With regard to clothing, thin flannel is the coolest wear in the hottest tropical weather, especially in a damp heat, and cotton drill and satin jean, smart though they look, should be avoided. I am strongly in disfavour of alcoholic drinks at sea, except, perhaps, in cases of atonic dyspepsia. In malarial regions alcohol is especially to be avoided. No laundry work can be done on board, so an ample supply of underclothing must needs be taken. Flannel or flannelette pyjamas should be worn at night throughout the voyage.

In conclusion, there are certain types of invalid who do no good at sea—dyspeptics, who require a specialized diet; aged, irritable, or nearly bedridden people; and those with chronic rheumatoid arthritis of the smaller joints. There are no facilities for the due treatment of surgical diseases requiring frequent antiseptic dressing, for there is no really adequate hospital accommodation on any ocean liner, however large, as far as I am aware. The only chance for an inebriate to improve at sea is on a sailing ship commissioned on teetotal principles, and such are, indeed, rarely to be found. On the whole, there are few cases of invalidism for which a sea voyage is a suitable remedial measure.

SOME GENERAL RESULTS OF AFFECTIONS OF THE NOSE AND NASO-PHARYNX.

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THE effects of obstruction to nasal respiration upon contiguous structures is widely recognized, and the local changes thus caused are very marked when the obstruction occurs in early life. As a result of adenoid vegetations, for instance, we get the well-known changes in the shape of the superior maxillae and the changes in the tympanic cavities, catarrhal and suppurative, giving rise to deafness of a greater or less degree. In adults, too, the effects locally, though not so marked, are obvious enough in many cases—changes in the external appearance of the nose, excoriations of the upper lip from the discharge, dull aching or even sharp neuralgic pains in the head, changes in the pharynx, larynx, middle ear, and so on. In fact it is clear that both from the obstruction itself and from the nasal discharge which may be present as its cause or result some alteration must take place in the surrounding structures.

It is not, however, to the local results that I wish now to direct attention. The effects of nasal obstruction, and especially of nasal discharge, upon the system generally, and the position of the latter as a possible or contributory cause of certain conditions of what we may speak of in a general way as ill-health, have received until recently little attention. No doubt this is due to the lack of knowledge which prevailed to within the past very few years concerning all affections of the nose. However, it is safe to assert that in no branch of medicine or surgery have such strides been made as in the diagnosis and treatment of diseases of the nose and its accessory cavities. The danger of this rapid improvement is that the rhinologist is apt, even more than might be the case with the more slowly developing special branches, to see things through glasses tinted by his speciality, and reduce to terms of nasal affections as many diseased conditions as can by any means be gathered in. On the other hand, to avoid this danger he may take up the opposite position, and, by being hypercritical and too conservative, miss the connexion existing between some nasal affections and those of a more general character.

The accessory air spaces of the nose, situated as they are in close proximity to the contents of the cranium, are worthy of all the interest and study which can be expended on them; and when we remember the very thin partitions which divide three of them, the frontal and sphenoidal sinuses and the ethmoidal air cells, from the dura mater, it is evident what serious results may arise from disease of their lining membranes and walls. Already during the few years in which the rhinologist has directed attention to these sinuses cases have been described as diagnosed during life and found *post mortem*, in which suppuration of the brain and its membranes has been found either as a direct extension from these sinuses or indirectly through venous and lymphatic channels. When one remembers the number of cases in which disease of the mastoid antrum has resulted in cranial affections, one is driven to the belief that as our knowledge of the nasal cavities and their diseased states improves we shall be able more frequently to trace the connexion between cranial affec-

tions and nasal disease, and also, remembering this relationship, to diagnose and treat certain inflammatory and suppurative conditions of the meninges and brain which hitherto with our limited knowledge have been either overlooked or, when suspected, have been assigned a wrong cause.

However, at present I am more concerned with the general results of the more common affections of the nose and nasopharynx. It has always appeared to me that the mere mechanical interference with nasal respiration caused by adenoid vegetations in the naso-pharynx is not sufficient to account for the general symptoms which frequently obtain in this condition. And yet that is the general teaching. Still it has no doubt happened to others as it has to me to see many cases of undoubted adenoids with marked nasal obstruction in which the only complaints were mouth-breathing, snoring during sleep, and, it may be, some degree of deafness—no general symptoms whatever.

