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NOTES ON CARCINOMA OF THE NASOPHARYNX.

by

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Some diseases are seen with considerable frequency in Hong Kong but are rare in most parts of the world. One of these diseases is carcinoma of the nasopharynx. So common is it that we sometimes have three cases at the same time in our small surgical clinic of forty-two beds. In 1923 Dr. Oscar Thomson (1) reported 90 cases in Canton of malignant cervical glands as cervical lympho-sarcoma. As the ears were "affected in 35% of the cases" and the nose "in 47% of the cases," and as the signs and symptoms so closely resemble ours, we suspect his cases to have been malignant nasopharyngeal growths.

Dr. J. H. Montgomery tells me that the disease is very common in Amoy; we have had cases from Shanghai and Swatow and in all probability this form of cancer is unusually frequent over large parts of China.

The disease is certainly not common in England,* but George B. New (2) says it is not so rare in the United Sates of America as is supposed, and he has recorded 79 cases at the Mayo Clinic over a period of six years. Half of these, however, were recorded as sarcomata. It must be remembered, too, that the Mayo Clinic draw their patients from a very wide area.

With regard to etiology, the early age of onset in many cases is a noteworthy feature. Cancer usually sets in after 40 but this form of cancer commences as often before 40 as after (54 cases below 40

* In Sir St. Clair Thomson's "Diseases of the Nose and Throat," 2nd Edition, less than two pages are given to the consideration of malignant naso-pharyngeal growths which are described as epithelioma and sarcoma.

years, 40 cases after 40 years). The following tables (figure I) shows the age incidence in quinquenial periods in 103 cases in Chinese.

These case have been chiefly in-patients in the University Surgical Clinic since 1914. There have probably been more cases in the wards than these, as we have rejected some where the records were not sufficiently complete to make a probable diagnosis of nasopharyngeal carcinoma. These 103, furthermore, do not include cases seen at out-patients, though some of our illustrations have been taken from

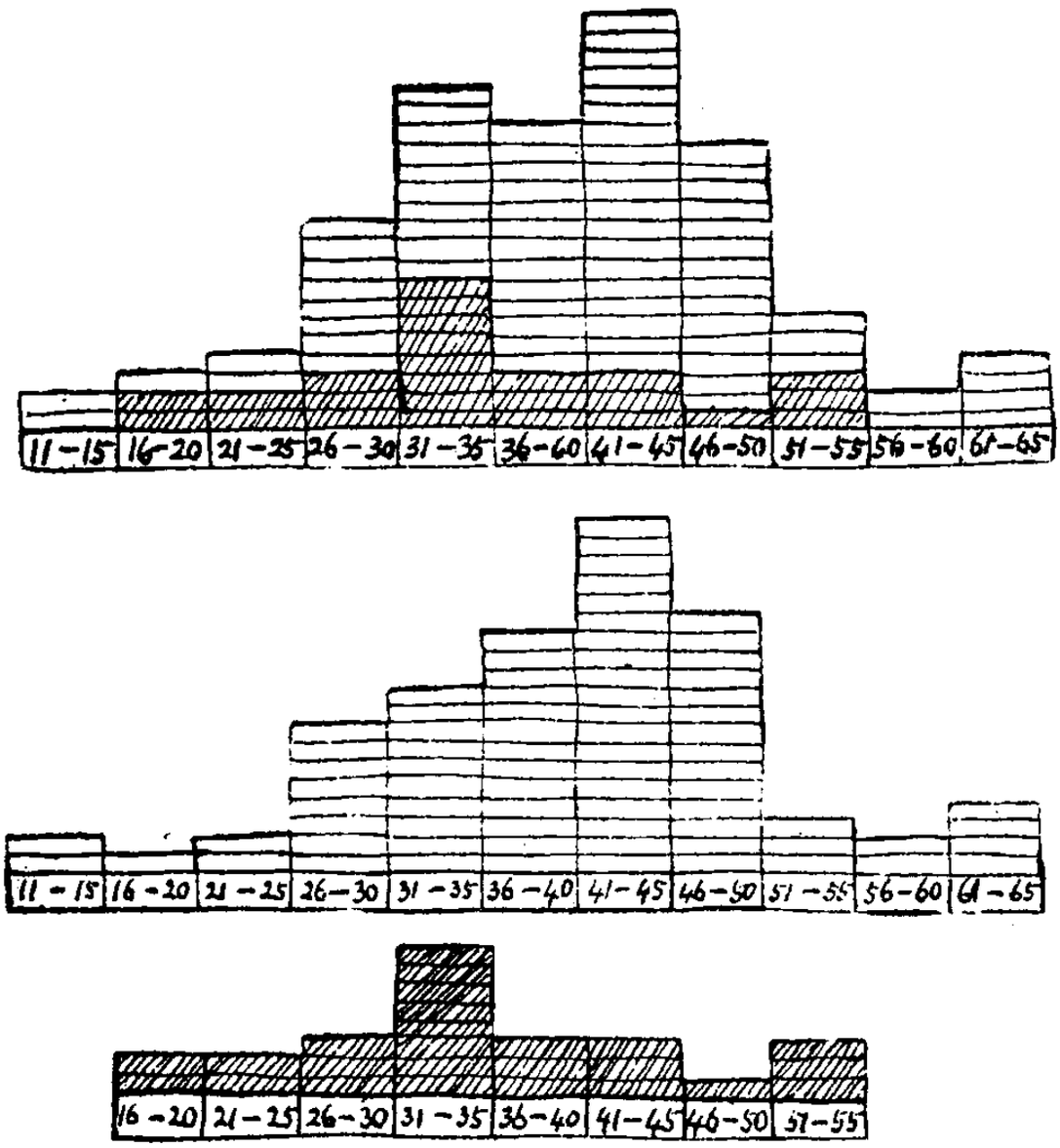

Figure 1. Age and Sex Distribution of Naso-Pharyngeal Carcinoma. Age means the age at which the first symptom was noticed. Of 103 Chinese patients, 25 were females, 78 were males. The top diagram shows the age incidence of the whole group. Two "peaks" are seen.

The middle diagram shows the age incidence in the males.

The lowest diagram shows the age incidence in the females.

From these diagrams we may conclude that the disease is 3 times as common in males as in females; that it frequently occurs before the usual cancer age and is common between 25 and 50. The most dangerous quinquennial period for men is 41 to 45 and for women, 31 to 35.

them. We think that very many more than 103 must have come to the Surgical Clinic during these years.

A few private cases have been included in this 103.

It will be seen that there are two " peaks " 31-35 and 41-45.

The female cases are represented by shaded oblongs. It is clear that the disease is less common in females, than in males (roughly 1 to 3) and that in them it tends to occur earlier. The commonest age of onset in females is 31-to 35, in males from 41-45, but the disease is frequent at any age between 25 and 50.

It is worth while to note some suggestions that have been put forward in the past to account for the unusual prevalence of the disease here.

Dobson of Yeung Kong (3) who regards this condition as a lymphosarcoma starting in adenoid tissue writes " We seek to impress " upon patients the seriousness of adenoids which continue after the " age of 20, when we may expect death, as Dr. Thomson says, from " incurable lymphosarcoma.

" We are firmly convinced that one of the causes of the continued " irritation and overgrowth of adenoids is smoke and its contained " gases, especially creosote. Native houses in this region are not " ventilated. A small hole in the roof or a window a foot square " are about the only openings except the door which is generally " closed. The fireplace has no flue and is fed with dry grass or a " poor quality of wood. Tobacco smoke is universally present, while " guttering candles light the ancestral table and incense adds its quota. " It is rare that one sees a kerosene lamp that does not smoke; open " kerosene or clay lamps burning pea-nut oil are very general among " the poor. In an atmosphere of this nature which is often dusty, " is it any wonder that the delicate structures of the childish or adult " post-nasal region become irritated and continue so? Such a con- " tinual bombardment with irritating substances certainly does not " tend to natural shrinkage of these lymphatic tissues. Again there " is the universal habit of picking the nose and of wiping the mucus " on any convenient spot, whence contagious organisms may be " transmitted to others. In this district hawking of the pharynx " and spitting is the custom, the sputum being ejected on the floor " whence the dust arises and settles where it will, there being no " circulation of air to draw it away. In the midst of these conditions " one expects to find irritated adenoids in about seventy per cent. of " children, and in these cases the irritated condition persists in danger- " ous form in a certain percentage. In fact it is a cause for wonder " when a clean nasopharynx is found in a suspicious case of malignant " enlargement of the cervical glands."

As will be seen however, we regard these as cases of carcinoma not of lymphosarcoma. The irritating factor of smoke might have to be considered in either case; but we should then have expected women to have been more susceptable than men as being the more exposed to smoke in their domestic duties.

Hot food as a possible cause of pharyngeal cancer has been discussed in an Editorial of the China Medical Journal (4), but it can hardly be invoked as a factor in malignant disease of the nasopharynx.

As we see the disease in Hong Kong it appears in many different guises and is often misdiagnosed in the early stages.

(1) Most commonly it presents itself as a case of *enlargement of upper deep cervical glands on both sides; but those on one side have appeared earlier and are larger than on the other* (Figures 2, 3, 4, 5, etc.). Rarely the enlargement is confined to one side. These are sometimes wrongly regarded as tuberculous or even syphilitic.

Figure 2.* Large masses of recurrent glands after a partial excision.

Nasopharyngeal carcinoma in a male case 222/25.

* These pictures of patients are rough outline tracings from photographs.

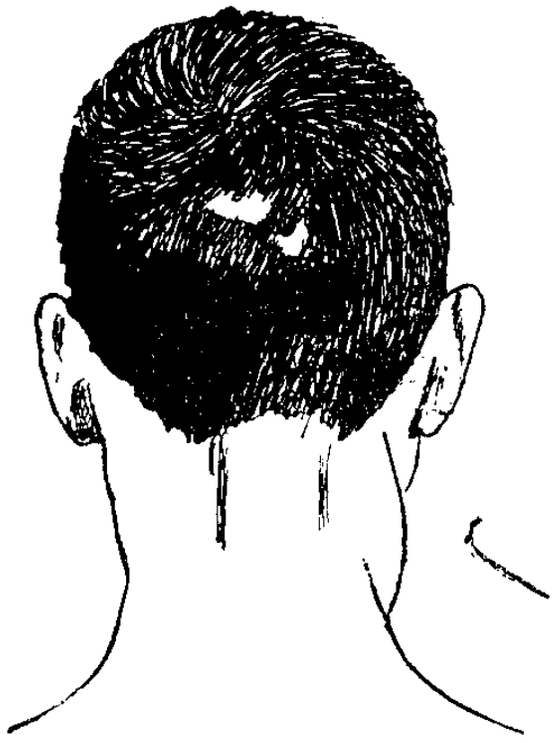

Figure 3. Englarged cervical glands seen from behind.
Nasopharyngeal carcinoma in a case 291/29.

Figure 4. Enlarged cervical glands seen from in front.
Nasopharyngeal carcinoma in a female case 266/24.

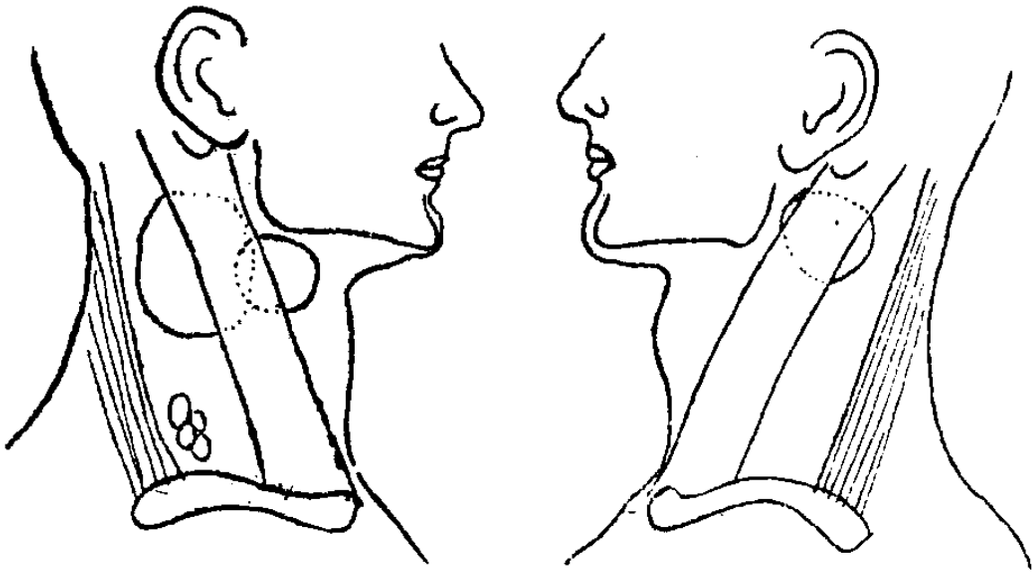

Figure 5. Conventional diagram showing chronically enlarged glands in a patient with nasopharyngeal carcinoma. Case 291/29.

(2) Occasionally there is a *large mass on one side of the neck* only. We have seen more than one such case which had been wrongly regarded as a gumma of the sternomastoid.

(3) In late cases the malignant growth spreads into the orbit and in such cases the prominent feature of the case is proptosis of one eyeball. Indeed carcinoma of the nasopharynx is a common cause of exophthalmos in our clinic.

(4) The case may present itself as one of nasal obstruction at first uni-and then bilateral. We know of one case where polypi were removed on numerous occasions, no sections being taken, and the patient being assured each time that the case was not serious. Occasionally a large mass may project below the posterior margin of the soft palate before the cervical glands are enlarged.

(5) An inexplicable attack of epistaxis may be the first sign for which the patient seeks medical advice.

