SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY.

February 5, 1932.

President—Mr. WALTER HOWARTH, F.R.C.S.

Discussion on the Common Colds and their Sequelae.

ST CLAIR THOMSON: "Wisdom comes, but the common cold not only lingers but remains elusive.

The Sterile Nose.—Possibly I have been honoured with the invitation to open this discussion as it might be thought that I should by this time know something about it, since it is twenty-one years since I committed to a textbook my views on the common cold.

The researches recorded therein, carried out in collaboration with Professor R. T. Hewlett thirty-seven years ago, have stood the test of time.

We were able to demonstrate that the nose, in normal conditions, contrary to what had previously been taught, filters off all dust and micro-organisms from the air before they can reach the larynx, dealing possibly with as many as 14,000 organisms during one hour's tranquil respiration. This successful defence of the lower airways was found to be largely due to the ciliated epithelium which is able to move a fragment of cork along at the rate of 25 mm. (1 in.) a minute. An interesting confirmation of a similar rate of eviction from the sinuses was recorded thirty years later by Lowndes Yates. On injecting 10 c.c. of an indigo-carmine solution into the antrum, the coloured solution, if the sinus was normal, appeared in the nasopharynx in about two minutes.

But in spite of the cilia, the inhibitory mucus, and other protective arrangements, the defence put up by the nose against infection is sometimes overborne and we contract a common cold. The view that this affection was infectious was advanced in my textbook at a time when it was far from being generally recognised. It is not yet universally accepted; and I find I must to-day repeat much of the evidence collected twenty-one years ago.

Beyond adding fresh evidence that the common cold is an infectious disease, I fear that medicine can claim but little progress as regards the ætiology, prevention or cure of this, the most common of all the 'sufferings of this sin-sick earth.' We might, comparing the 'cold'

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with other diseases, apostrophise it as Matthew Arnold did Shakespeare in referring to his elusive personality:—

> 'Others abide our question. Thou art free.
> We ask and ask. Thou smilest and art still,
> Out-topping knowledge.'

Definition.—Some of the literature on the subject is diminished in value as observers have confused together a study of influenza, primary pharyngitis, laryngitis or bronchitis, spasmodic rhinitis, asthma, or primary sinusitis. My effort at a definition of our subject is as follows: The common cold is an acute or subacute catarrhal affection, commencing in the nose or postnasal space, generally invading the sinuses and sometimes spreading to the Eustachian tubes, the pharynx, the larynx, or further. It may leave a chronic condition, locally or elsewhere.

Frequency.—It is hardly necessary to emphasise the frequency of the cold, otherwise it would not be generally known as the 'common' cold.

In six public elementary schools in Sheffield 30 per cent. of absences were due to colds (J. A. Glover). Colds and 'feverish catarrh' (excluding influenza) account for 25 per cent. of the admissions to a public school sanatorium (Lemprière).

At Rugby School in the three terms of 1920 there were respectively 64, 260 and 56 cases, and in the three terms of 1921 the cases numbered 243, 42 and 21. It was calculated by Dr. A. I. Simey that, on the low estimate of ten days for each case, in these two years seven thousand school days (or about twenty years of school life) were lost.*

Season.—As to the period of the year when the common cold is most prevalent, the investigations of the U.S. Public Health Service tend to show that the greatest frequency is in the latter part of January (153·3 per 1000); this declines until the latter half of June, to increase sharply at the end of July and beginning of August up to a peak (120 per 1000) at the latter half of September. Then comes a decline until a sharp rise (126 per 1000) in the latter half of November. From this date there is a decline (65) till the end of the year.

Predisposition.—It is generally recognised that colds are least common at the two extremes of life—infancy and old-age. Incidence is most frequent during the first four years of life, next between the ages of five and nine, and generally diminishes with advancing years (Warren Sisson).

An interesting investigation of large groups of students in Cornell University showed that in 815 freshmen 60 per cent. had colds two or three times a year, 15 per cent. never more than once a year, and 25 per cent. four or more times a year. Taking the two extreme groups (the one-or-less-a-year group and the four-or-more-a-year

* *Journ. Roy. San. Inst.*, 1927, xlvii., 475.

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group) there was no marked difference between the two as regards smoking, history of operation on nose or throat, exposure to irritant dust or gas, mouth breathing, sleep, exercise, draughts, wearing of flannel next the skin, goloshes, daily cold bath, tendency to perspiration, chronic constipation, or family history.