A week or two ago I saw at the Glasgow Ear Hospital a very good example of this. The child, a little girl of 8 years, was brought by her mother because of a certain amount of deafness. Questioning the mother elicited the information that she continually went about with her mouth open, and that she snored at night; otherwise the child was most robust, well grown, plump, very bright and mentally quick, with well-shaped chest, and a good appetite. In fact those who saw her remarked on her very healthy appearance. Further examination, however, showed that there was decided interference with nasal respiration, and by the finger a large mass of adenoid growth was felt. Later this was removed, and the deafness and difficulty of nasal breathing disappeared. In my experience, and no doubt in that of many others, this is by no means an isolated case. We are constantly seeing children suffering from nasal obstruction due to adenoid vegetations in the naso-pharynx in whom the commonly taught general symptoms of mental obtuseness, or, as it is called, aprosexia, delayed growth, pigeon chest, and general ill-health are absent; while, *per contra*, frequently in those cases in which these symptoms are present we find the adenoid growth very small in amount, and causing little, if any, interference with respiration through the nose.

Take, for instance, the case of a little girl of 10, whom I lately saw. Her medical attendant sent her to me suffering from deafness and delay of mental development approaching imbecility. On examining her I found that her tonsils were somewhat, though not greatly, enlarged, and that she had only a moderate increase of adenoid tissue in the nasopharynx. Nasal breathing was obstructed to only a slight extent. Yet after operation she improved wonderfully till now her mother says, "You would not know she is the same girl, she is so bright and cheerful;" even in two months others notice a marked change in her mental condition. It is a common example. Seemingly so little cause for the marked general symptoms, and yet such decided improvement after its removal.

That restoration of nasal breathing is not the sole cause of the improvement following removal of these growths is proved by the fact that in many cases mouth breathing persists for a long time after the operation, and yet both mental and physical improvement takes place. It is unnecessary to multiply instances bearing this out. We are constantly being told, "He is very much better, but he still breathes through his mouth and sleeps with his mouth open." He may no longer snore, as the levator palati may have regained their tone and there is no longer any obstruction to their action.

This being so, I have inquired what is the chief cause of the general results of adenoids, and the conclusion pressed upon me is that the secretion, which occurs in greater or less amount in this condition, must be given a prominent place. This varies much both in regard to its amount and to its character. It may be very small in amount or most excessive, and in character we find any gradation from ordinary mucus, odourless and even non-irritating, to very thick and bad-smelling muco-purulent discharge. In one little girl whom I saw frequently it was very abundant and very offensive to the smell, and in her the general physical symptoms were the most marked I have seen. Every morning she was sick, and vomited a large quantity of malodorous, thick muco-purulent material—the night's collection from the vegetations in the naso-pharynx. She sweated profusely during sleep, was very anaemic, had typical pigeon chest, poor appetite, and altogether her general state of health and physical development was such as to suggest tubercle, but though she was carefully examined with this in view no pulmonary or

other tuberculous condition could be detected. Her parents objecting to an operation, a nasal douche was prescribed, and some improvement resulted; but later, consent having been obtained, the adenoid vegetations were removed, and this was quickly followed by decided improvement in every respect. No doubt this was an exceptionally bad case, but it is certainly common, on examining the throats of children suffering from this affection, to see copious muco-purulent discharge passing over the pharynx from the post-nasal region.

It is reasonable to suppose that this entering the stomach must tend to destroy the appetite and to derange the digestion, and in proportion to the septic nature of the discharge and the amount absorbed, to set up those conditions of ill-health which are got as a result of chronic septic poisoning. We have seen in the case quoted to what a marked degree this may occur. The secretion from the adenoids is, in many cases, reinforced by that from the concomitant rhinitis, which is often found in this condition. Indeed, even apart from this condition, rhinitis is very common in children, and the purulent change which takes place in the secretion from its stagnation, due to the inability of the child to expel it, is probably the chief cause of post-nasal vegetations.

Passing from this cause of nasal obstruction in children, let us look at the commonest cause of this same condition in adults—turbinal hypertrophy, due to chronic hypertrophic rhinitis. From the nature of things, the general results are not so usual or marked as in children. The child is naturally more liable to physical and mental developmental defects and changes. Still, there are, in many cases, other general symptoms to be found following on nasal obstruction in adults—lassitude, depression of spirits, deranged digestion, with its results, irregularity of the bowels, loss of flesh, and so on.

