Commentary

The probable course of events in this case seems to have been : a primary lesion in the right maxillary antral area ; the first effect of which was represented by epistaxis and the formation of " ordinary polypi "—a secondary infection ? by implantation on the mucous membrane of the septum ; complete control of this secondary lesion ; and slow further development of the primary lesion which, not till some three years after the initial symptoms, grew to so great an extent as to invade the right nasal passage.

Lateral rhinotomy and removal by diathermy appears to have controlled even this original lesion, the result of which operation would perhaps have caused no discomfort except for the defect in the hard palate. (Quite likely the result of the radium or diathermy or both.)

Epistaxis is presumably the initial symptom in these cases. Local removal of the primary growth seems to be practical and satisfactory, but the prospect of life is not more than some four years after the first appearance of the symptoms, as the result of metastasis.

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GRADENIGO'S SYNDROME

By Dr. U. N. DAS (Calcutta)

ON *September 15th*, 1932, Kalidas Ghosh, a schoolboy, aged 14, Hindu male was referred to me by Dr. N. K. Nag for the following complaints :—

1. Purulent discharge from the left ear, duration one month and a half.

2. Severe neuralgic pain in the left temporal and parietal regions, duration one month.

3. Complete paralysis of external rectus muscle of the left eyeball causing double vision—duration a fortnight.

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Dr. U. N. Das

Past Illness.

Chicken pox in 1926, followed by otitis media in the left ear which continued to discharge for about a year, after which the ear became dry following treatment.

Present Illness.

The patient had an attack of typhoid fever in *July*, 1932 and during the course of convalescence he developed acute otitis media of the left ear on *August 2nd* and, after suffering from acute pain for two days, a purulent discharge occurred with subsequent relief of pain. A fortnight later he suddenly got a severe neuralgic pain in his left temporal region which was more or less continuous and gradually spread over his left parietal region. Aspirin, phenacetin, veramon, allonal and other analgesics were tried in liberal quantities without appreciable relief. On *September 2nd*, 1932 he suddenly began to " see double ". He was referred to me on *September 15th* when, on examination, I found the following :—

Left Ear.—There was a fair amount of mucopurulent discharge in the external auditory canal, two fairly large perforations of the drum separated by a bridge which was formed by the handle of the malleus. Distinct tenderness over the mastoid antrum and the tip. Hearing diminished considerably ; patient heard only the raised voice.

Right Ear.—Normal.

Nose.—Normal.

Naso-pharynx.—Normal.

Mouth, Fauces and Pharynx.—Normal. Cervical glands in the upper part of the anterior and posterior triangles of the left side of the neck slightly enlarged.

Left Eye.—Complete paralysis of external rectus muscle causing double vision. No nystagmus. No optic neuritis.

Character and Distribution of Pain.

Severe pain, neuralgic in character, over the left side of face, forehead, and scalp, with cutaneous hyperæsthesia over the area. Absolutely confined to the left side, it was most severe above the left eye and in the left temporal region.

Temperature on admission 97° F. and pulse 70 per minute.

Report of Blood Examination.

Hæmoglobin	50%
Red blood count ..	3,800,000 per C.M.M.
White blood count ..	9,500
Polymorphs	42%
Lymphocytes	54%
Large Mononuclears ..	0%
Eosinophiles	4%

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Report of Urine Examination.

Colour—pale yellow. Sp. Gr. 1,024. Reaction acid.
Albumen and sugar—nil.
Other abnormalities—nil.

He was operated on by me on *September 19th*, 1932. A simple Schwartze operation was performed. A few drops of pus were found in the tympanic antrum, which was surrounded by a few breaking down cells. Other mastoid cells appeared to be healthy and no infected cells could be found running in the direction of the apex of the petrous pyramid. The patient made an uneventful recovery. The most remarkable feature was that his severe neuralgia was relieved *completely* and the paralysis *considerably* improved on the next day. He was discharged from hospital cured, on *October 25th*, 1932.

Points of Interest.

1. The severity and extension of the neuralgic pain in spite of a comparatively slight lesion in the mastoid.

2. The complete paralysis of the sixth nerve, although no obvious infection could be traced towards the apex of the petrous bone.

3. Complete relief of pain and considerable improvement of paralysis *immediately* after the operation.

Causative organism.—Streptococcus (in pure culture).

In 1904 and again in 1907, Gradenigo described a triad of symptoms which has since then borne his name. These symptoms are acute otitis media with or without mastoid involvement, temporal and parietal pain, and paresis and paralysis of the sixth nerve.

Gradenigo divides his cases into three groups :—

1. The typical case as described above.

2. Those cases which have the typical triad of symptoms, but which also have involvement, at the time, of the second, third and fourth nerves.

3. Severe cases which, after presenting the typical syndrome, later develop meningitis and prove fatal.

His conclusion after a study of his cases is that " the triad of clinical symptoms is caused by a circumscribed simple serous leptomeningitis, localised at the tip of the pyramid and caused by diffusion of the infection in the tympanum." He states : " The constancy of the clinical picture makes me believe that the propagation was along pre-existing anatomical paths."

