was performed, but the cerebro-spinal fluid was not under pressure, and only a few drops of clear fluid were withdrawn. No alteration in the condition followed this procedure. Despite the continued artificial respiration, an earthy cyanosis now appeared, both pupils were dilated and fixed, and the extremities cold and clammy. At 3 p.m. the heart began to lose tone, gradually became irregular, and, despite energetic stimulation, death occurred at 4 p.m. (six hours after cessation of respiration).

A post-mortem examination was performed on May 11th, and the following notes are extracted from the report.

"Brain: no evidence of meningitis; circumscribed abscess about the size of a walnut in left temporo-sphenoidal lobe; abscess cavity contained thick greenish pus with foul odour; abscess situated completely in the white matter, but a visible track led through the grey matter to the petrous portion of the left temporal bone; the white matter round the abscess for a variable distance showed marked softening, with scattered minute haemorrhages; ventricles not distended, and contained no pus; no cerebellar or pontine lesion.

"Left temporal bone: tegmen tympani discoloured and eroded; middle ear and mastoid antrum full of partially organized granulations; the mastoid process showed marked sclerosis of the bone, and the scanty air cells were filled with granulations; lateral sinus not involved; no evidence of spread of infection to cerebellar fossa; membrana tympani thickened but intact.

"Stained films of the pus showed numerous pus cells, Gram-positive and Gram-negative diplococci, Gram-negative bacilli, and short chains of streptococci. Films of the growth on blood agar plates revealed similar organisms; the streptococci were non-haemolytic."

The cessation of respiration must have been sudden in onset as the ward sister had conversed with the patient shortly before she discovered him in this state, and none of the other patients in the ward was aware of any change in his condition.

With the assistance of the family practitioner I made more detailed inquiry into the previous history of this case. On or about April 15th he had complained of earache,

and had attended the Ear Hospital, where he was given some drops to instil into the ear. The condition apparently subsided, and he was in good health till the day of his admission to hospital. His wife reported that she had heard him say that he had "always been slightly deaf." The marked sclerosis of the mastoid process and its incomplete pneumatization suggest that the aural lesion was of longer standing than the history would suggest. No history of vomiting, vertigo, dimness of vision, diplopia, or even headache could be obtained. The necropsy findings point to the abscess being of some duration, and that the terminal condition was due to extension into the surrounding cerebral tissue.

Ransom¹ states that the respiratory centre is situated in the caudal part of the medulla oblongata. Landois and Stirling² discuss the question of an additional cerebral respiratory centre, but modern physiologists agree in placing the respiratory centre in the medulla oblongata. The work of Lumsden³ shows that the mid-brain has no influence on respiration. On anatomical grounds the cessation of respiration in this case does not seem to have been due to pressure on the centre. Four days had elapsed since the last withdrawal of cerebro-spinal fluid.

Macewen⁴ and others have described cases of cerebellar abscess causing pressure on the pons and cessation of respiration, but I have been unable to find any references to a similar condition occurring in a case of cerebral abscess.

I wish to express my thanks to Dr. D. Sage Sutherland, medical superintendent, for permission to publish this case.

REFERENCES.

- ¹ Ransom, W. S.: *The Anatomy of the Nervous System*, 1925, p. 330.
- ² Landois and Stirling: *A Textbook of Human Physiology*, 1891, vol. ii, p. 815.
- ³ Lumsden: *Journal of Physiology*, 1923, 57, pp. 153 and 354.
- ⁴ Macewen, W.: *Pyogenic Infective Diseases of the Brain and Spinal Cord*, pp. 137 and 196.

NASAL DISCHARGE IN CHILDHOOD.*

BY

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For the purpose of this communication 50 children, under 14 years of age, have been selected; these, when first seen, had one symptom common to all—nasal discharge. The children have been kept under observation, with few exceptions, for two years or longer. The fifty children may be classified as follows.

Fifty Cases of Nasal Discharge.

	Cases.
A. Tonsils and adenoids previously removed; maxillary antrum infection present	23 (16)
B. Maxillary antrum infection present; no operation on throat previously; adenoids not present	9 (1)
C. Tonsils and adenoids removed; antral investigation negative; nasal discharge persisting ...	10 (8)
D. Required second or third operation on tonsils and adenoids to terminate nasal discharge ...	6 (4)
E. Atrophic rhinitis	2

The figures in parentheses indicate the number of cases in which otorrhoea or deafness was a symptom: 29 such cases are noted, or 58 per cent. of all cases. It is only fair to add that many of these cases came under my

notice primarily for the relief of aural disease. Sinus infection was present in 32 patients, or 64 per cent. of cases, as shown in the table.

CLASS A.