A further study as regards the cold-susceptible group and what we might call the 'normal' group, in regard to past history of infectious disease, suggested the two following conclusions:—

(1) The general physique and the physical defects in cold-susceptible College students are much the same as in normal students.

(2) Cold-susceptible College students present a history of more infectious disease, asthma and hay-fever than do normal students (4·31 infections per person, compared with 3·38).

Ætiology.—In an endeavour to co-ordinate our views, and the knowledge we at present possess, I propose to consider the possible factors of causation as follows:—

A. (1) Atmospheric causes, chiefly a low temperature. (2) Cold as only a predisposing cause.

B. Disturbance of metabolism.

C. Infection.

Cold (*Low atmospheric temperature*).—As might be expected, France —the country of the dreaded 'courant d'air'—is the most devoted supporter of the age-old opinion that a cold, as its name applies, is due to cold. A personal friend of mine has written an excellent and much-quoted 'Essai sur le rhume simple ou coryza.' But he still holds that of all predisposing influences the most important is cold, particularly if moist and prolonged. He considers this to be the cause of the loss of tonus of the vasomotor system of the nose.

Now here it is assumed that a cold is due to chilling because it is most frequent in the coldest months. But there might be several other explanations of this coincidence, the most evident being that during cold weather people spend more time in vitiated air, in closer proximity, so that infectivity is favoured. Indeed, Leonard Hill and F. F. Muecke have shown that nasal turgescence and congestion are produced by a warm, ill-ventilated atmosphere and that this tendency is increased by exposure to a lower temperature. In other words, it is the warm, stagnant, vitiated atmosphere which originates the catarrh.

Very full investigations have been carried out in Johns Hopkins University on 'Upper respiratory disease (common cold) and weather.' The general conclusion of the report is as follows:—

'The evidence presented in this paper strongly suggests that changes in weather during a warm season are probably more associated with upper respiratory disease (common cold) incidence than changes in weather during a cold season.'

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Recently I discussed the subject with a member of a Greenland expedition. He confirmed the experience of all Arctic and Antarctic travellers. Mr. Courtauld, who had lived for some months under the snow without a cold, promptly contracted one as soon as he got on board the ship to take him back to Denmark.

Per contra, as we might say, the Metropolitan Life Insurance Company of New York records that in winter the indoor, sedentary worker has four times as many colds as soldiers and nine times as many as taxi-drivers!

Metabolism as a Cause.—Some would regard colds as merely an expression of a special type of disordered metabolism—as instanced in the 'carbohydrate child' or the 'protein child' in whom faulty dieting is accompanied by an undoubted susceptibility to catarrh. Indeed, V. S. Cheney, of Chicago, boldly states that common colds are not infectious. He considers a cold as a local manifestation of a systemic disturbance—a 'mild acidosis.' He bases this conclusion on (i) the reproduction of all the symptoms of a cold by inducing an artificial acidosis by the administration of ammonium and calcium chloride; (ii) the degree of severity of the cold symptoms being in direct ratio to the degree of acidosis induced; (iii) the successful results of the treatment of colds by thorough alkalinisation; and (iv) his failure to reproduce a cold in healthy persons by inoculating them with the secretions of an individual suffering from an acute cold. He suggests that the seeming contagiousness is due to similar unhygienic conditions in a group of individuals.

He regards the infectious origin of a cold as only an unproved theory, because in early stages the secretion is sterile and the organisms, often regarded as factors, are only secondary invaders of the later stages.

A Filterable Virus.—An extensive and very important work on the possibility of a filterable virus being the cause of a common cold has been carried out by Dochez and co-workers in New York.

Treatment.—The first principles are early diagnosis and early treatment. If every individual at the first threatening of a common cold went to bed and remained there for from thirty-six hours to three days, in an isolated and well-ventilated room, he would not only cease to be a focus of infection but he would curtail his attack and escape most, if not all, complications. Every case of established chronic sinusitis—with, perhaps, the exception of those originating from a tooth, from a septic swimming-bath, or some similar cause—started as an acute sinusitis, generally part of a common cold. I have never had to treat an early acute sinusitis which did not completely resolve if treated with rest in bed, warmth, and other methods to be touched on presently. I have never seen a fatal complication in an acute sinusitis so treated.