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How the Infection Reaches the Petrous Tip.

The paths of infection as described by Perkins are :—

1. The infection may follow the sublabyrinthine route, extending from the tympanum below the labyrinth and internal auditory meatus to the petrous tip.

2. From the mastoid antrum it may extend through the subarcuate fossa or petro-mastoid canal, which passes inwards beneath the superior semi-circular canal, and reach a layer of cells which sometimes lie above the internal auditory meatus, thus arriving at the petrous tip.

3. Or, this point may be reached by way of the carotid canal, access to which is obtained either by erosion of the bone or by tympanic foramina which give passage to the carotid branches of the tympanic plexus.

4. Finally the infection has been found in some autopsies to be by way of a layer of cells extending along the Eustachian tube, thus passing from the tympanum to the petrous tip.

Dupuy has suggested infection through the blood or lymph stream, but this would be very unusual. It is obvious that neglected mastoids in which pneumatisation is very extensive, there being direct extension of cells to the tip or almost to the tip of the petrous, are the causes which would be most likely to have the triad of symptoms. It is also interesting to note that streptococcus mucosus has been found to be associated with it more often than other bacteria.

In some of the cases there may be very little, if any, mastoiditis but, in studying the reports of other cases as well as my own, I have been struck with the fact that there is usually definite mastoiditis of a mild or severe type. It is also noteworthy that in quite a good percentage of cases, after the mastoid wound has healed quickly there is still a profuse discharge through the external auditory meatus.

Pathology.

As has been mentioned above, the cause of the syndrome is a serous lepto-meningitis localised at or about the petrous tip.

Why are the Fifth and Sixth Nerves Alone Involved ?

To answer this question we must first consider the anatomy of the region around the petrous tip. Wheeler, Vail, Perkins and Dupuy all give very interesting descriptions of the applied anatomy. The fact that the sixth nerve has such a long isolated and exposed course and that it traverses Dorello's canal accounts for its special vulnerability. The nerve, after emerging from the brain as a very thin cord at the lower border of the pons, passes forwards and

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upwards beneath the dura mater lying on the basilar surface of the sphenoid bone. Vail says—" The deepest lying bundles of the tentorium can be demonstrated in separate layers which form the ligamentum petrosphenoidale. This ligament passes from the spina sphenoidalis on the upper margin of the petrous bone and is inserted into the outer lip and the posterior surface of the lamina quadrangularis of the sphenoid, somewhat below the posterior clinoid process at the site of the accessory posterior clinoid process, which becomes the bony origin of the ligament. Between the inner part of the upper portion of the petrous bone under the outer margin of the lamina quadrangularis of the sphenoid and the ligamentum petrosphenoidale, there is a small, approximately three sided space with the apex outwards and the base directed inwards. In this space, Dorello's canal, lie the abducens nerve, and the inferior petrosal sinus where it empties into the cavernous sinus. The abducens nerve lies on the lower boundary of this area, more often near its outer angle, and is often confined to the angle which the spina sphenoidale makes with the upper margin of the pyramid of the petrous bone which, at this point, is somewhat flattened from above." The abducens nerve in this position, is therefore completely surrounded by unyielding structures, and any inflammatory œdema or swelling in this canal would naturally cause paresis or paralysis of the nerve.

The semilunar or Gasserian ganglion of the fifth nerve lies in a hollow (Meckel's cave) on the anterior surface of the apex of the pyramid and the pain is due to the inflammatory process at the apex causing interference with the ganglion.

Prognosis.

Nearly all cases make a complete recovery, though it may take weeks or even months before this occurs. Gradenigo had one case that died of streptococcal meningitis.

Treatment.

Cases have been recorded in literature in which recovery took place without any operation at all and, in others, after a simple paracentesis. In some cases, however, a simple Schwartze operation had to be performed before there was any abatement in the symptoms. A careful consideration of facts leads one to suggest that, provided there are no signs of mastoid involvement, the patient should be carefully watched for a week or so and palliative treatment given a chance. If the symptoms show no signs of improvement within that period, the Schwartze operation should be performed and a careful search should be made for infected cells leading to the apex. It has been urged that a simple mastoid operation could not possibly provide for adequate drainage for the infected cells at the tip

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but experience teaches us that this is usually the best procedure. An operation has been described in which removal of the diseased cells at the tip of the petrous pyramid has been recommended, but this step is seldom necessary.

No treatment is required for paralysis. Nearly all paralysis disappears in from a few days to a few weeks.

Some interesting features of the syndrome :—

1. It is rare for the pain and external rectus paralysis to occur simultaneously. The pain usually precedes the paralysis. In my case the paralysis appeared after a fortnight.

2. The ocular palsy is usually homolateral.

3. Optic neuritis never or very seldom occurs.

4. The mastoid process may or may not be involved. In some cases recorded in literature, the mastoid cells were found to be perfectly healthy at operation.

5. A large majority of cases run a benign course.

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