William Hunter has pointed out the importance of decayed teeth and other septic conditions of the mouth as the cause of many deranged states of the digestive function, and it has been recognized by many writers on diseases of the nose that chronic suppuration of any of the accessory sinuses causes in many instances deterioration of the general health both from direct septic absorption from the nasal passages and cavities, and from ingestion of the purulent material into and subsequent absorption from the alimentary tract. The constant disagreeable smell, too, which is present tends to produce loss of appetite and depression of spirits to a considerable degree in some people. In these cases, as Tilley has pointed out, treatment of the sinus disease is followed immediately by decided improvement in the general state of health. In such conditions there is no difficulty in accepting the relationship between the sinus disease and the ill-health, and it is no disproof of this that some people suffer from suppuration of one or more of the accessory nasal cavities, and yet seem little the worse, for it is well recognized that the results of septic absorption from any chronic purulent focus vary in different individuals. It may be that those cases of nasal suppuration, in which digestive disorders are got, have previously had their digestive power weakened from some other more generally recognized cause, and the amount of hydrochloric acid diminished so that it is now incapable of counteracting the effect of the ingested purulent material. No doubt in most cases there is more than one cause.

In ozaena, too, whether due to sinus disease, which I have not satisfied myself is generally the case, or to other cause, I am inclined, from careful observation of cases, to look upon the anaemia and ill-health so frequently found as the results rather than as predisposing causes of this distressing complaint. Fetid particles from the dry decomposing crusts in the nose are inhaled and some also, together with infected mucus from the pharynx, find their way into the stomach. In this disease too, if we may so call it in the present state of our knowledge, we get sometimes the same absence of general disturbance of health as in some cases of sinus disease. Lately a woman consulted me on account of deafness. Otherwise she was most robust and healthy looking, and yet examination of the nose corroborated the opinion of ozaena which, as is usually the case, had been suggested by the disagreeable smell. As far then as sinus suppuration and ozaena are concerned it is easy to understand how disturbance of health may arise, and there is a very general agreement as to the cause-and-effect relationship between the local and general conditions in certain cases. The same, however, cannot be said of the effects of chronic rhinitis and the increased secretion caused by it. The good results which have followed in many instances the nasal treatment of spasmodic asthma, and which have been

ascribed to the nervous connexion between the nasal cavities on the one hand, and the lungs and bronchi on the other, might be cited in support of a probable relationship between diseased conditions of the nasal mucosa and derangement of the gastric functions, the same nervous connexion existing between the nose and stomach. However, I do not wish to press this aspect of the question. My present purpose is to show that the chronic discharge from rhinitis, whether of the simple or of the hypertrophic variety, may give rise to digestive disturbance and general derangement of health, and that these may result even when the secretion is not at any rate markedly purulent. It is no doubt true that in a large proportion of normal nasal cavities the secretion is sterile; the exact percentage is variously given by different observers. At the same time it is equally true that the anterior part of the nasal cavities, that is the vestibules, is usually the abode of pyogenic organisms, giving rise at times to small furunculi in this locality, and it is also a frequent starting point of facial erysipelas. Given, then, an increase in the secretion, and stagnation also, especially when there is obstruction from turbinal hypertrophy, we find, as we would expect, even allowing for the fact that the nasal secretion is a pure culture medium, that there is a decided tendency for it to become muco-purulent, thus adding to its irritating character the possibility of absorption of septic material.

An actual purulent rhinitis is rare; indeed its existence is denied by some. If the pus is not the result of disease of one or other accessory air space, it can usually be found to depend on a local focus of bone disease. Yet the secretion in chronic rhinitis very frequently contains a large percentage of purulent material. It is hardly necessary to point out that in this condition even when it is not purulent it is irritating, as is shown by the redness and excoriation of the external nose and upper lip so frequently got. This irritating property itself is, in my opinion, calculated to cause gastric derangement, with consequent depression of spirits and general impairment of health. The following is a case in point:

A man came under my care with what he termed a chronic cold in the head. His history was that he had suffered from this for some years; that at times the discharge increased in amount, and there was a remission for a period and so on. He suffered much from indigestion always with frequent attacks of nausea, and had been treated in various ways by diet, drugs, and by washing out the stomach. It had appeared to him that the gastric condition was worst when the nasal discharge was most abundant. Rhinoscopic examination showed a condition of general rhinitis with hypertrophy, especially of the left inferior turbinal, and with an excessive amount of secretion, not at any rate manifestly purulent. The nasal condition was treated first by douching with borax and soda, followed by an antiseptic oily spray, and later the hypertrophy was reduced by the aid of the cautery. This was followed by improvement of the gastric condition, so that, as he states, he has been freer from indigestion than he has been for years.