(6) The chief symptom may be *persistent headache* suggesting an intracranial tumour.

(7) Or the pain may be neuralgic in character and sometimes numerous teeth have been extracted in the hope of curing the trouble.

(8) Rarely the patient seeks advice first for aural symptoms, tinnitus or slight deafness. But whilst ear symptoms are common they are not usually the patient's chief concern.

(9) Any of the cranial nerves may be paralysed, and such paralysis may be a prominent symptom.

It is of the utmost importance that the disease should be recognised at the earliest possible moment. Unfortunately the primary

carcinoma may be very inconspicuous for a long time. It may be a mere fissure, or else a small patch of induration. Even after the soft palate has been split at operation we have sometimes had to look a long time before discovering the lesion. Examination with the ordinary nasopharyngoscope is not really satisfactory. An improved form of nasopharyngoscope is needed and we have been trying to devise a satisfactory one. So far the most promising efforts are on the lines of a telescope along one nostril and an electric light along the other. Digital examination is not very precise here, as we wish to feel the posterior wall, sides and roof, and moreover it may on rare occasions give rise to considerable hæmorrhage. Next to detection of the primary growth the most important diagnostic sign is enlargement of the upper deep lymphatic glands in the neck; bilateral but *asymmetrical and asynchronous.* The glands are usually firm. If this occurs in an adult and is accompanied by any one sign of nasopharyngeal, nasal, aural or cranial nerve involvement the diagnosis of naso-pharyngeal carcinoma is almost certain.

A gland in the neck may be removed for microscopic section in serious cases of doubt.

For the routine examination of cases of suspected naso-pharyngeal carcinoma we suggest the following scheme.

Each sign or symptom enumerated below must be systematically looked for and the result recorded for right and left sides, together with the date of the appearance or observation. The size and position of the enlarged lymph glands should be charted on a diagram. (Figure 5).

NECK.

(1) Upper deep lymph glands enlarged, asymmetrical, asynchronous—moderate hardness. Later, infiltration of muscles and skin.

(2) Difficulty in rotating head and neck [infiltration of prevertebral muscles.]

(3) On turning chin upwards and to one side, the opposite sternomastoid cannot be felt or seen (figure 6) [involvement of accessory nerve.]

(4) On abducting the shoulder joint and on shrugging the shoulders the corresponding trapezius cannot be felt or seen, (figures 7, 8 and 9) [involvement of accessory nerve.]

FACE.

(1) Blindness and absent light reflex in one eye [involvement of optic nerve.]

(2) Exophthalmos (with ophthalmoplegia) on one side (figure 10) [involvement of orbit.]

(3) Enophthalmos, narrowed palpebral fissure, contracted pupil on one side [involvement of sympathetic fibres] (figure 11).

(4) Medial squint and inability to look lateralwards (figure 12) [involvement of abducent nerve.]

(5) Lateral squint and inability to look medialwards, dilated pupil and inability to accommodate [involvement of oculo-motor nerve.]

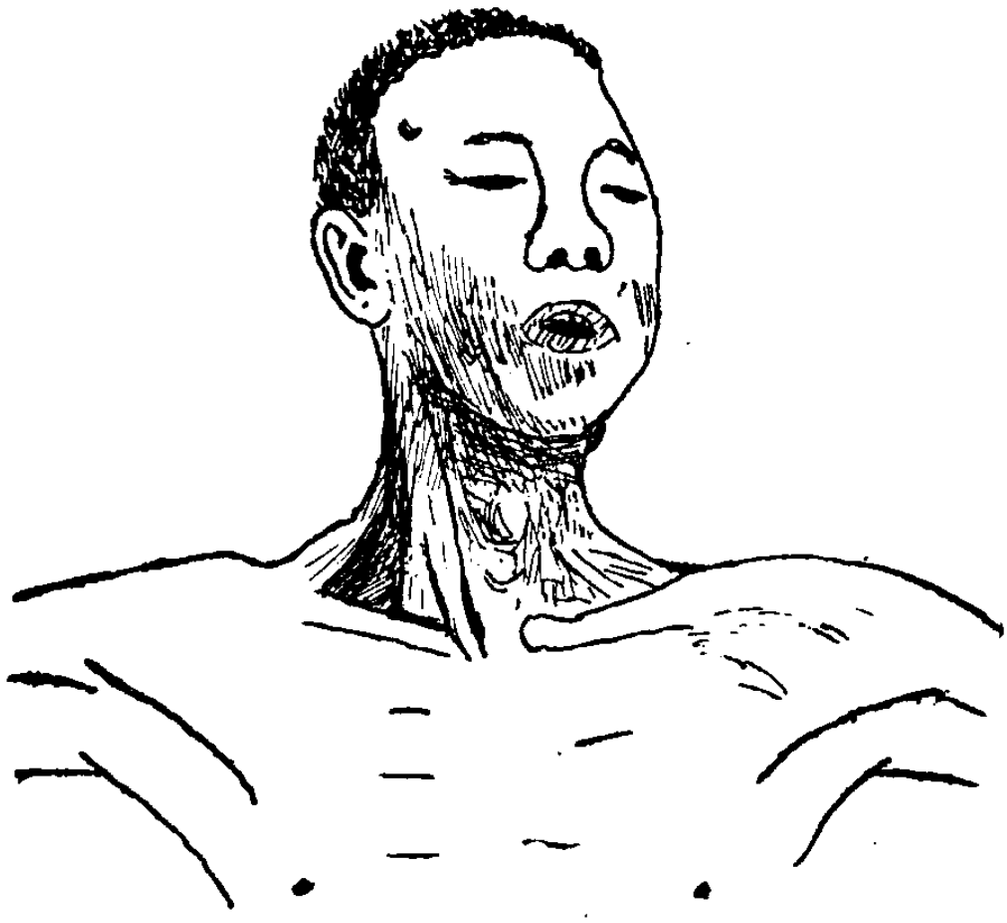

Figure 6. Atrophy of left sterno-mastoid and trapezius muscles. The left omo-hyoid muscle shows.

Nasopharyngeal carcinoma. * Out-patient case.

* Therefore additional to our 103 cases.

(6) Diplopia on looking downwards and lateralwards [involvement of troclear nerve.]

(7) Paralysis of one side of the face with inability to completely close the palpebral fissure (figure 13) [involvement of facial nerve.]

(8) Numbness of one side of the face or of parts of it [involvement of trigeminal nerve.]

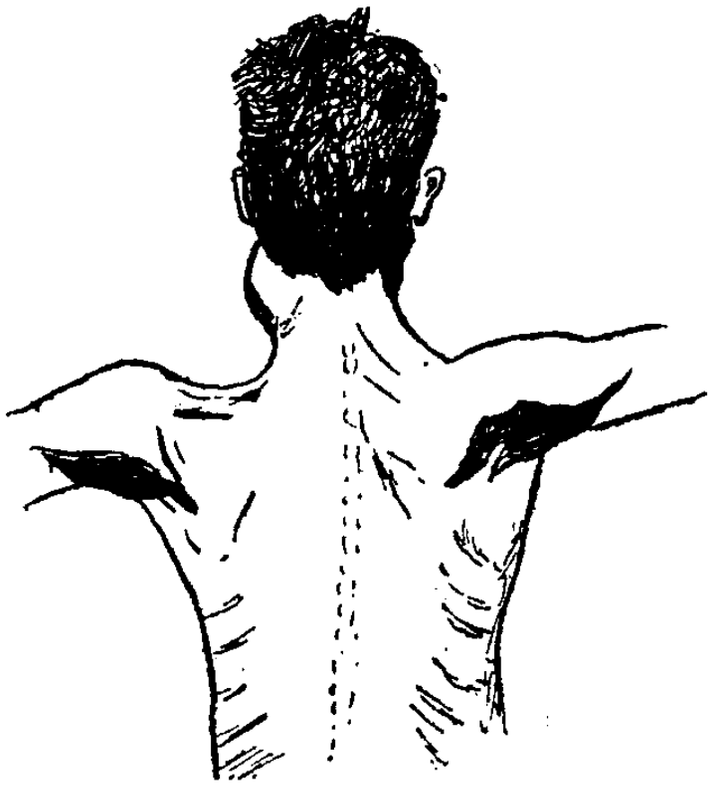

Figure 7. Paralysis of left trapezius muscle.
Nasopharyngeal carcinoma. Case 70/26.

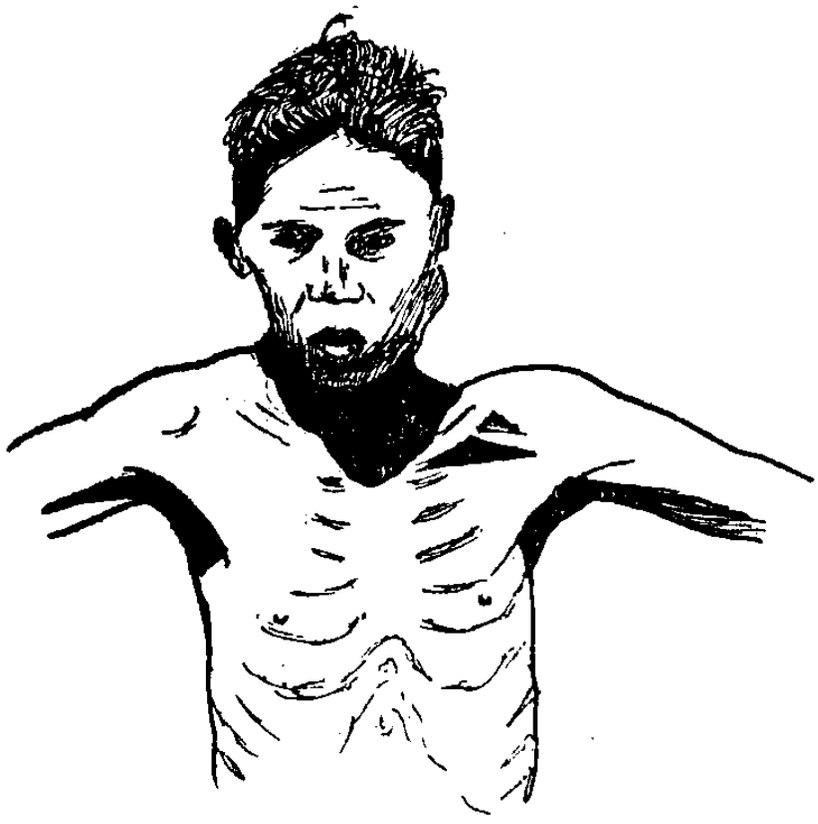

Figure 8. Paralysis of left trapezius, sterno-mastoid (not seen) and sternal part of pectoralis major muscle.
Nasopharyngeal carcinoma. Case 70/26.

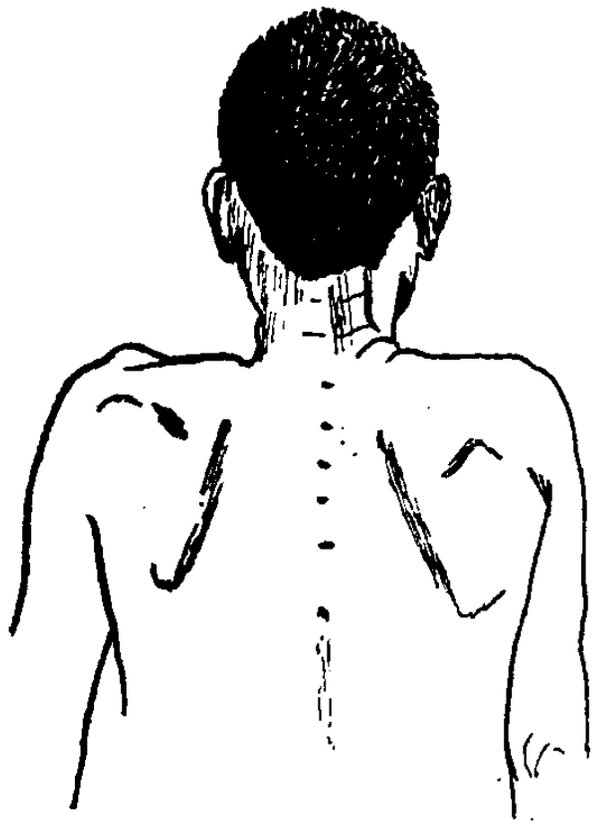

Figure 9. Paralysis of left trapezius muscle.
Nasopharyngeal carcinoma.
Out-patient case* 1929.

* Therefore additional to our 103 cases.

(9) Severe headache or neuralgic pain.

(10) Swelling in temporal region (figure 14).

NOSE.

(1) Difficulty in breathing through the nose, at first unilateral.

(2) Hæmorrhage or other discharge.

(3) Nasal polypus.

(4) Anosmia.—Test one nostril at a time with the sniffing of an aromatic (e.g. Friar's balsam or iodoform) not pungent (e.g. ammonia) substance [involvement of olfactory area.]

MOUTH.

(1) Inability to open mouth widely [infiltration of internal pterygoid muscle] (figure 23).

(2) Asymmetry of soft palate especially when patient says "ah!" (Figure 15).

Figure 10. Proptosis of right eye, with ophthalmoplegia. Nasopharyngeal carcinoma. Out patient case.*

* Therefore additional to our 103 cases.

(3) Tumour seen projecting beyond uvula,
felt through soft palate,
felt by paraffined finger,
introduced behind the soft palate,
seen with nasopharyngoscope.

(4) Tongue wasted and deviates to same side on protrusion (figure 16) [involvement of hypoglossal nerve.]

(5) Posterior one-third of tongue insensitive to touching with a bent probe [involvement of glossopharyngeal nerve.] The sense of taste is less easily tested here.

(6) Complete paralysis of one vocal cord on laryngoscopic examination (figure 17) [involvement of vagus nerve.]