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In addition to isolation and rest in bed, I need only mention warmth to the head (radiant heat, von Eicken's heat box), avoidance of nose lotions and sprays, and the use of steam inhalations of menthol, eucalyptus, and benzoic acid. The use of suction is of doubtful value. Drugs should be used only to relieve symptoms, and the comfort of salicin, the salicylates, aspirin, and phenacetin is common knowledge. When the mucous discharge becomes muco-purulent it generally means the invasion of the sinuses. If a purulent invasion of one or both maxillary sinuses is diagnosed, simple saline lavage should be employed."

JOHN FREEMAN: "Throughout its history both the laity and the profession have held that the cold is infectious. On this point the 'steamer colds' of the Scotch Islands would present a crucial experiment if confirmation were needed. In pre-bacterial days living germs were not imagined in infections, but when bacteriology came in, bacteria were sought and found in the common cold. In the mouths of all of us at all times are a number of different microbes, but after the onset of the cold one or more of these types is enormously increased in numbers, and to such an extent as to be obviously an infection. The micro-organisms which cause the bacterial infection in the cold are pneumococci, streptococci, Pfeiffer's bacilli, diphtheroids, micrococci of the catarrhalis type, Friedländer's bacilli and other coliforms, and staphylococci. Those who examine such cases find that there are little overlapping epidemics sweeping through the population during the catarrhal season; for a week or two we may perhaps find only the pneumococcus, then possibly Pfeiffer, then perhaps a streptococcus. I must emphasise that there is no doubt that these infections cause the bulk of the symptoms of a bad cold, and are responsible for nearly all the danger in sinusitis, laryngitis, and bronchitis.

For many years it has been noted that the watery discharge which ushers in some colds is almost bacteria free, and attempts have been made to explain this or to find an undiscovered germ; to-day the idea of the filterable ultra-microscopic virus holds the field. In 1914 Kruse filtered the discharge, proved that the filtrate was bacterially sterile, and with it transmitted typical colds to two-fifths of the healthy men on whom he tested it. Since then this work has been contradicted, repeated, or explained away, but now seems to be proved by Dochez and his fellow-workers in New York; both to man and to the chimpanzee, and through a series of men or chimpanzees will this bacteria-free filtrate transmit colds. From the time of instillation to the onset of symptoms there is an incubation period of from three to four days; after such an attack there is protection for three months (at any rate in the chimpanzee); because this protection does not cover against influenza Dochez deduces that the influenzal virus must

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be different from that of the cold. He asserts that he has grown his virus, still invisible and still filterable on a succession of thick embryo tissue cultures, and after that could produce a typical cold with it; it is destroyed by heat as is a microbe or a ferment; lastly, and significantly, the virus causes increased growth of the bacteria which we have noted as infecting in the second stage of the common cold.

If we take it as proved that a virus initiates colds, we do not know if it initiates all colds or how many viruses there may be; if it can act alone or what co-operating factors there must be; we do not know if it is alive or is a complex chemical agent like a ferment; we do not know yet how to prevent its action or to cure it when it comes. We might be able to extirpate it as we have extirpated rabies, but at present we have not enough knowledge. In the meantime the trouble from the virus itself seems to be trivial, but from the bacterial infections which it induces we have both trouble and danger.

Until we have found the specifically bacteriotropic antiseptic, any chemical which can combine with and so kill bacteria must also damage our living tissues; if it is too weak for that, or if we use hypertonic salt solution for douching or gargling we wash away the natural protection of the lysozymes and so again do more harm than good. But all these devices probably afford psychological comfort to the sufferer, and with regard to the psychological factor, Dochez in his very human and readable account says that his volunteers were sometimes too volunteering and would produce a cold because they thought the experiment needed one—a complication he escaped when dealing with chimpanzees.

The bacterial factor in colds can be dealt with either by reducing the chances of infection or by protecting against it with a bacterial vaccine. A vaccine is eminently suited to treating small localised infections, but we must give bigger doses to achieve prophylaxis. If we use such a dose in the catarrhal season we risk bringing on an infection suddenly, and patients then complain that they are made worse; therefore the requisite dose must either be given in the non-catarrhal season or attained step by step. However reached, maintaining doses should be given every month as the immunity is short-lived."