In these cases nasal discharge had persisted despite an efficient removal of tonsils and adenoids. Cleminson, in 1921, put forward as a cause of the lack of attention paid to the sinuses in young children the great similarity between the clinical picture produced by sinus disease and that painted in almost every textbook as due to adenoid hypertrophy. Both conditions may give rise to the running nose, and probably in the 23 cases in this group the tonsils and adenoids had been removed with a view to the relief of this symptom among others. When first seen by me nasal discharge was present, and unilateral or bilateral antral infection was demonstrated by proof puncture. The presence of pus or muco-pus in the suction syringe or wash-out was the only positive criterion of infection accepted. In the majority of children I perform proof puncture of the antrum with a fine, straight trocar and cannula through the inferior meatus of the nose, having first inserted a probe covered with cotton-wool in 5 per cent. cocaine with adrenaline on to the selected spot for perforation of the antral wall. I have had no trouble from the cocaine. I would like to ask the question, Was it unnecessary in the first place to have advised the throat operation? Probably it was not, as, in my experience, the presence of an obstructed or septic nasopharynx is a hindrance to the cure of an infected sinus; for, as

* A communication to the Section of Oto-Rhino-Laryngology at the Annual Meeting of the British Medical Association, Manchester, 1929.

Cleminson very aptly expressed it, "These two conditions [infected adenoids and sinuses] play into one another's hands." In view, however, of our increasing experience of the frequency of sinusitis in children, the presence of pus in the nose should have put the operator on his guard and made him consider the possibility of sinus involvement.

In most of these cases, when I saw them for the first time the diagnosis was self-evident, pus being present in the nose, generally in the middle meatus. A boggy or polypoid anterior end of the inferior turbinate led me to suspect an antral infection in a few cases. Recent correspondence in the *British Medical Journal* showed a very active interest in this class of case, and, unless the general practitioner—who operates on a great number of patients for tonsils and adenoids—and otologists and laryngologists realize the pitfalls of sinusitis in children, great harm will be done to the prestige of the "tonsils and adenoids" operation. In my opinion local authorities who recommend removal of tonsils and adenoids in great numbers should especially heed this warning. Another pitfall which it would appear appropriate to mention at this juncture is that pus in the nose, without blood, may be due to the presence of virulent Klebs-Loeffler bacilli. I have been called to three such cases in the last year and introduced this point, as in two cases the patients were children of medical men and the true cause of the discharge had been unrecognized.

CLASS B.

This class is composed of 9 cases; they are perhaps interesting in that they were cases of sinusitis uncomplicated by the presence of adenoids at any time in their history, with a marked freedom from otological complications. As in the previous group, I have no wish to give my views on the treatment of antrum disease, but record my disappointment of the value as a curative measure of simple antral wash-outs by means of trocar and cannula, except in cases of recent infection. What particularly is in the forefront of my mind in this connexion is the question as to whether ethmoidal disease is common in young children. Not all of our cases of antrum infection clear up as we should like them to. Are some of these failures—often comparative—attributable to an unsuspected ethmoiditis? A recent transatlantic communication lays stress on this aspect of the subject, and bases diagnosis on x-ray appearances. The infallibility of this course cannot as yet be accepted, but the question which appears to arise is whether in every case of suspected antral suppuration an x-ray photograph should be taken before treatment is commenced, and studied with reference to all the accessory sinuses of the nose. The following case is illustrative of difficulty in both diagnosis and treatment in a small child.

The patient was an undersized child, aged 5, whose tonsils and adenoids were removed one year previously for obstruction and nasal discharge; the muco-purulent nasal discharge persisted. There was a history of bronchitis since an early age. In the radiogram both ethmoids were dim. An antral wash-out was negative, right and left. The nose was very small, and it was impossible to remove a portion of the middle turbinate. The discharge continued. Pure culture streptococcus vaccines were given.

Opinion appears to favour removal of a middle turbinate in such cases as a first step in treatment. This should answer well in a suppurative case, but would it be of any use in an early case of polypoidal degeneration of the ethmoidal cells? One question in connexion with nasal catarrh and sinusitis in children I should like to hear your opinion upon, and that is: Is it possible that obstinate sinusitis and polypus formation in young adults is a development of nasal trouble, apart from adenoids, that begins in childhood? If ethmoidal disease with polypoidal degeneration of the mucous membrane of the cells be present at an early age, can we hope by operation to prevent the bugbear of an adolescent ethmoiditis? From my own experience operation on such cases is safer, and the field of operation more clear if the patient is sitting up in a chair. I use Woodman's chair.

One of my first cases in practice was a child, aged 7, whose adenoids had been removed three years previously. The child still suffered from some nasal obstruction. Adenoids had been well removed. Luckily, from my point

of view, I saw the child at the age of 11, when polypi were growing from the diseased ethmoidal cells. Such a case imprinted on my mind very forcibly the possibility of the early beginnings of ethmoidal disease, and increasing experience has confirmed this supposition.