EAR.

(1) Tinnitus, middle ear deafness; retracted membrane or perforated membrane and otorrhœa [involvement of tuba auditiva.]

Figure 11. Paralysis of the cervical sympathetic in a woman with nasopharyngeal carcinoma, showing narrowing of the palpebral fissure, enophthalmos (with absence of high light) and contracted pupil. The patient also had right hypoglossal paralysis. Case No. .../30.*

* Therefore additional to our 103 cases.

(2) Internal ear deafness. No nystagmus on syringing membrane with cold water [involvement of acoustic nerve.]

GENERAL.

Anæmia—hæmoglobin percentage lowered.

Weakness.

Loss of appetite.

In very late cases secondary deposits elsewhere (figures 18 and 19), dyspnœa and dysphagia may have to be recorded.

We have made no attempt to give figures of the frequency of the various symptoms, for it is only recently that all those mentioned above have been systematically looked for and recorded. Moreover, the cases would all have to be followed to the end, and we have been unable to keep ours under sufficiently prolonged observation.

The pathology of nasopharyngeal carcinoma presents some interesting points.

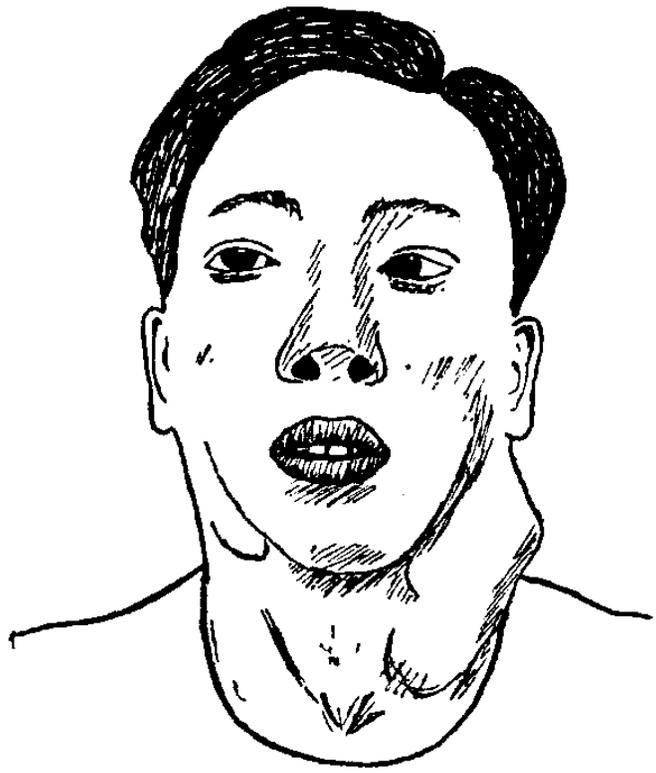

Figure 12. Right abducent paralysis (in this case, on the oppisite side to the larger cervical mass).

Nasopharyngeal carcinoma, case 475/29.

Figure 13. Right proptosis with right facial paralysis.

Nasopharyngeal carcinoma. Case 290/29.

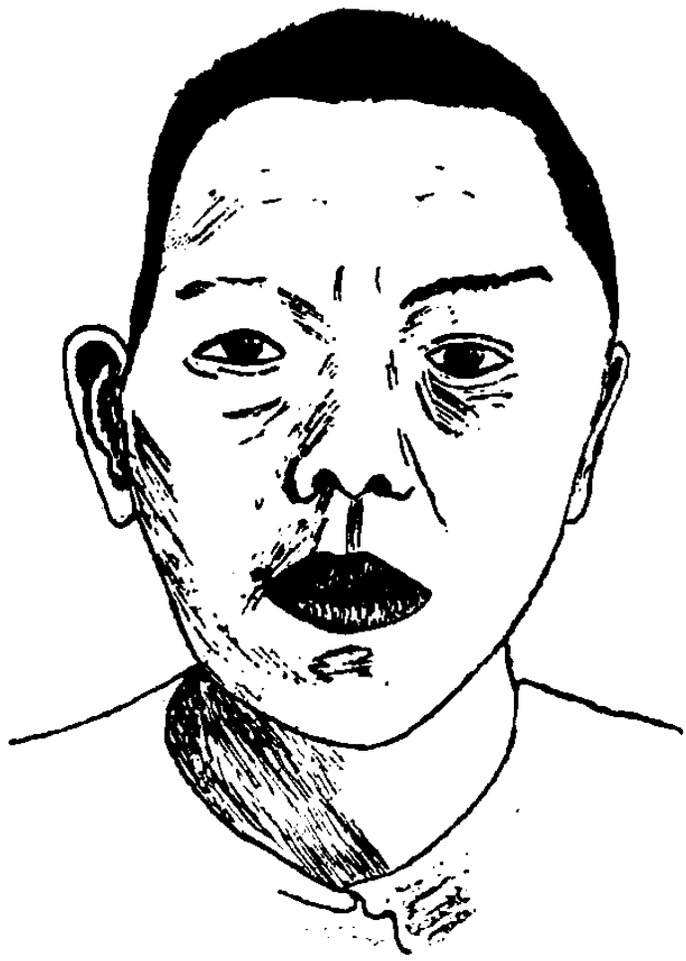

Figure 14. Swelling in the left temporal region. Nasopharyngeal Carcinoma Case 134/30*.

* Therefore additonal to our 103 cases.

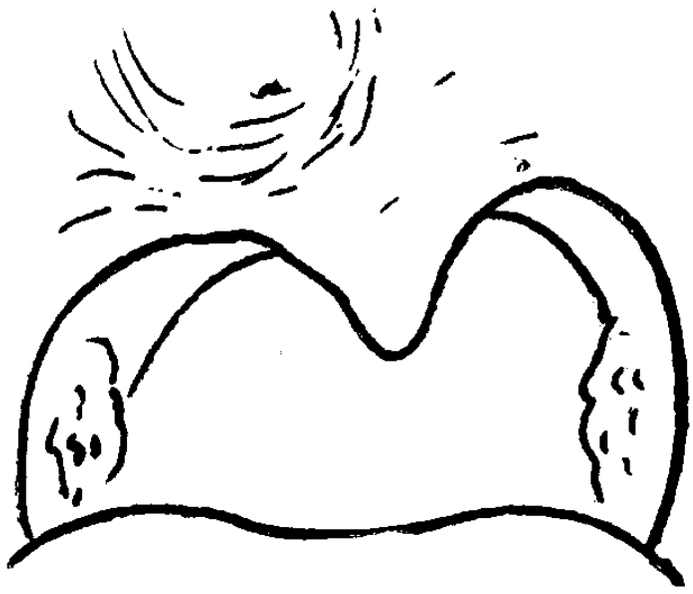

Figure 15. Asymmetry of the soft palate when the patient says " ah!"

Nasopharyngeal carcinoma.

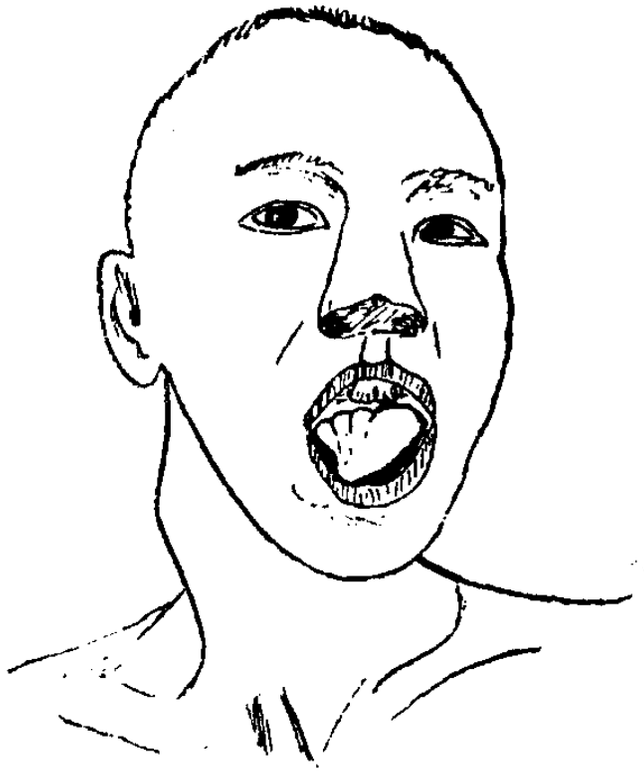

Figure 16. Right hypoglossal paralysis. (Note hemiatrophy of tongue and protrusion to the right).

Nasopharyngeal carcinoma. Case 291/29.

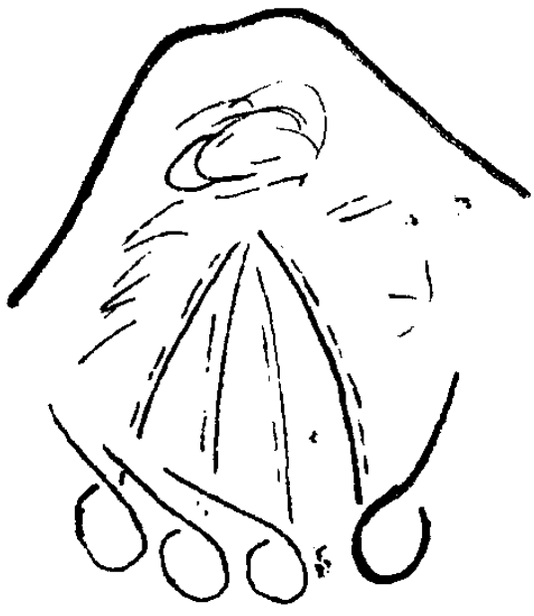

Figure 17. Complete paralysis of left vocal cord (semi-diagrammatic).

Nasopharyngeal carcinoma, out-patient case.

Figure 18. Enlarged axiliary glands.
Nasopharyngeal carcinoma. Case 400/29.

Our cases have been carcinomatous—neither stratified epithelioma nor tall columnar celled enclosing a lumen, but rather an atypical spheroidal celled growth. We have re-examined the sections from thirty-three of the cases recorded in this paper. All were secondary deposits in the glands or elsewhere. Thirty showed an atypical spheroidal-celled carcinoma, one was reported as sarcoma but the slide is missing. Another was reported as lympho-sarcoma but we think it resembles the appearance seen in parts of sections of undoubted nasopharyngeal carcinoma. The remaining section merely showed chronic inflammatory changes. Sections of the primary growth are not easily obtained, as a massive growth is often sloughing and a flat growth has usually been removed by diathermy. Secondary deposits in lymph glands sometimes show plaques of obvious carcinomatous cells (figure 20); at other times very small groups of 2 or 3 atypical malignant cells occurring in the lymphoid tissue may give a false suggestion of sarcoma. It is noteworthy that three of our cases showed giant cells and what is usually regarded as tuberculous giant-celled system as well as carcinoma. (Figure 21).

Figure 19. Secondary deposit in shoulder muscles as shown by microscopical section. (Case 489/29).

Figure 20. Section of nasopharyngeal carcinoma in a lymph gland in the neck.

Sketched by Dr. A. P. Guterres.

[We have however come across the following (which are not included in our 103 cases here reported):—

Stratified epithelioma,

Myxo-chondro-sarcoma,

Fibroma in a young male causing "frog face."]

Where does the growth begin? In our experience at operations we have seen small growths in the lateral recesses of Rosenmuller and on the posterior wall near its junctions with the side or the roof.

The growth in some cases is seen also in the upper and back part of the nasal fossa; but if it arose primarily in the nasal fossa the usual early enlargement of glands on *both* sides of the neck would be most unlikely.

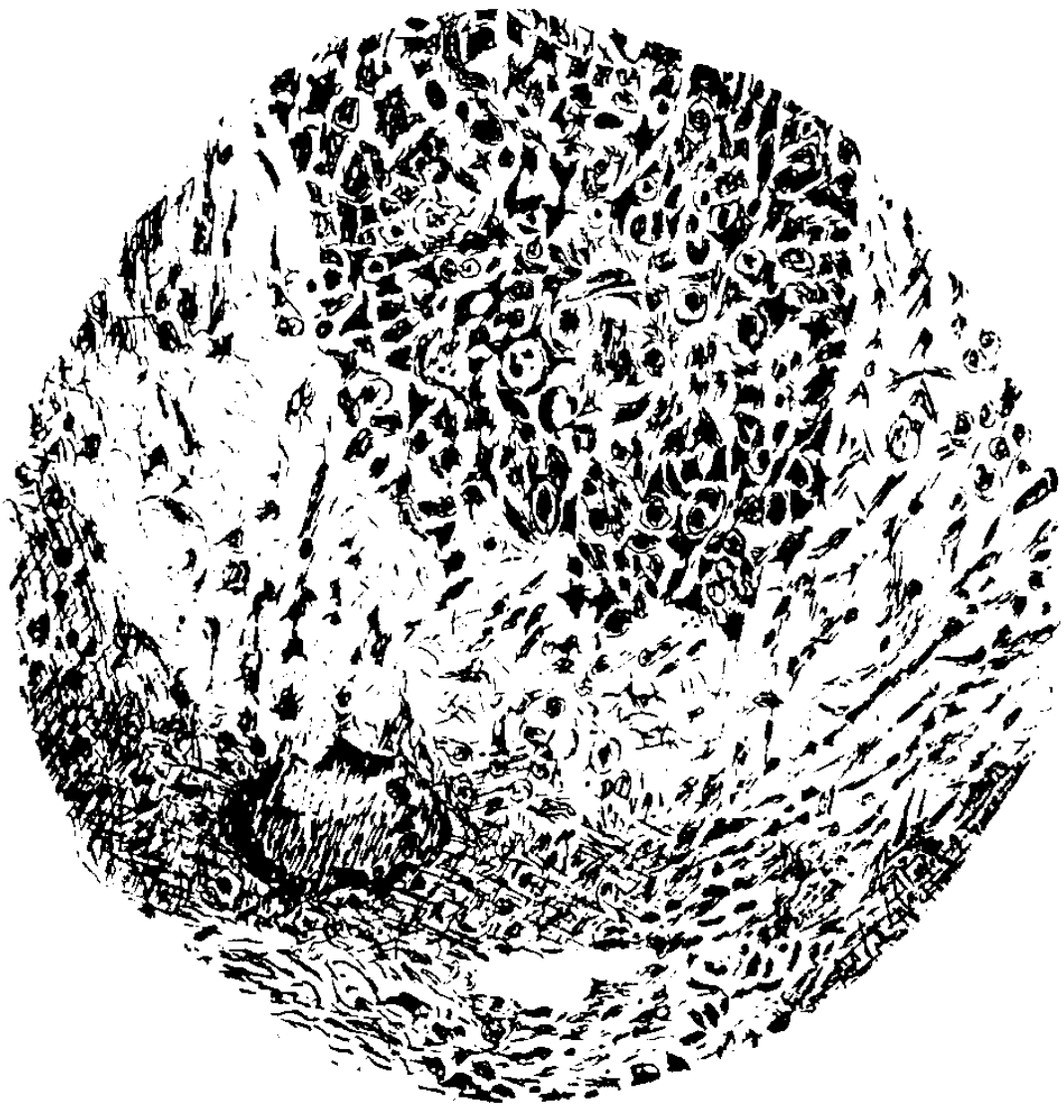

Figure 21. Section showing nasopharyngeal carcinoma close to giant cell formation, in a cervical lymph gland. From a private case.

