DISCUSSION

The relationship between bacteriology of dacryocystitis and nasal pathology have been studied by many persons, but yet not fully understood.

INCIDENCE

Considering the various types of dacryocystitis the incidence of chronic dacryocystitis is most common as against the chronic lacrimal fistula and mucocele (Duke Elder 1952). However, in present series out of 50 cases studied, 46 cases (92%) were found to be of chronic dacryocystitis and rest 4 cases (8%) were of chronic lacrimal fistula and mucocele.

AGE INCIDENCE

As for age is concerned the maximum incidence had been found in 4th & 5th decade of life. This was minimum in 1st, 2nd and above 6th decade. Traquair (1941) observed the maximum age incidence in the 5th and 6th decade. While almost similar observations were found by Duke Elder (1952), Reddy and Reddy (1955), Chaterjee (1955) and Agarwal (1961). Bale R. (1987) observed that commencement of disease at 30 years and maximum incidence in the 5th decade of life.
The probable cause of the occurrence of the disease in elderly persons may be emotional factors causing excessive lacrimation and relative insufficiency of drainage passages. The process starts at younger age, but patient starts complaining about the disease when the symptoms are precipitated at middle age.

SEX INCIDENCE

Sex incidence bears an important role in the etiology of the disease. The ratio is definitely high in females. In the present series the male - female ratio is found to be 24 : 76, that is in agreement with the others observations i.e. Traquair (1941) 17 : 83; SUMMER Skill W.H. (1949) 27 : 73; Duke Elder (1952) 20 : 80; Chaterjee (1955) 21 : 79; Reddy and Reddy (1955) 30 : 70; Malik et al (1969) 18.3 : 81.7. They stated that the females are almost three times more affected than the males. Sood et al (1967) and Bale Rajeev N. (1987) shows the male female ratio 37.7 : 62.3 and 43 : 57 respectively.
Various genuine reasons have been put forwards to explain the preponderance of the disease in the females like excessive lacrimation, less heartily blowing of the nose, uses of cosmetics and narrowness of the nasolacrimal canal as observed by Onode (1913), Fernandez (1921), Heller (1929), Baratta (1935) and Degliesh (1964). They described the high nasal index be the cause of frequency in females.

In India one more reason may be responsible for high incidence of disease in females, their long stay in kitchen where the dust and smoke (along with oil) may lead to lacrimation, stagnation of tears and infections. But this factor does not explain its high incidence in the western countries, where disease equally common in females as in our country. Women are more prove to disease because they keep more often than men might be the cause but it is hardly impressive (Duke Elder - 1952).
Socio-economic factor

As far as socio-economic factor counts in our study the poor class is affected maximum (58%) while average class affection is in 36% and high class affection is 6%. These findings were similar to those observed by Chaterjee (1955) and Reddy et al (1955), who observed maximum affection (70%) in poor patients, probably due to unhygienic surroundings. While Rosley S. and John (1967) reported 75% in poor class. Most of the areas of highly unhygienic surroundings and were of poor socio-economic status.

Incidence of eye affection

The affection of the left eye (58.06%) is dominating over the right eye (41.94%) as observed in present series, which is in agreement with other observers i.e. Veris (1955) as 66% in left and 34% in right eye, Sood et al (1967) as 50% in each eye, Malik S.R.K. et al (1969) as 58.8% in left and 41.2% in right eye and Bale R.N. (1987) as 51.04% in left eye and 48.94% of right eye.

Bilaterality was found, by Degliesh (1967) as 66% unilateral and 34% bilateral, by Malik S.R.K.
et al (1969) as 74% unilateral and 26% bilateral and by Bale R.N. (1987) as 57% unilateral and 43% bilateral. In this series it was 76% unilateral and 24% bilateral, which is more or less in agreement with earlier observers.

**Clinical Features**

In our study, the epiphora was the most commoner symptom (95.16%). The second common symptom was regurgitation of fluid or mucopurulent discharge along with epiphora while pressing the sac region (75.80%).


**Patency Factor**

In all the cases, syringing was done and 92% cases showed complete blockage of lacrimal passage i.e. saline regurgitate from upper puncta. In one case the lacrimal passage was found be partially blocked, that case was of mucocele. In three cases which were of chronic lacrimal fistula, the saline peeps out through fistula which also indicates the blockage of the drainage system of lacrimal apparatus below the level of fistula.
The regurgitation of saline from upper puncta in syringing test shows the definitive obstruction of drainage channel at various level.

**Bacteriology**

The direct inoculation on blood agar media had been helpful in preventing the total or partial damage to the organism by dissipation during transportation and storage. Hence more promising results were obtained. The absolutely sterile material and methods used helped to minimise the chances of contamination, only those organism grown within the inoculated area were taken into consideration.