Quite recently I have seen a lady suffering from a similar nasal condition in whom the gastric disturbance, with nausea and actual sickness, alternates with asthmatic attacks. The connexion of the two in the light of the nasal affection is interesting, though I am aware that asthma is stated to depend frequently on derangement of the functions of the stomach.

When the discharge is distinctly muco-purulent, as it is in probably the majority of cases of chronic hypertrophic rhinitis, its general effects will approximate those produced by sinus suppuration. These effects are sometimes very decided, and yet treatment and cure of the nasal condition is followed by great improvement of the general state of the health.

A case bearing this out is that of a woman under my care at the Glasgow Ear Hospital. She came suffering from nasal obstruction, which I found to be due to a large mass of polypi. Removal of these resulted in the relief of the obstruction, and she went away feeling, as she said, much better. A week later, however, she returned, and I was struck with her look of ill-health. She complained now of a copious discharge from both nostrils, which, as she herself stated, had completely taken away her appetite and caused a continuous feeling of nausea and depression of spirits. On examination of the nasal fossae the mucous membrane was found to be profusely bathed with muco-purulent discharge, which, no doubt, had increased from the negative pressure due to the removal of the compression of the polypi. She was given a nasal douche. A fortnight later, and only a few days ago, she returned looking and feeling decidedly better. The left nasal cavity was quite healthy, but in the right there was still a small amount of pus which, on careful examination,

appeared to come from the middle meatus, and by means of the probe bare bone could be detected in the region of the anterior ethmoidal cells. This may possibly require further treatment; but the notable feature was the disappearance of the gastric symptoms and the general improvement alongside the diminution of the nasal discharge.

In considering the general results of excessive or purulent discharge from the nose, we cannot, of course, leave out of count the nervous or mental element. It can easily be understood that in people of neurotic temperament, the sensation of secretion passing over the pharyngeal wall and the constant hawking to rid themselves of it may give rise to effects on the general health. Add to this the troublesome pharyngitis and laryngitis which is so frequently got as a result of nasal affections, with, in many cases, a certain degree of dysphagia, and we have a local condition which is calculated to set up a state of mind favouring abnormal introspection, giving rise to depression of spirits, loss of appetite, insomnia, and the general ill-health caused thereby.

It would appear, therefore, advisable in cases of chronic ill-health, associated or not with gastric derangement, to include among the possible causes certain affections of the nose and naso-pharynx, and especially those giving rise to a discharge of a muco-purulent or purulent character. The patient himself may make no complaint of this—indeed, he may be unaware of the existence of anything wrong with his nose, and the condition may only be revealed by careful rhinoscopic examination. As I have already stated, it is probable it will be found in most cases that the nasal affection is of the nature of a contributory cause, and that there has previously existed some digestive weakness which makes the patient more liable to the evil effects of the entrance of purulent material into the stomach; and that, while treatment directed to the nose is necessary to enable a cure of the more general state of health to be brought about, it must be looked upon rather as a reinforcement of, than as an alternative to, the more usual methods.

NOTE ON HAEMOSOZIC SERA.

BY

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In a preceding note,¹ we gave an account of experiments made to produce an antihæmolytic (haemosozic) serum by injections of ox bile into rabbits. We were only moderately successful, for unless added to bile in very large doses the serum delayed, but did not prevent, hæmolysis. In our opinion this result was due partly to the fact that it was impossible to produce a high degree of immunization owing to the cachexia caused in rabbits by repeated injections of bile, and partly to the great variety of substances which the serum of animals injected with bile might contain.

Preliminary experiments² having shown us that the bile contained not only two hæmolytic substances at least, but also one haemosozic substance, it seemed probable that on the introduction into the animal organism of such a complex fluid, reactions similarly complex might follow. We therefore endeavoured, in the first instance, to separate roughly the different substances present in bile, and to prepare sera by injecting each substance separately into different animals.

Our *modus operandi* was as follows: Ox bile taken aseptically shortly after slaughtering the animals was dried in vacuo over sulphuric acid. When completely dried it was finely powdered and repeatedly extracted with ether. This was decanted off, and the dried residue left after evaporation was suspended in physiological salt solution. This emulsion we call the ethereal extract. The same powdered bile was now extracted for 24 hours with absolute alcohol in the cold, the precipitate collected on a filter, washed with absolute alcohol and dried in vacuo. This precipitate when suspended in water we call the aqueous extract. The residue left after evaporation of the alcohol was dissolved in water and formed the alcoholic extract.