DAN MCKENZIE wished to say a few words on treatment. It could be looked at from the epidemiological—that is, the preventative—point of view, but knowledge was so vague that there was no method by which it could be controlled on the principles of epidemiological science. The key to the position he considered to be the carrier. Many people were carriers of the infection of the common cold without having any nasal sinus trouble, and in them no disease of the nose was present between the acute attacks. Yet at least twice a year

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these people had acute colds in the head, with the accompanying symptoms and sequelae. It could therefore be assumed that they were harbouring the causative virus during the latent periods. The reaction of the system during the acute attack produced a degree of immunity, but only of limited duration. During their acute illness carriers seemed to become infectious to their neighbours.

CASES.

Epithelioma of Pharynx treated by Diathermy. — DAN MCKENZIE.

A man, aged 60, was operated on by diathermy in Johannesburg in February 1930, and again in February 1931. The neck was not cleared, but X-rays were applied externally in August 1930, and again a few weeks ago. The neck presents the unusual appearance for pharyngeal carcinoma, of infiltration of the skin *en cuirasse*, as a result of which, with lymphatic obstruction, the laryngeal mucosa has become œdematous. But there is no sign of any recurrence of the disease in the pharynx. The case illustrates an effect of diathermy removal to which I have already drawn attention; namely, the influence of the abolition of sepsis in retarding the progress of the disease and rendering it more endurable. A drawback to the insertion of radium into an epithelioma of the pharynx is the introduction or dissemination of septic infection.

Endothelioma of Nasopharynx treated by Radium.— J. F. O'MALLEY.

J. D., male, aged 65, on 8th October 1930, came to University College Hospital complaining of nasal obstruction, especially on the right side, for three months, and of deafness in the right ear for one month. A hard smooth mass could be felt in the nasopharynx, its lower border being visible below the uvula. Several small lymphatic glands were felt in the anterior and posterior triangles of the neck and in the left axilla.

On 27th October 1930 a portion of the growth was removed for microscopic examination and six 2-mgrm. radium needles were inserted. All the needles worked loose at intervals during the next three days, so that the total dose amounted to 500 mgrm. hours. The mass continued to diminish in size for six weeks, which enabled the patient to breathe through the nose and hear normally with the right ear. As there was some growth still visible to a post-nasal mirror examination, on 8th December 1930, four 2-mgrm. needles were inserted. Two of these became loose within twenty-four hours and two remained for seven days, the dosage being 690 mgrm. hours, which, together with 500 mgrm. previously, gives 1190 total dosage. On 18th December the patient received 500 R. units of deep X-ray therapy on the right

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side of the neck and a similar dose to the left side on the 20th. He has remained free from any symptoms or signs of the growth for over a year.

Acute Pansinusitis with Proptosis of Eye. Recovery without Operation.—E. R. G. PASSE (introduced by HAROLD KISCH).

Patient, a man, aged 41, on 13th December 1931 awoke with left frontal headache and vomited on rising. The next day the headache increased and a discharge commenced from the left nostril. On 15th December there was spasmodic pain over the left eye. Patient vomited several times; vision of left eye became blurred. Felt too ill to work. Eye bulged slightly.

Examination showed slight œdema of left eyelids, proptosis of left eye downwards and outwards. Limitation of all movements, especially of internal rotation. Retinal veins dilated. Maximum tenderness in floor of frontal sinus. Nose contained pus coming from left ethmoid region. Left maxillary antrum contained pus. X-ray showed frontal, ethmoid and maxillary sinuses to be opaque.

Under local treatment and repeated antral lavage the condition subsided, the pain subsiding first, and the œdema and proptosis disappearing towards the tenth day.

15th January 1932.—Vision and movements normal. Discharge slight.

March 4, 1932.

President—Mr. WALTER HOWARTH, F.R.C.S.

Exophthalmic Goitre. Diathermy Removal of Tonsils. General Symptoms Improved—DAN MCKENZIE.

This patient came before the Section about eighteen months ago. The improvement noted then has been maintained and developed. Along with the typical signs and symptoms of exophthalmic goitre of a moderate severity, the tonsils were large and subject to frequent tonsillitis. Their removal under local anæsthesia took a long time, by reason of the cardiac irritability. At present the patient is, as nearly as possible, a healthy woman. She has put on weight, has lost her nervousness, and is capable of a good day's work or play. The goitre is only just visible; the pulse-rate is much lower than it was, and the relief has now lasted for over a year. The removal of the tonsils was completed without the loss of a day's work.