CLASS C.

This class consisted of 10 cases of nasal discharge of indefinite nature which persisted after the tonsils and adenoids had been removed efficiently, proof puncture of the maxillary antra being negative. Several of these patients were plethoric-looking children with a persistent mucous nasal discharge and intermittent otorrhoea, mucoid in nature and coming from an anterior perforation. Broad nostrils, with excoriation of the surrounding skin due to nasal discharge, short cough, and husky voice were common to all. To me they answer to the description "catarrhal child." The nasal mucosa is thickened and congested in common with that of the pharynx and probably the respiratory tract. Some of these patients give a long history, almost since birth, of chronic colds. Neil Macley has suggested that the susceptibility of the nasal mucosa to toxic products begins very early in life, and may be responsible for the catarrhal conditions in babies who have wet noses and a congested nasal mucosa, with nasal obstruction and respiratory difficulties. The frequency with which a history of colds dating from the first year of life can be obtained has been referred to by Dan McKenzie. I should like to emphasize the point from my own experience of these case-histories and many others, which show the early sensitization of the nasal mucosa to infection, with frequent spread to the bronchial tree during childhood. May I be excused for quoting from the following case record of Dr. Crosskey.

A boy, born August 22nd, 1922, was "snuffy" on September 2nd, and had bronchitis on December 1st of the same year. Later acute bronchial catarrh followed a cold. He had urticaria in September, 1923, and bronchitis in 1924, followed by nasal catarrh. In May, 1925, the tonsils were septic. He was seen by a physician in consultation in 1927, who advised removal of tonsils and adenoids, and thought cough might be partially due to asthma. The operation was performed by myself. Seen again in 1928, there was no improvement in the nasal catarrh and very little in the bronchial condition.

In this case there had developed an underlying vasomotor element, as evidenced by the development of asthma. I am precluded from dwelling on this aspect of the subject as a cause of prolonged nasal catarrh, but undoubtedly it has a place in the causation of the condition.

Macley further suggested that the altered condition of the nasal mucosa brought about by "colds" in infancy favoured the growth of germ life in the nose, and might lead later to a superimposed infective inflammation, probably spreading to the accessory sinuses. While watching one of these catarrhal children over a period of three years, and in 1928 having punctured both antra with negative results, I was surprised to find in 1929 that the nasal discharge which had before been mucoid had become muco-purulent. By radiography and by washing out I confirmed the presence of pus in the right frontal sinus. Such cases show their origin from a chronic cause rather than an acute one.

One patient in this group of ten cases had the well-known symptoms of a vasomotor rhinitis: attacks of tickling sensation in the nose, lachrymation, and copious nasal discharge. On washing out his antrum a large amount of pus was found. No cases could be traced as due to food proteins or animal emanations. Such cases are of importance, but apparently rare. As regards treatment for these children with a chronic catarrhal condition I am on rather unexplored territory; at present I direct treatment towards improving their general health. Three certainly improved greatly after courses of treatment by means of general ultra-violet radiation. Removal of tonsils and adenoids had not noticeably improved them. In this class are the cases with enlarged anterior and posterior ends of the inferior turbinates. Does removal of the posterior ends do any good? Is it still practised as frequently as formerly? Should the anterior ends be cauterized or removed to give better aeration to the nostrils?

Research on the chemical constitution of the blood in these patients may be a helpful line which I intend to investigate further.

CLASS D.

This consists of cases in which operations in the throat had been badly performed, and which cleared up after thorough removal of adenoids.

CLASS E.

Cases in this class are included merely to show the material on which this communication is based.

CONCLUSIONS.

The points which have appealed to me in reviewing these cases are:

1. That the presence of pus or muco-pus in the nose must suggest the possibility of sinus infection, although the presence of adenoids may produce the same picture.
2. That when dealing with infection of the maxillary antrum in children the possibility of ethmoid infection at an early age must be kept in mind.
3. That before deciding on any operative form of treatment of a child's nose or throat a careful history should be obtained. This may form a useful guide to prognosis.

PERSISTENT NASAL CATARRH IN CHILDREN.*

BY

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PERSISTENT nasal catarrh, or, in scientific language, chronic rhinitis, is a common disease in childhood, and its causes are numerous. The foremost cause is, of course, adenoids, and the adenoid growth is of two varieties. There is, first, the large central tumour mass; and secondly, the type in which the lymphoid growth is spread as a sheet over the roof and posterior wall of the nasopharynx. It is this second variety which is more liable to cause nasal discharge, and the discharge may persist even after careful operation.

Another cause of nasal discharge in children is diphtheritic infection, and we have found it so common in the Children's Hospital that we take a swab from every case of nasal discharge. I mention this in passing in order to emphasize the importance of bacteriological examination.