The bacterial flora of chronic dacryocystitis cases had been studied by several authors and number of organism have been isolated.

In the present series three cultures of each eye (one from conjunctival sac, one from lacrimal sac discharge and one from nasal mucosa) have been done. So total 186 culture reports has been found in which 126 (67.75%) showed growth of some organism i.e. positive culture report. Whereas 60 (32.25%) did not show any growth i.e. sterile culture report.
This figure is agreement with the other authors i.e. Rollet and Bussy found 26% sterile culture in their series while Reddy and Reddy observed 15% sterile and Bale R.N. found 35.43% sterile.

Out of these 126 positive culture 109 reports were found in pure form (single organism) and remaining 17 culture reports were in mixed form (more than one organism present in one culture).

Other authors were also found the mixed flora i.e. Rollet and Bussy, Reddy and Reddy, Ram and Prasad Gutierrez E.H. and Bale R.N.

In the present series of study the staphylococcus epidermis was found to be the commonest organism (20.43%) and second common organism was the pneumococcus (8.06%). Other organism in order of their frequency were found i.e. streptococcus viridans, Str. pyogenes, staph. aureus, E. Coli, Klebsiella, Str. Bete hemolytic, diphtheria, pseudomonas. These were more or less in accordance with findings of Reddy and Reddy (1955) and Ram and Prasad (1958). Order of frequency in their series was staphylococcus, pneumococcus, streptococcus, diphtheria etc.
Rollet and Bussy (1923) also found staphylococcus as dominating organism as the same manner and Gutierrez E.H. (1972) observed staphylococcus was a most dominating organism, found in 51% cases and pneumococcus was the second common organism found only in 8% of cases.

Pneumococcus had been found to be commonest organism causing this disease as observed by Duke Elder (1952), occurs in pure form or associated with other organism both in acute as well as in chronic form. Other organisms, which were found by him to be responsible for the disease, according to their frequency were staphylococcus, streptococcus, diphtheria, friedlanders bacillus and so on.

Bale R.N. (1987) observed that the pneumococcus and C-ve staphylococcus were equally responsible for the dacryocystitis 17.94% and 17.01% respectively. Other organism he was found according to their order of frequency i.e. C+ve staphylococcus, N. catarrhalis, pseudomonas, streptococcus, proteus, B.Coli, Klebsiella, candida and B. subtilis.
GROWTH OF ORGANISM FROM CONJUNCTIVAL SAC -

In our study, out of 62 cultures of conjunctival sac 34 were found positive and 28 (48.16%) were sterile. Amongst 34 positive culture reports 26 were found in pure form (single organism) and remaining 6 were mixed organism (more than one organism in single culture). In out of these 28 culture reports the staphylococcus epidermis was found as a dominating organism i.e. 12 eyes (19.35%). It is agreement with other observers like - Seal et al (1982) reported 80% positive culture and 20% sterile and in positive culture 1.5% found mixed and remaining 78.5% pure culture.

Staphylococcus epidermis was the dominating organism 39%. Bale R.N. (1987) observed the sterile culture in 48.95% and out of these 51.05% positive culture he found 0.69% mixed and remaining 50.36% were pure culture. Most common organism in his series was C - ve staphylococcus 15.38%.

GROWTH OF ORGANISM FROM LACRIMAL SAC -

In present study the culture report of 62 eyes (20) 32.25% found sterile and growth of organism was observed in (42) 67.74%. Out of these 42 positive culture 36 reports showed growth of single organism and remaining six showed mixed growth.
Staphylococcus epidermis found the maximum i.e. 10 eyes (16.12%) amongst all the culture reports (62); followed by streptococcus pyogenes, strep. veridans and D. pneumoniae etc. Other observers found the similarity with our study eg. Gutierrez (1969) in his study found the staphylococcus aureus as a very dominating organism in lacrimal sac i.e. 51% of eyes. In 32% of cases he found mixed growth. Whenever Seal et al (1982) found 16% sterile culture and in remaining 84% of positive culture 4% he found mixed and 80% in pure form. Staphylococcus epidermis was the commonest organism in his study and percentage of pneumoniae was the 10%. While Bale R.N. (1987) observed that the 37.06% sterile and from remaining 63.94% of cases 4.19% cases were found mixed. D. pneumoniae found as a commonest organism which was followed by C - ve staphylococcus 13.98%.

GROWTH OF ORGANISM FROM NASAL MUCOSA

As compare to conjunctival sac (45.16%) and lacrimal sac (32.05%) nasal mucosa showed only (12 eyes) 19.35% sterile culture reports. Out of these (62 eyes) 80.65% positive culture 8.06% showed mixed growth and remaining 72.59% was in pure form.
Staphylococcus epidermis was the dominating organism 25.80% which was followed by D. pneumonae, staph. aureus etc. It is the near agreement with other observers eg. Bale R.N. (1987) observed that the 20.29% cases was sterile and remaining 79.71% positive culture. From these positive reports he found 72.74% pure culture and 6.99% mixed C - ve staphylococcus was the dominating organism 20.27% which was followed by D. pneumonae 19.58% of eyes.