Sinusitis with Orbital Swelling treated by Antral Lavage—T. B. LAYTON.

Female, aged 15. Admitted to hospital 10th October 1931, with œdema of both eyelids and forehead. Treated medically for some days, then right antrum washed out: pus. Left antrum: pus escaped

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from cannula but would not wash through. Owing to blockage of left antral orifice, high resection of middle turbinal performed to drain frontal and ethmoidal region. Discharged 17th November 1931. Œdema much diminished, but fluctuating swelling still present. 28th December 1931: Sinuses clear after four washings.

Patient, aged 11. Orbital swelling and pus in nose after scarlet fever. Pus in left antrum. Discharged from hospital and treated by weekly washings and puncture of swelling under novocain. Two further weekly washings. Recovery.

V. NEGUS said these cases showed the value of antral lavage. Operative measures in acute cases frequently ended disastrously, and intracranial complications followed the operation. Practically every case of acute frontal sinusitis could be cured by washing out the antrum combined with something which would cause shrinkage of the middle turbinate. He used protargol, with small packs inside the nose. This, done twice a day, with daily lavage would cure most cases of acute frontal sinusitis. If pus had broken through the sinus and had produced an abscess it must be drained externally; but many swellings of the forehead got well in a short time.

Intrinsic Carcinoma of Larynx: Laryngofissure: (?) Recurrence—R. SCOTT STEVENSON.

Male, aged 68. Biopsy of vocal cord showed squamous-celled carcinoma. Laryngofissure November 1931. Right vocal cord removed. Growth did not involve either commissure. There is now dyspnœa. Is this due to a recurrence?

HERBERT TILLEY said the appearances suggested a cyst, with a smooth pale surface. Until twelve months ago he would not have thought it possible that a cyst could occur in the larynx in the situation from which a malignant cord had been removed, but last Spring a patient, whose malignant cord he had removed in 1927, complained of severe stridor. By the direct method he punctured the cyst with the galvano-cautery, and removed the walls with forceps; the patient went home two days afterwards.

SCOTT STEVENSON (in reply) said there was a rounded swelling on the right side, and he suspected a recurrence. There were no enlarged glands. He had wondered whether removal of the thyroid ala was really necessary. He thought that perhaps the lateral wall had fallen in because the thyroid ala had been removed.

Frontal Sinusitis, Orbital Cellulitis, Insular Panostitis three inches away; Recovery—E. A. PETERS.

Man, aged 24 in May 1927, admitted to hospital on account of œdema of the left orbital and frontal regions. No pus seen in the nose. Skiagram showed that left frontal sinus was involved. Moure's incision. Lower wall of frontal sinus removed. Middle turbinate removed, agger cell opened and intranasal drainage of the sinus carried

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out. Three days later swelling of frontal region extended to the other side, so a transverse incision was carried out and the right frontal sinus drained intranasally. Three weeks later a small patch of cellulitis appeared near the coronal suture and in six months' time a sequestrum of dead bone a quarter of an inch in diameter was removed; it involved the whole thickness of the calvarium.

Recurrent Papilloma of the Larynx—E. A. PETERS.

A woman aged 24 complained of hoarseness for eighteen months previous to operation. In December 1930 a papilloma was removed and again in June 1931. The papillomatous growths have extended and now cover the circumference of the glottis. The patient complains of loss of voice. The chest has been radiographed, and no trace of tubercle was found. Suggestions for treatment are invited. A section of papilloma removed is shown.

HAROLD BARWELL said that multiple papillomata were rare in adults, and the only treatment appeared to be to persist in removing them as they recurred, until they ceased to grow.

HERBERT TILLEY agreed with removal of these papillomata, but recommended drying of their bases as far as possible, and then applying monochloracetic acid. It had a more penetrating action than the cautery or silver nitrate, and there was less likelihood of recurrence, although this could not be guaranteed.

T. B. LAYTON said he had a patient on whom Mr. Steward had operated twenty-seven times. The man remained free from 1915 to 1923, when recurrence ceased, and it was thought that he was free. But recently he returned with another large mass. His larynx was now much bigger than it should be, as a result of the numerous operations, and he, the speaker, had wondered whether the present papilloma might not be of some advantage in making the larynx a little smaller.

