cases even in the presence of
persistent weeping, which may indeed by only the symptoms, the lacrimal passage remain permeable, while the diagnosis is made clear by the radiological and rhinological examination which should be undertaken in every cases of dacryocystitis and should always precede decisions as to treatment particularly when a drainage operation is contemplated.

In acute dacryocystitis the differential diagnosis concerns chiefly inflamed sebaceous cyst or furuncles near the medial canthus, erysipelas of the face, an acute periostitis, an acute sinusitis or more rarely a dental abscess, particularly of the canine tooth, giving rise to a maxillary periostitis which may simulate a pericystitis. The most common source of confusion is an acute infection of the ethmoids or frontal sinus tracking to the lacrimal region, but in these cases the maximal swelling and pain are usually above the medial palpebral ligament pressure over the sac itself does not excite maximal tenderness and the lacrimal passages are permeable. In these cases the diagnosis can be confirmed by radiography of the skull and if necessary of the sac and clinical rhinological examination procedures which should always be done to determine not only the aetiology but also the extent of the disease.

The history of the treatment of dacryocystitis is interesting not only because of its antiquity and many expedients which have at various times been tried since
the era of the code of Hammurabi, but also because its
exemplifies vividly the tendency for advances in knowledge
to move in circles rather than in straight lines, there
are few things under the sun which are really new. The
story certainly serves to show how resourceful is the
ingenuity of man and how great toleration of a sick body.
Celsus (25 B.C. - A.D. 50) excised the disease tissue
down to the bone which was then burned with a red-hot
iron so that a large sequestrum fell away - a heroic
extirpation of the sac combined with a nasal drainage
operation. Archigenes (2nd century A.D.) with the same
end in view, incised the sac, destroyed it with caustics
and then bored several holes through the bone into the nose.
These are similar somewhat brutal methods of approach
held until Anel (1713) inaugurated the more conservative
technique of attempting to restore the permeability of the
passages themselves and establish drainage by systematic
probing and syringing. These three principles - destruction
of sac, drainage into the nose and restoration of the
natural passages - have with many variations remained the
basis of all subsequent attempts of treatment. Apart from
these conservative treatment depends on heat and continuous
firm pressure (Fabricius ab Aquapendente, 1613).

Other expedients were advocated. J.L. Petit (1734)
incised the sac and from this vantage point forced probes
through the duct, the wound being allowed to heal after
the duct had been kept continually open for sometime, a procedure reviewed by Golowin (1923) who forced sounds upto 9 mm in diameter through an incision in the sac down the duct, fracturing the bone on the way. On the other hand, de la Foreste (1753) practised retrograde probing from the nasal ostium, a method later advocated by Polyak (1902), Critchett (1864) and at a later date Brown (1929) used dilating sounds of laminaria; Weber (1863-65) advocated rapid dilatation with conical sounds upto 4 mm in diameter, a practice followed by Ziegler (1910-22). Attempts to secure permanent drainage by leaving a metal tube (of gold, Mackenzie, 1819; Dupuytren, 1833) or a style (or permanent probe) of silver in the duct (Walton, 1863) were persistently made, others used wires or tubes of gold, silver or lead and others again threads of silk catgut or silk worm gut.

All these procedures were revived in more recent years, particularly the permanent insertion of a polythene tube into the naso-lacrimal duct after exposing the lacrimal sac in cases of chronic dacryocystitis (Summerskill, 1952; Singh & Garg, 1972). Most of them, however, are applicable to stenosis of the duct than to the treatment of an inflammatory condition. Cures have been claimed with all these methods, but the risk of a spreading cellulitis would seem to render their general application dangerous. Several such accidents have occurred, some of them fatal owing to orbital cellulitis and meningitis (A.L. Jones, 1984;
Fulton, 1885; Leplat, 1894; Cabanues and Ulry, 1897; Hildneth, 1936).

The technique of dacryocystectomy is concerned
the first essential is that the operation be carried out
in a bloodless field with anatomical exactitude and the
mucosa be removed in its entirety, particular attention
being paid to the fundus of the sac and the junction with
the canaliculi which, if necessary, can be completely
dissected out around a probe in the canaliculus (Pooley,
1913) moreover, the duct must be destroyed by through
curettage down the length of the naso-lacrimal canal. The
survival of any mucosa will entail continued suppuration,
a breakdown as a fistula, continued discharge through the
puncta on pressure, and the persistence of annoying epiphora.
It is to be noted that in such post-operative suppuration
the abscess sometimes points above the medial palpebral
ligament (West, 1932). It may happen that in the event of
a canaliculosis persisting, the canaliculi may require
to be destroyed by diathermy (Schultz, 1904).