As regards sinus suppuration, there is no doubt that the antra and ethmoids may become infected at an early age, as is proved by the work of Dean and others in America, and of Cleminson in London. My colleague Dr. Hall has followed up those researches and has kindly permitted me to quote his results, which are not yet published. He performed lavage of the antra in 85 cases from which adenoids and tonsils were to be removed. In 10 per cent. he found actual creamy pus in the antra, in 13 per cent. there was muco-pus, and in 27 per cent. the saline which he aspirated back into the syringe was turbid. The majority of such cases are curable by removal of adenoids, though a few cases may require operation on the antrum—namely, intra-nasal drainage.

The type of case which particularly interests us to-day is the little patient who suffers from persistent nasal discharge for which no apparent cause can be found. How frequently, for example, does one meet with children whose nasopharynges have been curetted on two or more occasions, without result!

Such patients suffer from nasal obstruction, as well as from nasal discharge, and I venture to submit that it is the obstruction, rather than the discharge, which constitutes the real cause of all the trouble. In fact, the so-called "persistent nasal catarrh" is caused by pyogenic infection in a narrow and poorly drained nasal cavity. In an obstructed nose secretions accumulate and readily become infected. The obstruction arises from arrested development of the nose and nasopharynx, caused by the adoption of a mouth-breathing habit at an early age. And how has this mouth-breathing habit originated? From a

succession of head colds during the first few years of life. The sequence of events is as follows: recurrent attacks of acute rhinitis, nasal obstruction and mouth-breathing, arrest of nasal development, and eventually chronic rhinitis. The appearance of adenoids as an attempt to combat infection is a mere incident, though a fortunate incident if the adenoids are of the large tumour variety. Operation then effects a dramatic cure. But frequently there are no adenoids, and, furthermore, in at least 20 per cent. of cases of adenoids of the second diffuse type operation fails to cure the discharge and obstruction. This heterodox view, that nasal stenosis is the essential lesion, is borne out by the results of treatment.

The object of treatment must be to restore the patency of the nasal passages. Naturally one must deal with any cause of obstruction which one discovers. Adenoids must be removed, and I agree with Dr. Dan McKenzie that the adenotome is a more accurate and scientific instrument than the curette.

Enlarged turbinates must be reduced by partial removal, and special attention paid to enlarged "posterior ends." I have never discovered posterior ends in children under the age of 6, though they are not at all uncommon in older children.

As regards deviation of the nasal septum, this cause of obstruction is, in my experience, rather rare in childhood, apart from deviation directly due to injury. The deviation involves, as a rule, only the cartilage and not the bone. There need be no hesitation in performing a limited submucous resection, and I have never seen deformity follow operation when care has been taken to remove only sufficient cartilage to relieve the nasal stenosis.

There remains, however, the large group of patients who show no obvious cause of the nasal catarrh, although the entire nasal cavity may be smaller and less developed than it should be. What can be done for those little patients?

Regular removal of the muco-purulent secretion is the first essential. In babies a simple suction apparatus (*mouche bébé*) is useful. Older children must be taught how to blow the nose (by the open method, not by grasping the nose), although this is a difficult task for teacher and pupil. Local applications may follow this cleansing regime, and one of the best is the French preparation gomenol, which is used in 5 per cent. solution in olive oil, and dropped into the nose with a pipette.

As regards internal treatment, the "catarrhal" child derives benefit from sodium bicarbonate in large doses. I cannot explain this action, but the free use of such an alkali, by the mouth, is of great value in middle-ear suppuration, as well as in chronic rhinitis.

The so-called "catarrhal" and thickened mucous membrane may often be restored to normal by the method of "diastolization" introduced by Gautier in France five years ago, but only recently adopted in this country. The procedure is virtually a means of massaging the nasal mucosa by the expansion and dilatation of a thin hollow rubber bougie, connected to an otomasseur.

The dental condition is of some importance. When the upper dental arch is narrow and the teeth crowded it may be desirable to fit an expanding denture composed of two halves. This aspect of nasal obstruction in children has perhaps been unduly stressed by our dental colleagues, but it certainly deserves attention in selected cases.

Most important, however, is the restoration of the perverted respiratory function by systematic re-education. Breathing exercises are indispensable, but in carrying out the exercises, expiration, as well as inspiration, must be nasal. It is essential to insist on this, as one often finds that the teacher encourages children to take a deep breath through the nose and then let the air escape by the mouth. This is, of course, quite an unnatural method of respiration. It is even worse than the method sometimes adopted after adenoid removal—namely, no instructions and no exercises at all!

By such methods, conducted with diligence and care, the patency of the nasal airway may be gradually restored, and as the patient loses his mouth-breathing habit and acquires the normal manner of respiration by the nasal route, the nasal discharge will disappear.

* A communication to the Section of Oto-Rhino-Laryngology at the Annual Meeting of the British Medical Association, Manchester, 1929.