Sketched by Dr. S. T. Hsiu.

We may assume that the growth arises in the epithelium of the nasopharynx or in a mucous gland.

It is interesting to speculate on the method of its spreading. At first by embolism and possibly permeation of lymphatic vessels it reaches the upper deep cervical lymph glands and then spreads in a downward and backward direction, the glands in the posterior triangle being widely affected as the case progresses. One of our cases showed spread to the axillary glands (figure 18).

As the pharynx is a midline structure and the lymphatic vessels of the two sides anastomose freely on the posterior wall, the glands on both sides are commonly affected though not to the same degree nor equally soon.

The growth in the glands is slow so that they enlarge to a considerable size before reaching the bursting point, after which the carcinoma will spread by direct infiltration into the prevertebral muscles causing a difficulty in turning the head, into the sternomastoid muscle which becomes adherent, and eventually into the skin which becomes adherent. Some of the nerves in the neck become involved, notably the accessory which runs between two lymph glands and so is very easily invaded. But we have also seen at operation infiltration of the hypoglossal nerve in a patient showing hemiparesis of the tongue. It is probable that the 7th, 9th, 10th, 11th, 12th and the cervical sympathetic are each sometimes implicated in the neck.

The lymph glands become adherent to the internal jugular vein and it is possible that the carcinoma may invade its lumen.

Meanwhile the primary growth will have been spreading. It will creep along the surface into the nose, block the tuba auditiva or spread down the back of the nasopharynx to appear in the throat. It will infiltrate through the muscular coat of the pharynx and invade the pterygoid muscles in the infratemporal region so producing the trismus. The temporal region may be invaded producing swelling (figure 14).

The growth also spreads to the orbit. The route of spread is not certain; four routes are possible (figures 22):—(1) Via the infratemporal fossa and through the inferior orbital fissure. (2) Via the nasal submucosa, through the sphenopalatine foramen, via the pterygo-palatine fossa, through the inferior orbital fissure. (3) Via the nasal fossæ and through the posterior ethmoidal air cells. (4) Via the foramina at the base of the skull (figure 23) and so by the posterior and the middle cranial fossæ and through the superior orbital fissure. Route (1) seems the more likely. As the tumour enters from below, the abducent which is the lowest of the nerves entering through the superior orbital fissure is early paralysed and a medial squint

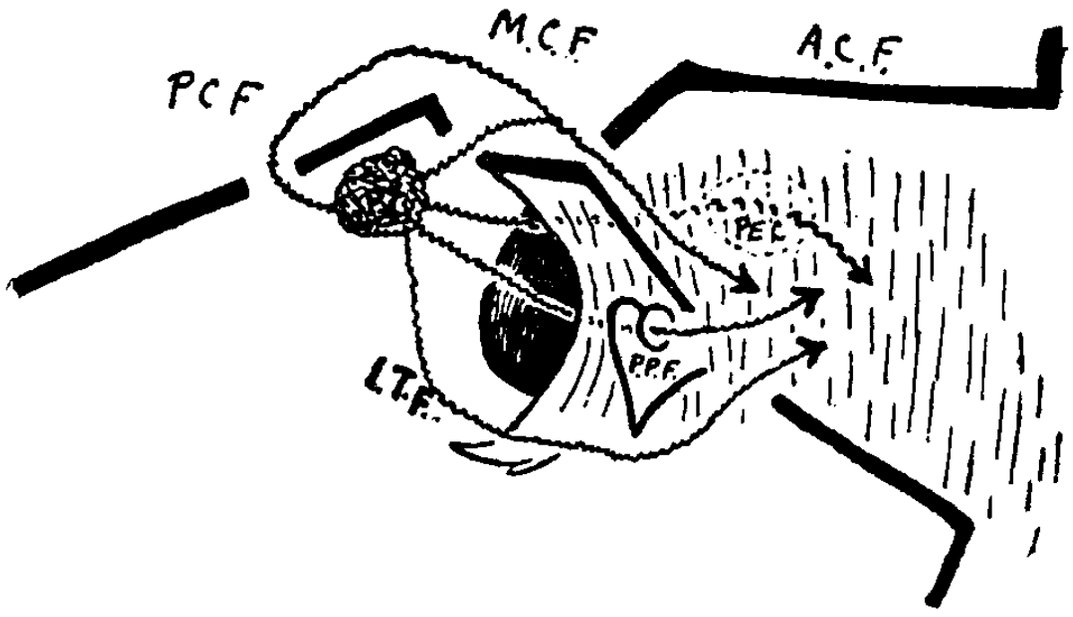

Figure 22. Diagram of possible routes of spread of nasopharyngeal carcinoma into the orbit.

P.C.F. Posterior cranial fossa.
M.C.F. Middle cranial fossa.
A.C.F. Anterior cranial fossa.
I.T.F. Infratemporal fossa.
P.P.F. Pterygo-palatine fossa.
P.E.C. Posterior ethmoidal air cells.

develops. Very soon afterwards exophthalmos begins to develop, the optic and other oculomotor nerves are affected (possibly also the sympathetic), and blindness and ophthalmoplegia succeeds.

The disease also spreads into the cranium. In a post mortem examination nodules of growth may be seen studding the dura mater of middle, posterior and even anterior cranial fossae. These may have entered by permeation or infiltration through the foramina at the base of the skull (fiure 23), namely :—

the jugular foramen the hypoglossal canal	to the posterior cranial fossa.
the foramen lacerum the carotid canal the foramen ovale the foramen spinosum	to the middle cranial fossa.
the lamina cribrosa	to the anterior cranial fossa.

Cranial nerves may be involved in or just below some of these foramina, or even within the cranium. Involvement of the acoustic nerve (which is however rare) must be intracranial. The 2nd and

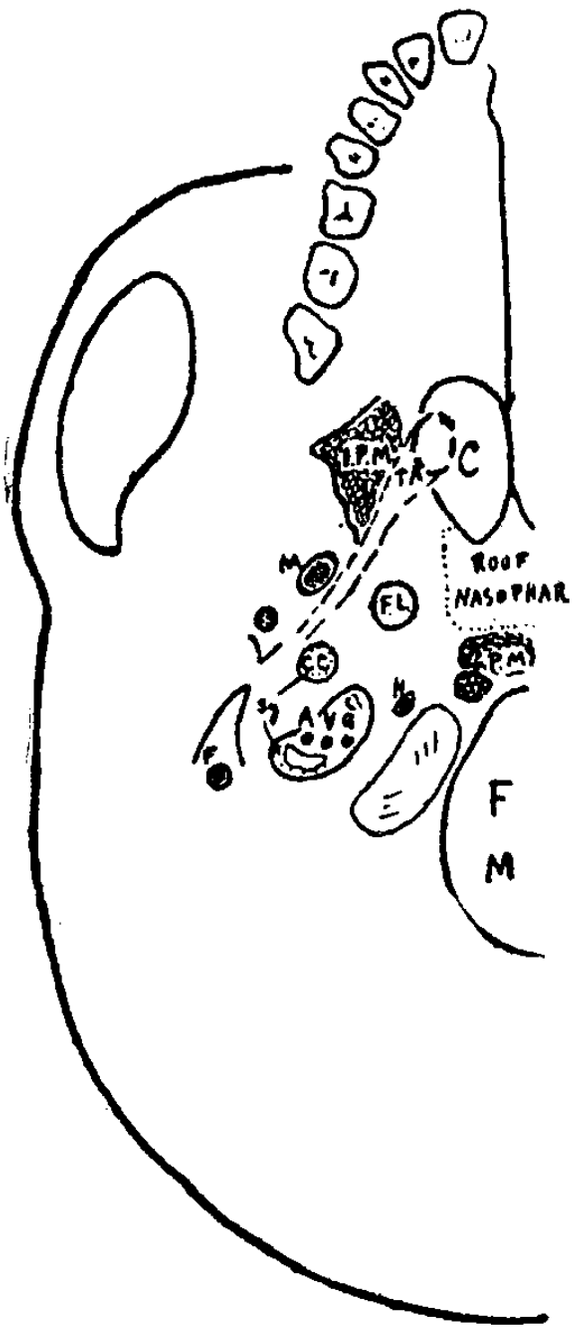

Figure 23. Diagram of base of skull.

C. Choana.	P.M. Prevertebral muscles.
F.M. Foramen Magnum.	M. Mandibular nerve.
F.L. Foramen Lacerum.	F. Facial nerve.
C.C. Carotid canal.	A. Accessory nerve.
F.S. Foramen spinosum.	V. Vagus nerve.
T.A. Tuba auditiva.	G. Glossopharyngeal nerve.
I.P.M. Internal pterygoid muscle.	Sy. Sympathetic fibres.

3rd divisions of the trigeminal nerve might be involved in the pterygo-palatine and infratemporal fossæ respectively, as well as within the cranium.

Nerve involvement then may be in the neck, in the orbit, in foramina at the base of the skull or within the cranium. Indeed the sympathetic fibres to the eyeball might conceivably be affected in any of these situations.

Dissemination by the blood stream occurs late. In a fatal case (290/29) secondary deposits were found in the spinal column and in the liver by Dr. Osman (figure 24). These showed carcinoma in microscopic sections. The deposit in the scapular muscles seen in figure 19, may have been by the blood stream or by permeation of lymphatic vessels.

Treatment:—

Nasopharyngeal carcinoma is one of the most difficult of all malignant growths to cure. We have prolonged life for extra months but in only one or two out of 103 cases have we imagined we were securing a permanent recovery. The prospects in future are a little better.

To attain success *early diagnosis* is of great importance. A nasopharyngoscope which could obtain easily a clear view of the lateral walls, posterior wall and roof of the nasopharynx would be of great value in an early case of enlarged cervical glands in an adult.

Extensive *block dissections* of both sides of the neck including both anterior and posterior trangles (figure 25) and with the implantation of radium needles from the neck towards the nasopharynx and perhaps backwards into the prevertebral muscles are required. This may be followed by X-ray exposure to the neck, or by radium needles in Columbia paste. Both the common and the external carotid arteries are ligatured on the side primarily affected.

The primary growth has been treated by us by splitting the soft palate in the midline diverging behind to one side of the uvula under chloroform (or even local anæthesia) and then diathermising the growth. Alternatively or successively radium may be applied. We have only just now, owing to the generosity of the Matilda Hospital, had any radium available for treatment. In collaboration with Dr. Farr, we apply a 25 mg. needle in a lead tube container introduced along the floor of the nose. Deep X-ray therapy could also be employed, but we have no personal experience of its use in such cases.

In late, practically moribund cases the propriety of prolonging life by tracheotomy, gastrostomy or cerebral decompression may be considered. The headache occasionally disappears spontaneously. At times a concentrated mag. sulph. enema will remove it for a considerable time. At other times the headache is not relieved. Aspirin occasionally affords relief.