During the end of the last century and indeed,
during the first three decades of the present one, the
classical methods of treating dacryocystitis were, therefore,
probing by Bowman's technique in those cases wherein little
structural damage had occurred, and excision of the sac in
the vast majority of cases. In general, the results were
satisfactory, but even when dacryocystectomy was most in
favour, the persistence of epiphora - even although not in
distressing degree - always excited aspiration to return
to the original technique of the ancients, wherein hope
was offered of a total cure of the disease with a perfect
restoration of function by re-establishing a connection
between the sac and the nose (Caldwell, 1893, and others).
How to make the communication permanent - essentially a
rhinological problem remain unsolved until an Italian
rhinologist.

Toti (1904) evolved his operation of external
dacryocystorhinostomy. The operation was not immediately
popular, partly because the technique was new and difficult
to the ophthalmologist and partly because the results were
not by any means invariably good. Subsequent improvements,
however, have remedied these defects, but in the mean time
a purely rhinological technique was proposed by West (1910)
and Polyak (1912) - an endo-nasal or internal dacryo-
cystorhinostomy wherein the approach to the sac was made
from nose, a technique rendered more easy by a trans-septal
approach (Kofler and Urbanek, 1925). These two techniques
may be simplified to form a combined external inter-nasal
operation (Mosher, 1915-23).

In the mean time, Forsmark (1911) in Sweden,
elaborated the idea of transplantation of the sac wherein
its lower part was cut away and implanted through a hole
in the bone into the nose. Finally, owing to the persistence
of suppuration in some cases, Blaskovics (1912) partially
excised and West (1921) completely excised the sac leaving
at the same time an opening into the nose - partial or
complete dacryocystectorhinostomy.

The original external dacryocystotorhinostomy of
Toti (1904) consisted of exposing the sac by an external
incision, resecting its inner wall, punching out a
 corresponding piece of bone with a hammer and chisel,
 resecting a corresponding area of the nasal mucous membrane,
 and sewing up the external wound. The lateral wall of the
 sac, pressed by bandages over the opening in the bone,
 thus became the lateral wall of the nose into which the
caliculi opened directly so that the sac itself as such
ceased to exist. The success of the operation depended
largely on the extensiveness of the resection, but even so,
the formation of granulations or the presence of extensive
disease of the walls of the sac frequently resulted in
failure from subsequent cicatrization.

Dupuy-Buutemps's technique or modification of
it has remained the most popular, and in suitable cases
a very high percentage of functionally good results can be
obtained 95% in 1000 cases.

The modification have been variations in the
methods of suturing, thus Soria (1944) sutured a single
flap of nasal mucosa to the posterior flap of the sac and
the anterior flap to the bony wall of the nose for the
hammer and chisel of Toti. Iliff (1954) introduced the
oscillating stryker trepain saw, and Krasnov (1971) cut
the bone ultrasonically. Several surgeons have attempted
to maintain patency in the opening by the temporary
introduction of such agents as rubber catheters, polythene
tubes, gauze or silk sutures. Good haemostasis is essential
indeed to attain it some surgeons relied on hypotensive
anaesthesia (Rycroft, 1959). The opening in the bony
lacrimal fossa should be large, at least 12.0 mm in
diameter and should exclude the medial wall of the naso-
lacrimal canal. Mucosa should be sutured to mucosa
anteriorly and posteriorly, and the medial palpebral
ligament is best preserved.

Partial or complete dacryocystorhinostomy is
applicable when the walls of the sac are extensively
diseased and their retention seems inadvisable, a technique
available when the sac is absent. To meet such cases,
Blaskovic (1912), Hotte (1918) and Arruga (1935-38), using
an external method, removed the whole sac except that part
into which the canaliculi open and thereafter made an
opening into the nose.

The various technical modifications introduced
into these procedure have been ably reviewed by Chandler
(1936), Welt (1950) and Fico (1972).
Galen in the second century also employed to surgery to create a new passage way from the lacrimal sac to nose.

Modern surgery of the lacrimal sac began in Italy in 1904, with Toti's description of an operation which involved

1. creation of an opening into the nasal wall with hammer and chisel,

2. removal of the nasal mucosa in this opening and the medial half of the lacrimal sac. Sutures were used only in the skin. Toti was successful in about half of his cases. Blascoviccs in 1912 used the Toti's technique but removed the entire lacrimal sac except for a small portion surrounding the opening of the canaliculi.

The basic technique of DCR was modified as follows -

In 1920, and again in 1922, Dupuy-Betems and Bouvignet in France and Ohms, working independently in Germany, modified the Toti technique by dissecting the anterior and posterior flaps of the nasal and lacrimal mucosa and then suturing the flaps together. The French surgeon had successful results in 94% of more than 1000 operations.
In 1921, Moshar combined the Toti's technique with intranasal removal of the middle turbinate and suture of the anterior border of the opening in the lacrimal sac to the tissues anterior to the bony opening. He anticipated success in 90% of all cases.

In 1947, Hogan reported such results in 49 operations performed by a modification of the Moshar-Toti technique.