A. J. WRIGHT said he wished to correct the idea that after a time these papillomata ceased to recur; he had under his care a lady aged nearly 80, on whom Sir Henry Butlin had operated by thyro-fissure for papillomata when she was 30; the late Dr. William Hill had also operated upon her several times, and the growths were still recurring. There had never been any signs of malignancy.

E. BROUGHTON BARNES said that papillomata should be removed through a tube, and he recommended, instead of chemical treatment of the stump, cocainising the larynx thoroughly and treating the stump with diathermy. The smaller papillomata could be destroyed with diathermy without using forceps.

T. B. JOBSON said he had treated a child, aged 8, with diathermy for papilloma of the larynx. He used a flat electrode on the cord, and just turned the current on and off again. The child did well, and the voice, which had been discordant, improved very much. There was neither dyspnœa nor call for tracheotomy afterwards.

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Societies' Proceedings

Discussion on the Treatment of the Suppurating Maxillary Antrum.

W. M. MOLLISON: "The suppurating antrum does not necessarily contain laudable pus; the contents are often mucopus or more like mucus than mucopus; in the so-called hyperplastic inflammation of the antrum there may be no secretion at all. No doubt it is the uncertainty as to the contents of the antrum that leads some surgeons to advocate radical operative treatment in all cases.

Acute Suppuration.—There must be numberless cases of suppuration that recover spontaneously; the common cold is often complicated by sinus pain relieved suddenly by discharge from the nose.

It should be the object of the rhinologist to assist nature to this spontaneous cure. To that end, sprays of weak adrenalin, 1/3000, should be used every three hours, or ephedrine, and heat to the head, by means of the special 'bath' heated with electric lamps, applied.

Should recovery not follow, puncture through the inferior meatus is carried out. In acute cases, local anæsthesia is not always satisfactory, and I have found that sensitive patients, at least, appreciate gas and oxygen anæsthesia.

The fluid in the antrum may be clear yellow and escape under considerable tension; as a rule it is pus, and must be withdrawn by means of a syringe or washed out with saline. One such washing is frequently enough to bring about recovery.

In some cases which refused to clear up after the usual puncture and washing, a good result has been obtained by giving the patient sodium bicarbonate to render the urine alkaline and by using a solution of bicarbonate for washing out the sinus.

In cases in which attacks of acute inflammation recur with every infection, it is well to remove the anterior end of the middle turbinate.

Chronic Suppuration.—Chronic antral suppuration is taken to include all cases other than acute, though this may not be strictly accurate.

It has been shown that the washings from an antrum may be macroscopically clear but contain organisms; threads of mucus only may be seen as evidence of disease in the antral wall.

It has been shown that a diet deficient in vitamin A predisposes to upper respiratory tract infections; on the other hand, really correct diet, properly balanced, prevents such infections. Thirty new-born infants were placed in a ward and kept there for two years, under ideal hygienic conditions; no infections of the upper respiratory tract occurred, except in the case of one child whose mother withheld cream in error.

One observer suggests there are three factors that lay the mucous membranes open to infection:—(1) deficiency in vitamins; (2) allergy;

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(3) endocrine imbalance. If these factors can be corrected in some way, infections might be avoided.

That a change in the reaction of the mucous membranes is important is suggested by an observation on the action of radium. A series of cases of chronic sinusitis on which operations had been performed without success were treated by exposure to radium: much improvement was noticed.

How does the antrum empty itself?—It is logical to investigate this question as a preliminary to discussing treatment of antral suppuration. The most important factor is ciliary action; when acute infections occur the cilia are temporarily put out of action.

Another factor has been suggested, namely, the alternating negative and positive pressure in the sinus during respiration. To determine the amount of this positive or negative pressure, a small water manometer was used. This was attached to a hollow needle introduced into the antrum in the ordinary way, under the inferior turbinate. Patients with normal noses showed during quiet inspiration a negative pressure of 2 to 8 mm., during expiration a positive pressure of 4 mm. Forced respiration increased these figures. It is obvious that if there is (*a*) an accessory opening, or (*b*) a second opening produced surgically, the negative pressure will be lessened and drainage hindered.