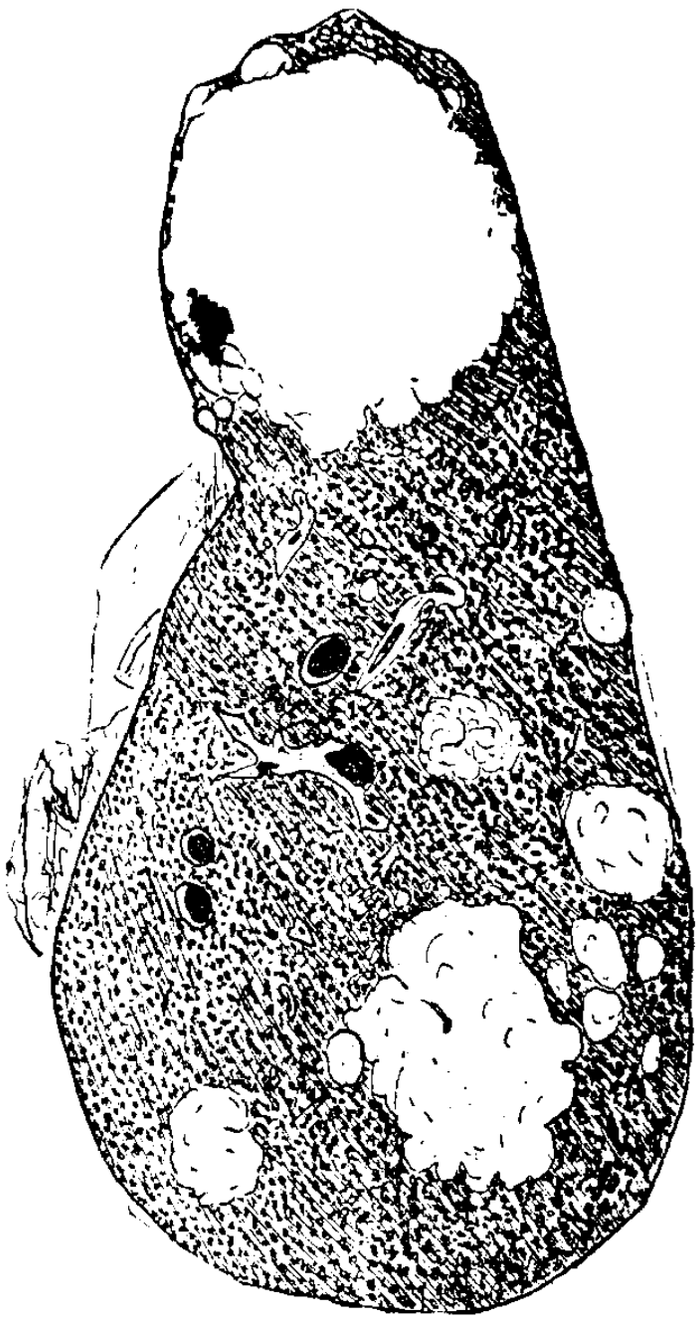

Figure 24. Secondary deposits of nasopharyngeal Carcinoma in the liver.

Autopsy 448.

Professor Tottenham kindly employed lead treatment for us in several cases but the results were not encouraging, though of course the numbers were too small for any conclusions to be formed.

We are indebted to Dr. A. P. Guterres for one of the microscopical drawings; and to Mr. H. Leong, clerk to the Surgical Unit for much assistance with the photographs and the reports. We also owe much to many successive firms of ward clerks and dressers whose work has enabled us to take stock of our knowledge of this disease at the end of 1929, and to compile these rough notes and sketches for the benefit of medical students.

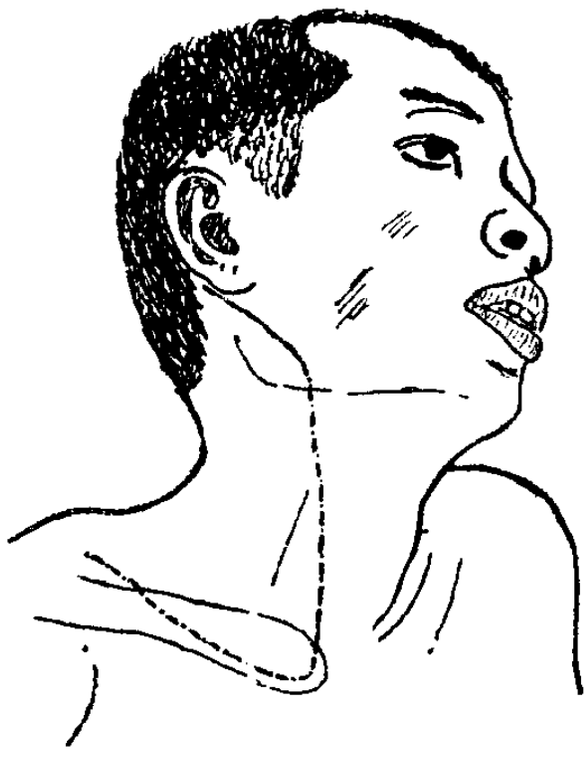

Figure 25. Scar after block dissection of the neck for nasopharyngeal carcinoma. Note edge of scalene muscles. Case 291/29.

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THE DIAGNOSIS OF SPRUE.*

by

J. C. Macgown, M.D., CH.B.

Sprue has been described by Sir Patrick Manson as the most serious chronic disease affecting Europeans in the tropics. It is not an extremely common disease, but it's prevalence is increasing and it has become a serious menace to Europeans whose work necessitates their residence in the tropics. It is not a disease perculiar to Europeans, but they seem to be more liable to it than natives. Manson Bahr has recognised cases in Ceylon, and Ashford has recognised cases among natives in Porto Rico. Manson, who worked in China never recognised a case in pure Chinese.

By the term "Sprue" is understood a form of catarrhal inflammation of the whole or part of the mucous membrane of the alimentary canal, generally associated with disturbances of the functions of the liver and pancreas. This manifests itself by the passage of large, pale coloured, pultaceous, frothy stools, progressive emaciation and finally marked anæmia of the pernicious type. The disease is rarely acute. More generally it occurs in a chronic form and it may exhibit periods of latency extending over a number of years. It may occur as a primary disease or it may supervene on another affection of the bowels. It is very slow in progress, and unless properly treated tends to terminate in atrophy of the intestinal mucosa. When this occurs, it is doubtful if there is any treatment of avail and the victim dies a slow lingering death.

The utmost importance is now laid on early diagnosis of the condition, as it is in the early stages that it is most amenable to treatment, but in the early stages none of the classical symptoms may be present. This has been the difficulty in the past, failures drifting home most of them to die within a few months of their return. It is with the practitioners in the tropics that the responsibility rests. The disease must be recognised and treated then, at the earliest opportunity.

Before passing on to the actual diagnosis it is necessary to consider the clinical pathology, as examination of the stools and blood gives a certain amount of information.

The large size of the stool is one of the prominent symptoms and naturally varies with the amount of undigested food residue passed.

* A paper read before the Hong Kong and South China branch of the British Medical Association on January 8th, 1930.

The average daily weight of a normal stool, when the patient is on a milk diet, is estimated at 6 ozs. and according to Harley 87% of the solid matter ingested in the food is normally absorbed. The size of the individual sprue stool varies enormously. Daily stools up to 31 ozs. have been recorded. Analysis of these stools, as compared with the amount of solid matter ingested, point to the fact that, even in cases which are progressing favourably on a milk diet, less than 60% of the solid matter is absorbed.

Chemical Composition of Sprue Stools.

The amount of fat in the stools is greatly increased. According to analysis the amount of fat passed in normal fæces averages about 3.95 grm. per diem, when the diet consists solely of milk, that is to say that the fat absorption in the normal subject is over 95% of the total amount ingested. With a similar diet the excretion of fat in sprue averages about 35 grm. daily. The total fat may amount to from 25—50% of the dried stool.

The analysis of sprue stools were undertaken by Thomson (1924-25) to ascertain if the pancreas played any part in the disease. The proportion of neutral fat to fatty acid in normal stools remains practically constant in the ratio of 1 : 2. The organ chiefly concerned in the splitting of the neutral fats is the pancreas. In pancreatic deficiency the proportion of neutral fat to fatty acids in the stools is increased, in the extreme cases it may be as high as 8 : 1.

In the blood a grave degree of anæmia is found only in the most advanced stage of the disease. The number of red cells has been recorded as low as 960,000, with a hæmoglobin percentage of 20. The colour index is generally raised and may be about 1.5. In other respects the blood feature resembles that of pernicious anæmia of the aplastic type; nucleated reds are rare. This examination of the blood is important as there are some cases where the bowel symptoms cease but the anæmia goes on and if this is found to be of the pernicious type it is a sign of the presence of sprue. Scott has shown that there is a definite calcium deficiency in the blood. First, the amount of free calcium is reduced by being transformed into combined calcium. Later the total calcium is reduced. In normal blood the total calcium is about 10.7 mg. per 100 cc. This is all free calcium and there is no combined calcium. In sprue the free calcium may be as low as 6 mg. per 100 cc. but some of it is transformed into combined calcium which may amount to about 3.8 mg. per 100 cc. so that the total calcium is very little reduced.

Clinical Manifestations.

Onset of Symptoms.

As a rule the onset is very insidious. Cases starting acutely probably belong to those in whom the disease has been lying latent for some time and some secondary factor, such as dysentry, suddenly precipitates the onset of the symptoms. The earliest symptoms vary greatly in different patients. Diagnosis should not be postponed till the white, gaseous stools develop, for this represents the well established disease. Hospital records go to show that patients are frequently admitted with the diagnosis of debility and enteritis, before some classical feature of sprue develops. Some writers state that sprue very rarely develops in healthy persons. This is probably accurate, in so far as the sprue has been undermining the patients general health for weeks, perhaps months before the onset of the symptoms. A looseness of the bowels, with 3 or 4 motions a day, may be the only initial symptom. This may last 2 or 3 days. The patient probably takes a dose of castor oil and the looseness disappears. These early motions have a characteristic feature. They may be greenish or brown in colour and are seldom the pale colour to be seen later on in the disease. At this stage there are no mouth symptoms or any other symptoms except perhaps a change in the patient's mental outlook. He may become irritable and apprehensive for no reason known to himself. People who were formally cheery may become dull and morose. This mental condition is a well marked feature of sprue.

Weeks or months later the diarrhœa again returns. In the meantime the patient may have suffered from dyspepsia, with hyperchlorhydria, which he in no way connects with his diarrhœa. This time he probably consults a doctor who may, or may not, examine his stools for amœbæ. As often as not the patient is given a dose of castor oil and a few injections of emetine, on the off chance that he is suffering from chronic dysentry. The patient may be put on a milk diet for a few days and the diarrhœa clears up again. In the meantime he steadily loses weight. From now onward the patient may complain of an increasing irregularity of the bowels. He volunteers the information that he is awakened in the morning with a feeling of abdominal discomfort and distension. He then has an urgent call to stool and passes a large, soft motion with much flatus. This releases his discomfort and he may pass no more stools for the rest of the day. A few months later similar evacuations may take place in the forenoon. The patient's attention will be drawn to the character of the motions which become increasingly paler and very frothy. Soon after the diarrhœa has become established the mouth symptoms commence.

Not every case of sprue, however, starts with diarrhœa. There are cases where the tongue and mouth symptoms have existed months before any sign of diarrhœa.

In rare cases anæmia and loss of weight may precede the diarrhœa by several months. These cases without other symptoms are very difficult to diagnose at onset.

Symptoms in a TYPICAL Established Case.

General.

The patient looks ill. His expression is anxious and worried. His countenance has a dusky palor and his skin seems transparent. A brownish-gray pigmentation over the malar prominences, forehead and cheeks is sometimes seen. He is easily tired and complains that exercise does not seem to do him any good, as formerly. He is often hungry, but is afraid to eat indiscriminately as he knows from experience that this will make his diarrhœa worse. He becomes very introspective, taking a great interest in his motions and becoming very depressed when the number of these is increased.

The *cardio vascular* system is normal but the blood pressure is low.

The *respiratory system* has no symptoms of it's own although broncho-pneumonia may appear as a terminal symptom.

Muscular System. Troublesome cramps and carpo-pedal spasms may give the patient a sleepless night. This is looked upon by some as a most unpropitious sign.

Nervous System. Tingling and numbness of the limbs are late symptoms and may be the forerunners of those of combined degeneration of the cord, which will be dealt with in sequellæ.

The temperature, as a rule is normal throughout, though in the last months of life it may be irregular. The occurrence of pyrexia must be regarded as being of a serious prognostic significance.

Local Symptoms.

Mouth. At first there appears a tenderness at the tip of the tongue, with the formation of little blisters, or aphthæ on the frænum, the buccal mucosa and inside the lower lip. The aphthæ are remarkably evanescent, as is also the inflammation of the tongue itself. This inflammation is of a perculiar kind and affects the fungiform papillæ at the tip and the margins.

The mouth symptoms may subside as quickly as they commenced but result in gradual atrophy of the filiform papillæ, leaving the fungiform papillæ standing out as angry inflammed knobs. This peculiar inflammation of the tongue may commence round an aphtha and spread along the margin; at the same time the patient suffers

from excessive salivation and disturbance of the sense of taste. He is extraordinarily sensitive to acid fruits, salts, hot drinks, curries, and spices of all kinds. As the disease progresses, even light wine may cause the most intense pain and burning in the mouth. A curious point is that any exacerbation of the mouth symptoms, in some patients, appears to be relieved by a recurrence of the diarrhœa, while again, in others, the exacerbations of the mouth and bowel symptoms coincide. As the disease progresses superficial longitudinal and transverse fissures make their appearance but do not extend into the muscular tissue. The mucous surface of the tongue has now a highly polished appearance divided into a number of incomplete compartments by the fissures already mentioned. The buccal mucous membrane also becomes smooth and atrophic. The lymphoid tissue of the hard palate and the follicles on the mucous surface of the lower lip stand out prominently. Cracks and fissures may appear at the angles of the mouth and become extremely painful. Eventually, at the stage preceding death the whole tongue and mouth become covered with a grey growth of thrush fungus.

In the *stomach* acid dyspepsia and flatulence are constant symptoms. In the early stages the gastric juice may be normal or there may be hyperchlorhydria. In the later stages hypochlorhydria or achlorhydria is usually found. Vomiting is common, especially after indiscretions of diet. Abdominal pain is frequently complained of especially just before the bowels move. Meteorism is often extreme. The abdomen is distended, especially in the lower half and peristalsis may be observed to take place through the attenuated abdominal wall. Most clinicians place reliance, as an aid to diagnosis, on the shrinkage of the liver dulness, indicating a considerable degree of atrophy. Movement of the bowels may cause the patient great pain on account of the scalding feeling caused by the acid motions on the raw mucous membrane of the anus. Sometimes the motions are almost pure white but they are usually grey or a light yellow. The usual consistance is that of porridge and the appearance is frothy. They have a characteristic sour adour. At times the motions are watery and again the patient may be constipated.