Emphasis was also given in the present study to find out the relationship between three flora in all the cases. It was observed that the organism growth were common to all the three in 25.80% of cases. The conjunctival and lacrimal sac flora was same in 35.48% as against the lacrimal sac and nasal mucosa, where it was in 14.15% of cases. There had been no correlation between the three flora in 24.19% of cases.

Similar organism were found in nasal mucosa and lacrimal sac discharge in 14.15% of cases so it is very likely that the nasal cavity would be the source of infection in some cases as clinically nasal infection was also found in 6 cases. However, it is very difficult to decide whether the infection was primary or secondary in the sac from surrounding structures.
The pneumococcal infection was unexpectedly low in the present series while the incidence is usually very high in conjunctival sac and nasal cavity (Duke Elder 1952), (Bale R.N. 1987). There is a possibility that the cases of chronic dacryocystitis are due to pneumococcus to begin with secondary bacterial invaders may set in later on and in some cases they may outgrow the pneumococcus, which may not be isolated on routine method of culture. In the sterile cases the possibility is that after some period the organism extinguished either due to increased resistance of the patients or by using drugs. This hypothesis not only explains the bacteriology of dacryocystitis but also the relationship seen with the nasal pathology.

Comparative high incidence of staphylococcus may be due to poor personal hygienic habits, these cases were mostly from poor socio-economic status. They were not very particular about cleanliness. The unusual low incidence of streptococcus and pneumococcus may be due to the fact that there are very delicate organisms and do not grow in abnormal conditions. These organisms were also very sensitive to antibiotics which may result in sterility of smear during routine culture.
Nasal Pathology -

In the present study out of 62 eyes, 13 (20.96%) eyes had nasal pathology and a large portion of 49 (79.03%) had not be any nasal pathology. In these 13 eyes of nasal pathology, 4 eyes were affected by deviated nasal septum (DNS), 5 by inferior turbinate hypertrophy (ITH) and 2 by rhinitis in which one case was having of chronic rhinitis and one was suffering from atrophic rhinitis. Two cases were affected by deviated nasal septum with inferior turbinate hypertrophy. This is more or less in agreement with the other authors i.e. -

Bale R.N. (1987) observed the nasal pathology in 28.6% cases in which DNS in 5.59%, ITH in 6.29%, rhinitis 6.99% and DNS & ITH were in 9.79% of eyes.

The relationship between the flora of lacrimal sac and nasal mucosa of cases with nasal pathology had been also studied and found that out of these 13 cases (had nasal pathology) revealed that in 46.15% (6 cases) of cases there was similarity in the flora from the two sites whereas in 53.85% (17 eyes) cases, there was no correlation between the two. It is also observed by Bale R.N. (1987).
The commonest site of obstruction in lacrimal passage is the junction of the lacrimal sac and the nasolacrimal duct observed 54.8% by Campbell (1964) and 53.2% by Malik S.R.K. et al (1969). Other commonest site of obstruction was the sinus of Maier 24.3% observed by Campbell (1964) and agrees with it Nahata (1964) and Malik et al (1969). Next common sites of obstructions were found at the lower end of canal as observed by Traquair (1941) and Rutz et al (1966). So the following nasal pathology may be the cause of dacryocystitis i.e. -

- Deviated nasal septum - Extreme deviated nasal septum may compress the inferior turbinate against the lateral wall of lower end of nasolacrimal duct of the same side so the duct compress and due to that obstruction may be the cause of dacryocystitis as observed by Bockstein (1926), Kofler (1930) etc.

- Inferior turbinate hypertrophy - Enlargement of inferior turbinate bone may obliterate the anterior part of the meatus leading to local rhinitis and thus obstructing the opening of nasolacrimal duct which may the cause of dacryocystitis as observed by Post (1928) etc.
Inflammatory and chronic allergic condition like chronic rhinitis and chr. nasal catarrh may spread the infection to the lower end of nasolacrimal duct which may obstruct the duct and dacryocystitis results, as observed by Duke Elder (1952).

Atrophic rhinitis may also be the cause of dacryocystitis because of the destruction of the nasal mucosa, permitting the entry of infective secretion of nose into the lower end of nasolacrimal duct as observed by Franceschetti (1935).

Few authors also claimed that the chronic sinusitis may be the cause of dacryocystitis and few believed that the infection of nose may spread towards lacrimal passage either by venous or lymphatic pathways because of lacunae in continuity between ethmoid bone and lacrimal bone.