We had therefore: First, the substances soluble in ether (ethereal extract); secondly, the substances soluble in alcohol (alcoholic extract); and, thirdly, the substances insoluble in or precipitated by these two reagents (aqueous extract).

1. The ethereal extract is insoluble in water, and contains cholesterin, lecithin, and the fatty substances which are

soluble in ether. The extract can be suspended in water only with difficulty, and though not toxic in itself when injected intravenously, it proves fatal by causing emboli. The subcutaneous injection of the extract of 300 c.cm of bile is followed by no particular symptoms, even when such large doses were repeatedly injected. Temperature and weight remained normal, or the animals increased in weight even, and no inflammatory symptoms were noticed at the point of inoculation. This extract is undoubtedly haemosozic when added to bile, for it diminishes though it never completely neutralizes the hæmolytic properties of bile. The serum of animals repeatedly injected with this extract has no special hæmolytic or haemosozic properties and indeed does not differ in its action on bile or blood from normal serum.

2. The alcoholic extract is very soluble in water; 0.20 gram injected intravenously kills a rabbit weighing 1,000 to 1,200 grams; death supervening in the majority of cases only after a few days. The temperature rises two or three hours after the injection, but the fever is of short duration. In one of our rabbits 0.10 gram gave rise to a profuse hæmorrhage of the ear on the injected side lasting two days. Subcutaneous injection was followed by intense inflammation ending in necrosis of the skin at the point of inoculation. When injected under the skin of the ear, dry gangrene was the result. The part in contact with the liquid became parchment-like and thin, and finally fell off.

Phlebitis was the rule after intravenous injection. In short, the alcoholic extract produced all the lesions of the skin generally following on the injection of bile. Repeated injections, even of small doses, produced cachexia. The animals lost their appetite, diminished in weight, suffered from diarrhoea, and died, the temperature falling for some time before death. The necropsy showed no macroscopic lesions. A 2 per cent. solution was slightly, and a 5 per cent. solution very, hæmolytic; but if heated to 100° C. for thirty minutes such solutions lost their hæmolytic properties. The serum of animals repeatedly injected with small doses of this extract was haemosozic, that is, it prevented the hæmolytic action of the alcoholic extract and of bile, but had no action on the ethereal or watery extracts. The serum of animals which had received three or four injections was more haemosozic than the serum of animals which received larger doses. Some of these sera when mixed with bile in equal proportions altogether prevented hæmolysis, a result which we had seldom been able to obtain with the sera of animals injected with bile. The serum when mixed with bile in a test tube gave rise to a very fine precipitate, which did not settle down altogether at the bottom of the tube, but which did not pass through a paper filter. When heated to 56° C. for thirty minutes the serum completely lost its hæmosozic properties.

3. The aqueous extract was not wholly soluble in water. A filtered solution of 0.10 gram injected intravenously caused death in 8 to 10 hours. The same dose injected subcutaneously without previous filtration produced a hard tumour surrounded for some days by an inflamed area. This tumour was sometimes as large as a walnut, and enclosed an encysted abscess, containing very thick, cheesy, but aseptic pus composed almost exclusively of more or less degenerated mononuclear wandering cells. The poisonous properties of this extract were marked therefore, and one had necessarily to proceed very slowly when injecting animals with it.

Moreover immunization was rendered very difficult by the fact that the animals appeared to become more susceptible to the poison. Very small doses of the extract were borne well as a rule at first, but when such doses were repeated, the fever not only increased, but lasted longer after each injection. The animal's weight diminished and cachexia supervened after the fifth to seventh injection. The aqueous was less hæmolytic than the alcoholic extract, and the hæmolytic power diminished when the extract was heated to 100° C. for half an hour. The serum of animals injected with the aqueous extract was haemosozic when red corpuscles were suspended in aqueous extract or bile, but less so than the preceding extract in the case of bile. It had no hæmosozic effect on red corpuscles suspended in alcoholic extract, and had no effect on the ethereal extract. The serum mixed with bile produced a precipitate in the latter, which, though it did not settle at the bottom of the tube, did not pass through a paper filter.

In our first note we pointed out that, occasionally, the serum of animals injected with bile was not haemosozic but hæmolytic. We now found that, occasionally, the serum of animals injected with alcoholic or watery extract was hæmolytic instead of being haemosozic as is the rule. In some cases