The general health of the patient eventually shows signs of giving way. He becomes extremely emaciated, dull and listless. The smallest action requires an effort. Any indulgence in diet or physical fatigue causes a recurrence of symptoms every time in a more acute form. With the gradually increasing weakness and emaciation the patient assumes the appearance of a most marked anæmia. The lips are pale and the eyes sunken. The ankles become œdematous and the skin dry and scaly. Pruritus ani and, in women, vulvi sometimes appears to add to the suffering. Emaciation becomes so extreme that the victim resembles a living skeleton. The diarrhœa

becomes continuous and the patient takes to bed. If the anæmia is severe petechiæ may appear on the extremities and buttocks. Less and less food is taken so that death may supervene from inanition. In other cases a fatal termination may follow an acute choleric attack or may be due to some intercurrent disease.

Such is the story of an untreated case or of one which has not been recognised in the early stages when treatment is of most avail.

Death may occur in a year from the onset of the symptoms, while in a more chronic form the course of the illness may last as long as 20 years. In the latter group the mouth and bowel symptoms may be absent for long periods at a time.

Initial symptoms have been known to develop after a patient has left the tropics. In a case such as this, the disease must have been present in a latent form and have been brought out by some factor which lowered the patient's resistance.

Nicholls (1928) describes a condition, common to natives of Ceylon, where the mouth and œsophagus closely resemble sprue in the European. There, natives seldom complain of diarrhœa, and much milder than in Europeans. A similar condition is described that these are sprue and owing to racial immunity, the symptoms are the frothy stool, usual with Europeans, is absent. Nicholls concludes by Manson Bahr occurring amongst native prisoners in jails in Ceylon.

Occasionally dyspeptic symptoms may dominate the clinical picture.

The existance of the varied clinical forms seems to suggest that the morbid process has attacked different organs or parts of the intestinal canal.

The mouth symptoms and wasting may progress in the absence of diarrhœa. A case is occasionally met with in which the diarrhœa subsides, yet copious solid stools continue to be passed and emaciation is progressive.

The diagnosis of sprue, as early as possible, is of the greatest importance. The disease, at the beginning, yields much more readily to treatment and the earlier treatment is commenced, the better the prognosis. The onset being so insidious, the early diagnosis presents a certain amount of difficulty. The only initial symptom may be a slight looseness of the bowels for a few days and the motions have no characteristic appearance. A feeling of lassitude may persist after the diarrhœa has ceased. A patient, having complained of such symptoms should be kept under careful observation. The stools should be thoroughly examined for amœbic and bacillary dysentry and ova of intestinal parasites. A note should be made of the patient's weight. Next time the patient complains of looseness of the bowels another examination of the stools should be made. If this is negative the

ionic calcium content of the blood should be ascertained. Any reduction of the ionic calcium content of the blood associated with loss of weight and diarrhœa should be considered an indication of sprue. If there is any doubt at this stage, it is far better to treat the case as sprue than to wait for some classical symptom to develop.

There are three prominent symptoms, which occur in other diseases from which sprue may be distinguished, namely, diarrhœa, sore mouth and anæmia. The diarrhœa is to be distinguished from hill diarrhœa, chronic amœbic or bacillary dysentry and chronic pancreatitis.

Hill diarrhœa occurs commonly in the hill stations of India at an elevation of 6,000 feet or over. It attacks new comers and is apt to occur in epidemics and at certain seasons of the year. Like sprue, it is characterised by a flatulent dyspepsia, by nausea and by the passage of large, liquid, pale fermenting stools and the tendency of the diarrhœa to occur in the early morning. There are however no mouth symptoms. Sometimes diarrhœa may persist for a considerable time and may develop into or predispose to genuine sprue.

There is little danger of confusing a chronic amœbic or bacillary dysentry with a case of sprue. In amœbiasis the main points in differential diagnosis will be the history of the intermittent passage of blood and mucus, the presence of pain over various portions of the intestinal canal, as for instance over the transverse colon, the character of the stools, the presence in them of entamœba hystolitica or it's cysts. In the case of bacillary dysentry, the characteristic cellular exudate in the stools and serum agglutination tests will determine the diagnosis. Very early sprue, before the mouth symptoms develop, and hill diarrhœa might be confused. In this case the ionic calcium content of the blood would give a valuable clue. Scott gives the calcium content of the blood in 105 cases other than sprue, i.e. diarrhœa, amœbic and bacillary dysentry, mucous colitis and syphilis, malaria, kala-azar, filiariasis, undulant fever, etc. The ionic calcium averaged 10.2 mg. per 100 cc.

Pancreatitis in advanced cases presents a wonderful clinical likeness to sprue. There is the passage of large, bulky, colourless motions of acid reaction, with great, often rapid emaciation. Distension of the abdomen, anæmia and tongue symptoms may also be present. Pancreatitis is however, rarely primary. It is often malignant and secondary to diseases of the liver, gall bladder and ducts. Begg believes that all chronic sprue cases have pancreatitis. Careful examination ought to distinguish the two diseases. In sprue the liver is diminished in size and in pancreatitis the head of the pancreas may be felt enlarged, with tenderness of pressure on the abdomen. Also in pancreatitis there is always a history of attacks of fever, while

the tongue, if affected, will show only aphthous patches and sugar will frequently be found in the urine.

The mouth symptoms must be distinguished from those of pellagra, syphilis, the inflammation caused by excessive smoking, pyorrhœa, or carious teeth.

Syphilis. The tertiary syphilitic tongue, in contra-distinction to that of the chronic sprue, shows large areas of leukoplakia; other syphilitic stigmata may also be present. The Wasserman reaction would clear up any doubt.

Smoker's tongue. The inflammation involves the fungiform papillæ where the smoke impinges on the tongue and there may also be superficial leukoplakia.

Pyorrhœa effects the gums at the alveolar margin and a carious tooth would only cause inflammation on one side.

Sprue must be distinguished from other diseases in which anæmia is a prominent symptom. Such are pellagra, ankylostomiasis, pernicious anæmia, chlorosis, chronic malaria, kala-azar and scurvy. From *pellagra,* sprue can be distinguished by the complete absence of cutaneous symptoms so characteristic of that disease. In pellagra there is often a general inflammation of the tongue and the passage of frothy and gaseous stools. The inflammation however is general and not confined to definite areas. The fat content of the stools and ionic calcium content of the serum in sprue are also diagnostic features.

Ankylostomiasis is often associated with a chronic diarrhœa, but the absence of mouth symptoms, the eosinophilia and presence of ova in stools afford sufficient grounds for differentiation.

Chlorosis may be distinguished from sprue by the plump condition of the patient and the absence of diarrhœa.

Chronic Malaria may be confused with sprue; but the splenomegaly together with a history of febrile attacks, the mononuclear increase and perhaps the presence of parasites in the blood, should serve as a guide.

In *Kala-azar* there is usually a great enlargement of the liver and spleen together with an intermittent pyrexia, all of which are not found in sprue.

The comparison of *Pernicious Anæmia* and sprue has already been gone into: The important points in sprue for differentiation are increased fat content of stools, absence of bile pigment from stools, diminished liver dulness, tetany, rapid wasting, mental depression, and origin in tropics.

In *Scurvy* there will generally be a history of diet defecient in vitamine, hæmorrhages are common and the stools do not have the typical appearance of the sprue stool. In scurvy the anæmia is always of the secondary type.

SOME CLINICAL OBSERVATIONS ON THE EFFECTS OF SODIUM AMYTAL GIVEN INTRAVENOUSLY TO PRODUCE GENERAL ANÆSTHESIA.

by

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Sodium Amytal is a powerful sedative which has been claimed to be able to produce general anæsthesia if it is administered intravenously. Its dosage has not been worked out yet, but an empirical figure of 1 grain to 1.5 grains to every 10 pounds of body weight has been prescribed and not more than 25 grains should be given to any patient.

A few practical points have to be borne in mind whenever this drug is used. The drug in the form of white powder should be dissolved in sterile distilled water in ampule in the strength of one gram of sodium amytal to 10 c.c. of distilled water. Fresh solution, which ought to be perfectly clear, should be prepared just before use. If there is any suspicion of the solution being cloudy, it should be rejected. This drug cannot be exposed to air too long and 20 minutes should be regarded as the safety limit of exposure of it to air. When injecting no more than 1 c.c. of the prepared solution should be given per minute.

Before operation morphia and atropin can be given as usual. Fall of blood pressure is the chief drawback of sodium amytal. Ephedrine sulphate or sodium benzonate may be given with advantage either with or after administration of this drug. Morphia can be safely given after operation for the restlessness which is liable to occur after administration of sodium amytal. The patient is to be carefully watched after operation as he usually takes few hours to come round.

We have tried sodium amytal in three of our cases which presented difficulty in open ether administration and in every one of them a rather small dose was prescribed owing to our lack of experience of this drug. In all the cases the patient had become deeply asleep before the injection of the drug was finished. Apart from operation the blood pressure fell very low, being round about 60 mm. of mercury. The pain sensation was found by no means abolished. We have to employ injection of a 0.2% solution of B Eucaine in saline with 10 minims adrenalin added, to every 3½ ozs., of the solution to start the operation. After certain stages open ether was found necessary but very little was used to keep patient under. In one case ether seemed to counteract to a large extent the lowering of blood pressure by sodium amytal. Intravenous saline (2%) was given to one case only. All the cases came round quite early the

time being one hour or so after operation. One case was rather restless when coming round. In two cases injection of Ephedrine sulphate was given as the blood pressure kept low for some considerable time. The following are short accounts of the cases:—

Case 1. L.N.S. Female, 23, weight 77 lbs., case No. 383/29. Patient suffered from a vesico-vaginal fistula with vaginal stenosis following labour. This condition developed about three months before admission. She was considered to be a case in which an ordinary plastic operation would not be successful. A preliminary sub-totalhysterotomy was performed by Dr. Samy in the gynæcological department. Later a tube graft was raised from the thigh and implanted into the vulva to close the rent but this means failed. A uretero-colic anastomosis was considered to be the sole means to give her relief. Owing to previous experiences of ether inhalation patient became so disgusted with the smell of ether vapour that she refused to take ether altogether. As the operation would involve the rectum, rectal ether was impossible and the operation had to be postponed. Sodium amytal was first tried on her, 1 grain per 10 lb. of body weight was given. She made a good recovery after operation.

Case 2. M.H., male 36, weight 85 pounds, case No. 3/30. He was admitted for hæmatemesis. Clinical evidence rather suggested peptic gastric ulcer. The radiological department reported an early carcinoma or polypus of the stomach. A partial gastrectomy with gastrojejunostomy was performed. His teeth were unhealthy, therefore sodium amytal was given. The dosage was 1.2 grains per 10 pound of body weight. He was rather restless after the anæsthetic. He died 11 days after operation. Section of the diseased mass showed simple gastric ulcer.

Case 3. C.F.K. Female, weight 93 lbs., case No. 27/30. Patient was admitted for an angioma of the upper lip. The condition was present after birth and it had been growing since. Tumour was about 3″ x 3″ x 2″, hanging from the upper lip and covering the mouth like an apron. Open ether inhalation was considered unsafe before the growth was removed. Sodium amytal was given in the dosage of 0.8 grain per 10 pounds of body weight. She recovered.

We acknowledge that we don't know enough about sodium amytal to draw a conclusion but there are few points which are worthy of comment. As we used minimum doses we do not pretend to denounce the drug's strength to produce general anæsthesia, but we

certainly find it helpful in reducing the amount of ether given. On the other hand the fall of blood pressure was alarming. As we wanted to test this drug's own merits we were rather reluctant in giving ephedrine which we shall give at the same time with the administration of the drug in future. We agree with the writers of this drug that it produces sleep very rapidly. Perhaps great credit should be given to the drug in enabling us to perform the operation of uretero-colic anastomosis as rectal ether or avertin could not be applied to this case and spinal anæsthesia would not give us enough time to finish the operation.

We are indebted to the agent of the Eli Lilly Company for sending us the samples of Sodium Amytal and for loan of the pamphlets.

This note is written under the guidance of Prof. K. H. Digby. The writer is specially grateful for his permission to publish this note.

AFFECTIONS OF THE EYE
in
GENERAL PRACTICE.

(*Continued*)

SIGNS AND SYMPTOMS OF ERRORS OF REFRACTION.

by

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During each holiday season doctors are frequently consulted regading various symptoms shown by young people home from school. One of the commonest causes of headaches in children is an error of refraction.

Although ophthalmology may be among the subjects for the M. B. Examination, it is seldom that any serious attention has been paid to such conditions of the eye resulting in what is commonly known as errors of refraction. Therefore I may be pardoned if I state a few elementary facts with regard to this subject

The normal eye of an adult measures on an average 23 m.m.s. in its antero-posterior diameter. The various media together form a lens or a focussing arrangement whereby parallel rays of light entering the cornea in front, are brought to a sharp focus at the retina behind.

Suppose a state of hypermetropia exists, that is, the antero-posterior diameter of the eye is less than 23 mms., the rays will not be brought to a focus on the retina but will meet somewhat posterior to it. There are various conditions of the eye which will produce hypermetropia as well as this abnormal shortness of the eye, but we need not be concerned with these for the moment.

Young people with hypermetropic eyes have the power, by using their accommodation, that is, of allowing the lens to become more convex to focus the rays on the retina. The focus which would be behind the eye is brought forward to the retina. In those with strong power of accommodation, vision is not interfered with at all. In fact, all children are born hypermetropic, with very few exceptions.

At a large school, where for some time I have had the care of the children's eyes, it is the rule to examine under a mydriatic each child entering the school. With the rarest exceptions I find some degree of hypermetropia to be present.