The antra of a normal person were injected with iodised poppy-seed oil through the canine fossae. One side of the nose was then blocked with wool and sealed with collodion. The patient was kept in the vertical position for seventeen hours. At the end of this time he removed the plug and refused further co-operation. X-ray examinations made at intervals throughout the experiment showed that the iodised oil spread upwards along the nasal wall of the normal side antrum and fell into the floor of the nose and in seven hours the antrum was nearly empty, while on the obstructed side no movement of the oil was seen after the seventeen hours. It would be interesting to repeat this experiment in a patient with congenital atresia of one side of the nose.

Surgical Treatment—(1) Intranasal operation.—Consists in making a hole into the antrum below the inferior turbinate, combined, in most cases, with removal of the anterior end of the middle turbinate. Except in special cases this is the operation of choice. When the hole in the antral wall is made sufficiently large it remains open enough to pass a cannula; it must be made large in the first place, as it shrinks rapidly. Actually I am not convinced that a permanently large hole is advisable; a better result is often seen with a small than a large one. At the end of the operation itself, I pack in a strip of ribbon gauze, moistened with 10 per cent. argyrol, partly to introduce the argyrol, and partly to make sure that all discharge is removed; the strip is then removed.

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Antral suppuration in children should always be dealt with by the intranasal operation and the removal of adenoids, if any. I feel that antral suppuration in children is more frequent than formerly.

It will be noticed that no mention is made of removal of part of the inferior turbinate. I feel strongly on this point; in my opinion, it should not be touched. The opening into the antrum can easily be made under it; if the turbinate is much in-curled, it can be levered away from the outer wall.

Some of the most intractable cases of post-operative discomfort from crusting are those in which large parts of the inferior turbinate have been removed and a very large hole made into the antrum.

(2) Peroral operation.—In certain cases an intranasal operation is inadequate and the so-called radical operation is required. These are cases in which (1) the intranasal operation has failed; (2) the contents of the antrum are cholesteatomatous; (3) there are foreign bodies in the antrum, including teeth, or bits of teeth; (4) there are antro-choanal polypi that recur after simple removal, and cases of polypoid lining; (5) there are fistulae.

Canfield's operation I find difficult, and probably for that reason alone I do not see its advantage over the others.

In the Caldwell-Luc operation the incision is generally made horizontally, but a vertical one can be used. In order to prevent damage to the nerves going to the teeth, the bone area removed should be triangular with the apex downwards. In spite of this the nerves to the incisors may be damaged. Retraction of the tissues upwards must not be violent, to avoid damage to the infra-orbital nerve. Neuralgia of the second division of the fifth nerve due to too violent retraction is sometimes seen after the Caldwell-Luc operation, and is most intractable. I speak feelingly, having had two cases.

Removal of the naso-antral wall is to be made low down and without damage to the mucous membrane of the inferior meatus. It is the custom to make a large flap of this mucous membrane and turn it down into the floor of the cavity, and I have found this satisfactory. Actually it has been suggested that the mucous membrane should be left, a small hole being made later if necessary.

The lining of the antrum remains to be dealt with. Ciliated epithelium regenerates well in any part of the body, and the antrum is no exception. Recently work has been done on this subject in Toronto; even after removal of the antral lining, epithelium re-formed; thus regeneration has been noted sixteen days after operation at which all the lining had apparently been removed; ciliated epithelium has been found in the dog one month after removal, and in man nine weeks after. The epithelium arises either from microscopic lining left after operation or it grows in from the nose. Evidently the more

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islands of epithelium that can be left the better; for this reason it would appear important not to scrape away the antral lining too vigorously, better probably only nip off the exuberant polypoid lining.

Lastly, there are cases of antral disease that continue to suppurate in spite of well-performed Caldwell-Luc operations; the discharge is very annoying to the patient and may continue for years. Re-opening the antrum and skin grafting the cavity will sometimes give a good result."

A. J. M. WRIGHT: *Acute Suppuration.*—"Most of us now regard the washing of an acutely inflamed mucous membrane as undesirable. In cases without complicating factors, such as the involvement of other sinuses, an acute suppuration almost invariably clears up without puncture and lavage, and I find myself puncturing the acute suppurating antrum less and less frequently.

Chronic Suppuration.—In cases of chronic antral suppuration, it is of importance to adapt methods to the pathological conditions present rather than to follow a stereotyped treatment.

The types of suppuration are—dental, nasal, polypoid, and a mixed group described as mucoid, œdematous or allergic. In this last group I include cases in which obvious suppuration is absent, but in which there is a mucoid discharge, œdema of the mucosa, and perhaps an allergic factor. While the title of this discussion would seem to exclude such cases, I find myself unable to do so.