In 1911, Forsmark recommended transplantation of the lacrimal sac. The same recommendation was made by Stock in 1934, and by Gifford in 1944. In this technique the sac is severed from the naso-lacrimal duct at its junction with it, after which its lower end is pulled into the bony opening by sutures brought out through the nasal.

In 1944, Soria recommended suturing a single flap of nasal mucosa to the posterior flap of the lacrimal sac. He also recommended suturing the anterior flap of the sac of the anterior border of the bony opening. Cause drainage from the sac down to the nasal fossa was provided for 72 hours.

In 1946, Arruga brought together his experiences with dacryocystorhinostomy, which covered many years and which has previously been reported in a number of publications. His operations were performed by the Dupuy
Dutemps technique and were facilitated by several new instruments of his own design.

In 1954, Iliff suggested that the stryker can be used to open the lateral bony nasal wall. The rapid oscillating action of the saw is far less traumatic than the action of dental, or other burs, bone chisels and rongeures.

In what has been said so far in this brief historical note, one must be impressed by many efforts made to modify the Dupuy-Dutemps technique. The reason, it seems, is that this is a difficult operation, particularly in respect to the accurate approximation of the corresponding flaps of the nasal mucosa and lacrimal sac by direct sutures. Another reason for failure in a certain number of cases is post-operative closure of the newly created lacrimal tract either by formation of granulation tissue at the new bony opening, of the anterior flaps to the posterior flaps. Arriaga puts particular stress on this latter possibility. To simplify the operation, several observers recommend that no sutures be used to unite the flaps but instead, plugging agents should be left between them. Other surgeons use the basic Dupuy-Dutemps technique or some modification thereof and suture the flaps, but also leave some sort of plugging agents between (rubber catheters, steel wire, silicone sponge, polythene tubes, sicks of suture material & gauze).
The flaps are sutured as recommended by Boris. The bony opening is created by the Iliff trephine on the Stryker saw. A 2.0 or 4.0 silk suture is left in the new lacrimal drainage pathway for several days, as recommended by Castrovicio. This technique was found simple, safe, efficient and uncomplicated.

If a chronic dacryocystitis should be corrected before intraocular surgery, Dacryocystorhinostomy is the preferred operation.

Dacryocystorhinostomy is indicated for the relief of disabling epiphora due to physiologic insufficiency of the lacrimal pump or to atonic distension of the lacrimal sac.

Useful as Dacryocystorhinostomy is, dacryocystectomy is still indicated in three diseases of the lacrimal sac – (1) Malignant lesion, (2) Tuberculosis, and (3) Syphilis. This operation was formerly the favoured procedure for all conditions of the lacrimal sac, but now it has been almost entirely replaced by external Dacryocystorhinostomy.

Dacryocystorhinostomy is also indicated for the relief of disabling epiphora due to physiologic insufficiency of the lacrimal pump or to atonic distension of the lacrimal sac.

The surgeon who undertakes any operation on the lacrimal sac must possess a precise knowledge of the
anatomy of the lacrimal excretory pathways and of their relations to other structures and landmarks. Bleeding will be excessive and dangerous for instance, unless the surgeon bears in mind the position of the angular blood vessels, which are situated slightly anterior to the lacrimal crest.

Pre-operative dacryocystography may give valuable information. Two other precautions are important. Patency of the lower punctum the common punctum and canaliculus must be assured.

Dacryocystorhinostomy with silicone sponge
(Thomas, J. Mirabile, M. D., and Charles Tucker, M.D., East Hartford, Conn, 1965)

Dacryocystorhinostomy fail in a large percentage of cases because of obstruction of the newly made canal by granulation tissue and scar contracture. A tapered silicone sponge implant has been used in 12 successive operations for chronic dacryocystitis without failure.

The purpose of this communication is to demonstrate the use of this material. The operative technique was a modification of the Dupuy-Dutemps procedure. All operations were performed under local anaesthesia.
All these procedures were reviewed in more recent years, particularly the permanent insertion of a polythene tube into the naso-lacrimal duct after exposing the lacrimal sac in cases of chronic dacryocystitis (D.C.R. - a modified technique by A.M. Joglekar, July 1983).

Dacryocystorhinostomy by routine method gives definitely few failures in the best hands where all technical details are observed like proper size of bony window (12.5 mm x 10 mm), proper suturing and proper size of flaps. The average rate of success is about 90%, ranging from 80% to 95.7%.

In failed cases, when the site is explored, one can observe growth of granulation tissue in raw areas. In routine method, only two areas of the stoma are covered by mucosa and superior and inferior area are left raw.

Follow-up ranges from 6 months to two years. Total 86 cases were operated. Four cases had recurrence of symptoms (95.34%) success.

Dr. A.M. Joglekar (1983) experience chances of blocking of stoma with granulation tissue is reduced with D.C.R. with implant.