In order to follow intelligently what is meant by accommodation, if a child 10 years of age is given some finely printed book to read, and told to bring it as close to the eye as possible, it will continue to read until the book is but 2¾ inches from its eye. The same child when 15 years of age, can read the same print at just a little over 3 inches, but at 25 years of age, the distance will have receded to 4 inches. At 40 it will be 7 inches, but at 45 it will be 10 inches; and so it is seen that the ciliary muscle which is responsible for the increase of the curvature of the lens, is gradually growing weaker throughout life. At 60 years of age there is little or no accommodation present.

The effect of instilling atropine, or other drugs which are known as mydriatics, is to paralyse the ciliary muscle, and therefore the power of accommodation. A great many children in the full vigour of health, can readily accommodate continually to the extent of 2 Dioptres without showing any symptoms whatever.

What is a Dioptre? A Dioptre is a lens whose length of focus is equivalent to roughly 40 inches. A child whose media is deficient in refractive power, say of 4 Dioptres, must in the attempt to see clearly, exert accommodation to his amount. A 4 Dioptre lens is equivalent to one of 10 inch focus.

Suppose a boy aged 10 on returning home from school tells his parents he has had frequent headaches. His eyes may appear to be perfectly normal. In the surgery it is found he has 6/6 vision in each eye. He can read the smallest print held, say, 10 inches away. What can cause his headaches? In such a case the doctor must never forget that he cannot exclude the presence of hypermetropia unless the ciliary muscle is paralysed by means of the installation of atropine. If the boy's constitution seems sound, and his digestive organs are performing their functions in a normal manner, it is imperative that his eyes should be examined.

A doctor in charge of school children may, at this stage, put forth the query, if a boy aged 10 or 12 has from one to one and a half Dioptres of hypermetropia, would you prescribe spectacles for such a condition? My experience with many school children has taught me that such a query cannot be answered by an unqualified yes or no. If the child is in good health and does not suffer headaches and is able to learn his lessons in a normal manner, there is no need to inflict the wearing of glasses upon him. But if he is not very robust, if he complains of occasional headaches, then by all means prescribe little more than half his total error, to be worn only during school hours.

Some parents are greatly distressed when informed that their child must wear spectacles, but in the condition of hypermetropia, there is the stong probability that as the eye increases in size together with the child's growth, so its refraction will become normal.

In the large school to which I have referred, I find from time to time I have been able to tell a boy or girl to put aside their glasses. What then have the glasses accomplished? First they have saved the child from headaches. Secondly, they have saved him from constant nervous strain, and thirdly, from producing an aversion to the child's study of books. Thus the growth of the child has not been impeded by imperfectly functioning eyes.

I will give three brief illustrations of how strain on the accommodation unrecognised, may produce disastrous results. A girl aged 16 was brought to me by her father. She was nervous, highly neurotic, and under-developed. At each school inspection she was found to have 6/6 vision in each eye and so had never worn glasses. Using 2 per cent. homatropine, the effect of which passes away in 24 hours, I found she had 4 Dioptres of hypermetropia in each eye. I am quite prepared to say that if this girl had worn her proper correction since 5 years of age, I would not have had to deal with so poor a specimen of girlhood.

A doctor's child aged 5 was seized by a fit, and rolled down the front door steps into the arms of his aunt. She was a medical woman and was greatly distressed at such happening. The boy appeared to be vigorous and healthy, but later on he again became unconscious. The attacks did not resemble epilepsy and in order to elucidate the case, I was asked to examine the optic discs for a possible state of papillœdema or optic neuritis. The physician had in mind a neoplasm of the brain. Under atropine I found the fundi to be perfectly normal, but there were fully three dioptres of hypermetropia present. I promptly prescribed glasses to be worn constantly with the happy result that only once during the past three years was there anything that would approach to the semblance of a fit. Father, mother, aunt and nurse all state that the child's health has improved enormously and nothing was done beyond prescribing spectacles for the correction of 3 Dioptres of hypermetropia.

My third case is one of great interest. A mother brought her two young children from abroad, one aged 7 to have its eyes examined as it was thought she could not see properly. The other child, two years younger, showed poor mental development, and was to be placed under he care of a children's specialist. I did not think it possible that any physician, knowing that one child had 8 Dioptres of hypermetropia, could possibly forget the probability of an error of refraction existing in the child under his immediate observation. But indeed such was the case. The suggestion came from the mother, and in accordance with her wishes, I examined the younger child's eyesight. It had 9 Dioptres of hypermetropia in each eye. This child was given the proper correction, was placed under the care of

a capable governess, and when I saw it two years later, it was astounding to see the mental ability which it had acquired during that interval.

It is a remarkable fact that physicians both in and out of Hospital are at last realizing the enormous benefit that can accrue from the wearing of properly prescribed glasses. In a recent lecture at the Royal Society of Medicine it was stated that headaches, including migraine could often be improved by the careful prismatic correction of slight muscle imbalance, and suggested that the investigation of any case was not complete without an examination of the balance of the extraocular muscles of the eye. It has been my custom for years to examine the muscle balance of each case I see, but I emphatically state that the greatest causes of headaches are not due to muscle imbalances, but to the presence of hypermetropia or hypermetropic astigmatism which has not been corrected, or the correction of which has been done in a faulty manner.

Let me briefly allude to myopia. Myopia or short sight is the opposite condition to hypermetropia or far sight. Here the commonest condition is due to a lengthening of the antero-posterior diameter. It is an acquired condition and one which does not escape the attention of the parents or the doctor so readily as that which we have just been discussing. The child with myopic eyes cannot see black boards, maps, or pictures as well as its normal sighted companion can. Sooner or later it is made to sit in the front row of the class. It is not long before subconsciously it realizes that it cannot see as well as others. Such children usually have an abnormal fondness for books, and they avoid the full amount of play indulged in by their companions. They read holding the book close to them at times when they should be playing. They are allowed to read in bed by indulgent parents or servants, and it is among the latter that I have found the worst forms of progressive myopia. No child should be allowed to read in bed.

In my consulting room a child will tell me, to the parent's astonishment, that it has been given books to read when going to bed. The last child which made this statement was 8 years of age and had 9 Dioptres present. This amount had been rapidly acquired.

Fortunately the average case is not so marked. A child returns home from school with the report that he should have his eyes examined as he cannot see distinctly. Again the accommodation is paralysed by means of a mydriatic. The amount of the error is estimated, and that glass given which will give the child the normal 6/6 vision. So, all possibility of eye strain is excluded.

Astigmatism simply means that the curvature of the cornea is not that of a Soccer ball but that of a Rugby ball. Its two chief

meridians are of unequal radii. It may be corrected by a convex cylinder if of the hypermetropic variety, and by a concave cylinder if myopic in character, or a combination of both, when it is known as mixed astigmatism.

At all ages eye strain or asthenopia is the result if the error is not corrected by proper glasses. The remarkable fact is clear to every oculist that it is the low degrees that produce the worst symptoms. This is due to the eye making the attempt to accommodate so as to produce the clearest image possible, which it does not attempt to do if the error is great.

In the outpatients department of a Hospital for nervous diseases the study of the symptoms produced by errors of refraction is highly illuminating. But what is of much greater interest is the result of properly prescribed spectacles. For some years we have carried out the estimations of errors of refraction at the West End Hospital for Nervous Diseases and results have been obtained which have convinced us that even such central nervous disturbances as epilepsy, severe migraine, nervous debility, can be affected, in selected cases, most profoundly by such glasses as will eliminate the possibility of throwing upon the ciliary muscle a strain which physiologically it was never intended to bear.

SQUINT: ITS CAUSE AND TREATMENT.

Again I will remind readers of some simple elementary facts of anatomy. Each eye-ball lies in a bed of fat, its movement being governed by six muscles. Four straight and two oblique. Reference to diagram No. 1, which represents the reader looking down from above on the eye-ball and muscles.

The internal rectus attached to the inner side of the eye-ball when it contracts turns the eye-ball inwards.

The external rectus turns the eye-ball outwards.

The superior rectus turns the eye-ball upwards and slightly inwards, while the muscle not shown as it lies beneath the superior rectus, the inferior rectus turns the eye-ball down and slightly in.

The superior oblique passes through a small cartilaginous pulley and passing across over the eye-ball is inserted posterior to the equator. The remaining line represents the inferior oblique and is inserted below the eye-ball and behind the equator. The superior oblique contracts and pulling through the ring, rotates the eye-ball downwards and outwards.

The nerve which supplies the superior oblique is the fourth cranial nerve, called by older anatomists patheticus from its action on the eye-ball. The inferior oblique by its contraction rotates the eye-ball upwards and outwards.

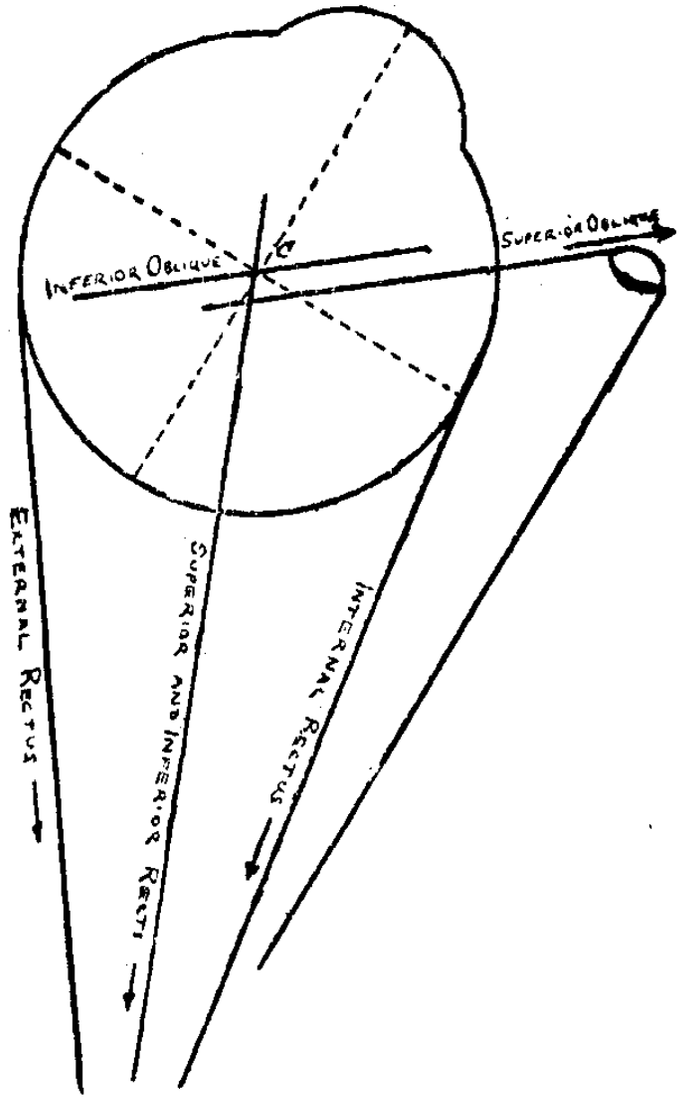

Figure 1.

The balance produced by the twelve extra-ocular muscles is such normally as to produce single vision, and so if there is a paresis or partial paralysis or complete paralysis of the sixth nerve supplying the external rectus, then the unopposed pull of the internal rectus which is supplied by the third cranial nerve will rotate the eye-ball inwards. Such a squint would be known as a paralytic squint, and practically all those I have seen in babies have been produced by the use of forceps at a difficult confinement.

Recovery is far from common, but in adult life when there is tendency for the internal rectus to weaken, the eye-ball will appear practically straight but the patient will still be unable to rotate the eye-ball outwards beyond the middle line.

I have mentioned that the superior oblique is supplied by the fourth cranial nerve, the external rectus by the sixth. All the remaining muscles are supplied by the third. The levator muscle of

the superior eye-lid is also innervated by the third cranial nerve, so that a complete paralysis of the third nerve would be recognised by the following. The eye-ball would droop as it is no longer supported by the superior rectus, it is rotated outwards by the unopposed action of the external rectus supplied by the sixth nerve, and the downward and outward rotation is also augmented by the action of the active superior oblique, while ptosis or hanging down of the superior eye-lid will also follow.

The squint with which we are more directly concerned at the moment is not a paralytic form, but what is known as concomitant strabismus. This is the commonest variety met with. There is no paralysis concerned in this squint. I refer my readers to the previous article in which I explained the action of accommodation. If the ciliary muscle within the eye-ball allows the focus of the lens to increase by one dioptre, then remembering that one dioptre lens is a lens the focal length of which is one metre or roughly 40 inches, the eye-ball is really looking at a point 40 inches away. Suppose both eye-balls rotate towards the middle line so that both visual areas meet 40 inches away from the nose, then each eye-ball has rotated through

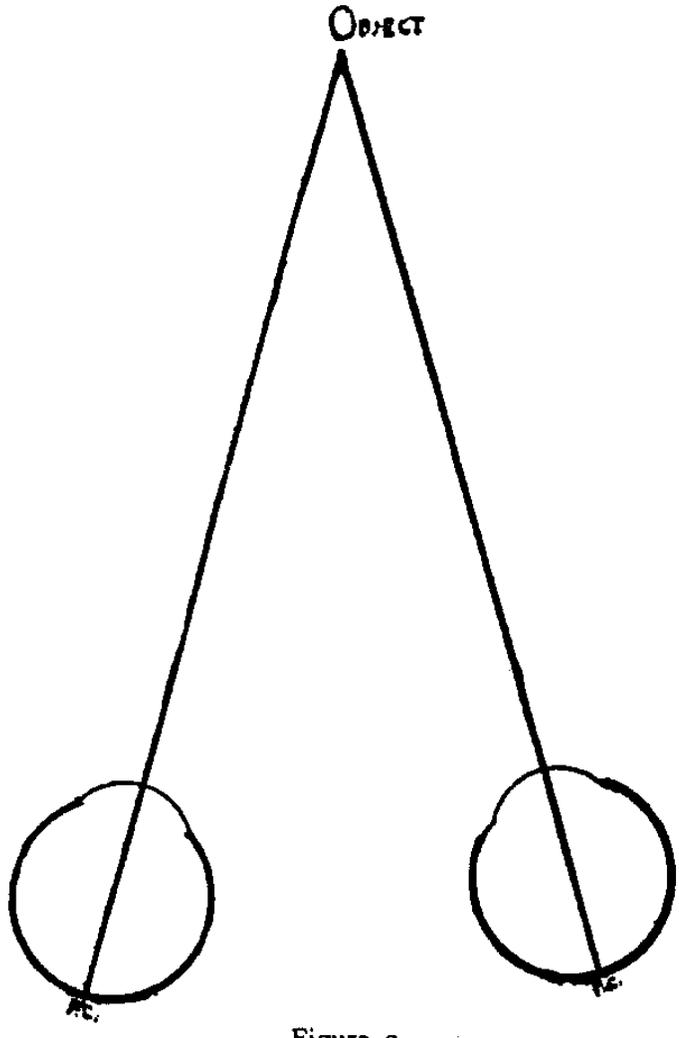

Figure 2.

one metre angle. Suppose again that each eye-ball is looking at a point 10 inches away as in illustration No. 2, that is each eye-ball has rotated inwards through four metre angles and the accommodation will have increased simultaneously four dioptres also. It is perfectly plain then that the action of accommodation is linked up with convergence of the eye-balls, the ciliary muscle internally and the two internal recti externally are supplied by the third cranial nerve. But what will happen in the case of a hypermetrope who requires a four dioptre lens to focus distant objects and who has not glasses to aid him? Not only will he have to exert 4 dioptres of accommodation to see a point 10 inches away but he will have to exert a further 4 dioptres to compensate for his hypermetropia. Such strong innervation to the ciliary muscle by equalling 8 dioptres within the eye-ball is accompanied by an effort of the recti muscles rotating both eye-balls inwards to a point 5 inches away. Yet the patient is striving to see a point 10 inches away. Here is a conflicting issue. The result is obtained by both visual axes being rotated through 8 metre angles and as one visual axis is directed to a point 10 inches away the other visual axis will be rotated much closer inwards as illustration No. 3, and the latter eye is therefore the squinting eye.

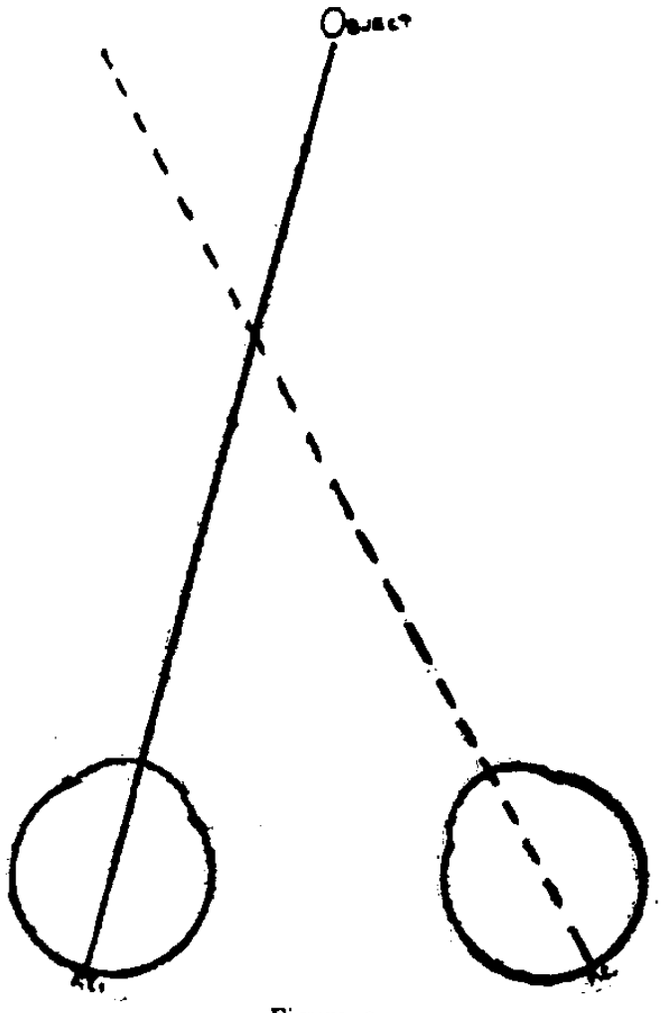

Figure 3.

I have tried to make this explanation as simple as possible so that any of my readers might clearly comprehend.

The squint commonly met with in children is therefore due to lack of harmony between the action of the ciliary muscle within the eye-ball and the internal recti without.

Not due to a curl hanging over the child's forehead, not due to a tassel hanging from the baby's pram cover, not due to worms, not due to fright, and not due to naughty imitation of another squinting child. Surely if the women of the East End of London can appreciate that the squint is due to lack of glasses, how much more the educated general practitioner.

It is true that a squint is often noticed for the first time say after an attack of measles or other febrile disturbance. Such a little patient has just been able by means of good muscle tone to exert accommodation in excess of convergence, but the loss of muscle tone consequent on the illness will allow this squint suddenly to appear. The child can no longer keep up the fight.

In every centre for child-welfare it should be taught that a squinting child over the age of six months should be seen by an oculist. The eyes of a baby have not settled down to complete concomitant action until three months old. Several intelligent mothers have brought their five months old babies to me with a decided squint. In each case, having examined the refraction under atropine I was able to prescribe little spectacles, the sides of which were tied round the baby's head with tape. These babies have become so used to the glasses that they cry if they are not put on on wakening.

Can a child grow out of a squint without the use of glasses? Yes, it is possible, and occurs in a great many cases, but at what a cost? Let me illustrate by reciting the following case. A boy aged 14, the son of a professional man was brought to me by his mother. Both eyes were quite straight, but the vision of one eye was very poor indeed. I examined this eye and found it to be perfectly healthy. When I asked the mother had the boy ever squinted she told me he had, but as the Doctor told her he would grow out of it, glasses were never prescribed. The images formed in this squinting eye were disregarded by the brain so that the faculty of finer sight in this eye was lost. It is useless to attempt the re-education of the squinting eye after seven years of age. Worth in his admirable book on "Squint" has proved this, and it is the common experience of every oculist. Once only can I remember having improved a little patient's vision by two lines, who was nine years of age. The good eye was completely occluded for months.

A squinting eye becomes an amblyopic eye, and remains so throughout life whether the squint disappears by itself or by an operation.

Will glasses then cure every case of squint? I have seen many little children from one to three years of age whose eyes become perfectly straight after the use of correcting glasses in three months' time, but in spite of glasses a certain number will not become straight. In the latter class two factors are concerned. The first factor is somewhat problematical. The brain has not acquired the power of fusing two images into one. Stereoscopic vision is impossible. The second reason is an absolute one, and invariably discovered at the time of operation. The power of the internal rectus in virtue of its size and strength far exceeds that of the external rectus, the latter muscle is often a mere ribbon. At these operations I constantly demonstrate to those looking on the great inequality of these two muscles. No muscle training that has ever been devised could change the condition commonly found.

How long in this latter class should glasses be tried. Sometimes I do not wait more than a year, and in others two years.

It is the happy experience of many oculists to find that when they have straightened the squinting eye the little patient at once begins to develop its fusion faculty. The stereoscopic vision begins to be appreciated and in that test with which so many are familiar "the bird flies into the cage."

The much less common form of squint, the divergent variety is usually associated with the opposite condition of refraction i.e., myopia or short sight.

In the operation for squint, no longer is the internal rectus merely cut through or tenotomised with the fervent hope that the eye will be found straight on removing the bandages, such an operation is neither logical nor surgical. When the orthopædic surgeon tenotomises a muscle and reattaches it full physiological action will follow so the ophthalmic surgeon has found that after the internal rectus is divided a suture must be passed through the cut end and attached to the old insertion. This provides a check on the movement and action of the tenotomised muscle while advancing the external rectus. If the eye-ball has been rotated outwards beyond the middle line then the check suture can be brought into play and the eye-ball brought back to its middle line so that the visual axes will be parallel.

Editorial.

CANCER AMONGST SOUTHERN CHINESE.

In this issue we publish a paper from the Surgical Clinic on Naso-pharyngeal Carcinoma. Prof. Digby and his staff are to be congratulated on this interesting account of what, in other places is a rare disease. It shows what can be achieved by conscientious cataloguing of cases, a process in which both students and staff are co-operating for their ultimate mutual benefit. One can recommend the article to students as an excellent exercise in diagnosis of cranial nerve lesions, and to more advanced workers it gives a great ground for thought on the ætiology of cancer. A series of such well collected and carefully scruitinised cases, setting forth the percentage incidence of the various new growths met with in China would be invaluable data to any workers on the causation of cancer.

It is interesting to note that the theories propounded to explain the increased incidence of naso-pharyngeal carcinoma in China, are all based on the increased irritation of the air passages owing to various national habits and customs. Dr. Dobson considers that the gases from the stoves in small badly ventilated houses is a potent factor. But, as Prof. Digby's article points out, why then should there be a greater incidence amongst males? One wonders whether the growth is as common amongst the better class Chinese, and what its incidence is amongst Cantonese living in large settlements in other parts of the world.

It is doubtful whether Dr. Mayo's suggestion is any nearer the point. He considers that the habit of eating very hot rice leads to chronic irritation of the pharynx, and that the men's table being served first explains the greater incidence in males. This theory is open to many criticisms. To start with the hot rice should hardly enter the naso-pharynx and it is doubtful whether the Chinese take food any hotter than other races. Furthermore, it would be rather necessary on this hypothesis to find out how many of the lower class Chinese men eat their food so much in advance of their women folk.

In spite of these theories we must admit that the ætiology is still a mystery and will remain so until many more sets of authentic data put some reviewer on to the right trail. One cannot help feeling that an investigation into the almost universal method of clearing the nasal passages which is employed in the East may through some light on the causation of naso-pharyngeal irritation, and may thus lead towards the solving of the problem of this type of cancer. In this connection it may be worth examining the nasal passages of the Cantonese with a view to ascertaining whether the

deeper passages are protected as efficiently by nasal hairs from solid air borne particles as in the European. The growth of hair on the face and the body of the Chinese is relatively scanty, and a deficient growth of nasal hair would tend to allow easier access of dust and bacteria to the posterior passages.

If the chronic irritation be due to infection, it would point to the lowering of the self-disinfecting power of the nasal mucosa. Arnold, Ostrom and Singer* have studied the average rate of disappearance of bacteria sprayed on the nasal mucous membrane. On an average, 20,000,000 bacteria were sprayed on the nasal mucosa of each of 42 normal persons, and within 5 to 10 minutes, 90-95% of the bacteria were rendered non-viable. The important part of their work however from our point of view is the fact that this marvellous auto-sterilizing power of the nasal mucosa seemed to be fairly constant except when both temperature and humidity were raised. For example, those subjects who, at 70 degrees F., and 70% humidity, destroyed 90% of the bacteria in 5-10 minutes, took 40-60 minutes to do this at 95 degrees F., and 90% humidity. This opens up a very interesting and important avenue of research for some worker in the tropics.

SPRUE IN HONG KONG.

Another article in this issue which is of special interest is that of Dr. Macgown on Sprue, a disease which plays such great havoc amongst Europeans in the tropics, and yet which leaves the native races practically untouched. This field is thus closed to the University clinics which work almost exclusively amongst the Chinese. Here as in many other instances especially in tropical medicine, the practitioners have stepped into the breach and supply us with some very important additions to medical science.

Sprue does not seem to be as common here as in some tropical places, but still it is not a rarity. Like Addison's or Pernicious Anæmia, it is one of those baffling diseases which attack more than one system in a manner which appears to us to be most disconnected. The similarity is further strengthened by the fact that its ætiology is still uncertain, some believing it to be a manifestation of a vitamin deficiency in the tropical food of Europeans, and yet others claiming it to be an infection. The work of Prof. Bailey K. Ashford at Porto Rico seems to point very strongly to infection being the cause, but whether the Monilia psilosis is the specific organism involved seems

* Proc. Soc. Exper. Biol & Med. 25:624 (May) 1928.

to be a debatable question. The vaccine treatment does not seem to give such good results as a high protein diet and fruit, avoidance of fats and carbohydrapes except in small quantities, and the giving of liver extract.

We look forward to the next few years in the hope that, just as Addison's Anæmia has of late given up its secret, so the practitioners in the tropics will be able to just as efficiently deal with Sprue, and thus save many firms thousands of pounds as well as many human beings great suffering and even their lives.

Acknowledgments.

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Therapeutical Notes.

Every pain is the result of a disturbance in the physical or mental equilibrium, an interruption of some vital function, a deviation from the normal. Injuries, inflammations, excessive muscular strain, disturbances of the circulation, all are productive of pain. And be it trivial or severe, prolonged or ephemeral, uppermost in the mind of the patient is the prompt suppression of that pain.

To the patient, wracked by the painful pneumonic process, nothing is more grateful or comforting than an Antiphlogistine jacket applied over the thoracic walls. Physicians conversant with this simple procedure generally concede that this plastic anodyne dressing induces a hyperæmia of the superficial structures setting up a highly decongesting process in the deeper seated tissues and thereby relieving the dyspnœa and the stress on the right heart.

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NOTE:—*Theacylon should not be given on an empty stomach.*

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