Dental Suppuration.—In cases of recent origin, in which the infecting tooth is obvious, it is worth while to remove the tooth and then to wait before carrying out any operation on the antrum. In a few such cases, the suppuration clears up spontaneously, but should it not do so it is better to postpone operative drainage until the alveolus has healed. A simple intranasal operation in dental cases is usually satisfactory. If suppuration persists after operation, it is probably due to infection of other sinuses, the presence of unrecognised infection in other teeth, the existence of a syphilitic or malignant element, to infection in the bone, or to the removal of too much of the inferior turbinate. In cases of bone infection only time will cure.

Nasal Suppuration.—In cases in which the antrum alone is involved, an intranasal operation is all that is required.

Polypoid Cases.—Cases with polypoid degeneration of the antral lining are usually due to a nasal infection and accompanied by suppuration in the ethmoidal and sometimes the frontal sinuses. This polypoid degeneration seriously alters the prognosis. A simple intranasal operation is usually followed by the extrusion of polypi through the operation opening into the nose. I have been in the habit of opening the antrum through the canine fossa and removing the polypi thoroughly, but recurrence has been frequent. The researches of

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Knowlton and McGregor show that it is possible for the lining to be replaced after its complete removal. I think that this treatment is worthy of further trial in such cases.

Œdematous or Allergic Cases.—By this I mean cases in which, on exploratory puncture, the antrum is found to contain mucus or in which puncture is negative but X-ray examination shows changes in the antral mucosa. Although I am aware that extensive operative interference on the antrum has been advised by some observers in cases in which obvious suppuration is absent, I believe that the more rational line to follow is the use of constitutional measures, combined with the operative treatment of any mechanical factors which may be interfering with nasal drainage and ventilation."

DAN MCKENZIE said that nothing had proved so beneficial to the patient and creditable to the laryngologist as puncturing an acute suppurating antrum. He wished as much could be said of the operations for the chronic suppurating antrum. On previous occasions he had brought forward his own views on the uneasiness with which he contemplated operating on many cases of chronic suppuration of the maxillary antrum and other sinuses. It seemed that something essential about the pathology of sinus suppuration was not understood. In spite of a perfectly planned and executed operation, a large percentage of the cases continued to suppurate. It was all very well to say the reason was because other sinuses were suppurating, but frequently this could not be detected, and even if they were, operation on other sinuses did not help. He did not think it was a question of vitamins, for the mass of our people were not deprived of these bodies. Attention ought to be bestowed upon finding the unknown factor which kept the suppuration going whatever the surgeon might do.

A. LOGAN TURNER: "The various statistical tables published from time to time clearly show that the incidence of complications from this cavity is much lower than from the other paranasal air cavities. In Burger's table, on which 534 cases of intracranial complication are tabulated, only 18 or 3 per cent. of the whole had the primary focus in the maxillary cavity. This is not surprising if we recall the fact that this sinus is the only one of the series that has no bony wall contiguous to the cerebral cavity. Consequently, infection of the brain and its membranes by direct continuity of inflammation through the bone, a frequent pathway of intracranial infection, is excluded in the case of the maxillary cavity.

Infection of the intracranial structures, however, by the venous pathway is a possible route, as the veins of the lining membrane of the antrum link up with the pterygoid venous plexus and through it with the cavernous blood sinuses. In this connection it is interesting to note that of the 18 cases referred to on Burger's table, in more than

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half the complications were of the nature of a thrombo-phlebitis of the dural blood sinuses.

I should like to refer to the post-operative complications consecutive to operative trauma of the maxillary air cavity. These unfortunate occurrences take place from time to time, perhaps more often than we realise. An inquiry some years ago, from laryngologists in this country, into the incidence of complications in paranasal sinus suppuration brought me this information, that of 60 cases returned in which the complication supervened on operation, 14, or 23 per cent., arose in connection with operation on the maxillary sinus, six intranasal and eight of the Caldwell-Luc type.

In these, diffuse osteomyelitis of the maxilla occurred as the initial stage in 13. Showing itself some days after operation as a swelling of the cheek, it then invades the frontal process and extends to the nasal and frontal bones, and, unless checked in the early stage, results in fatal complications. Of the 13 cases with diffuse osteomyelitis, seven died from leptomeningitis, four of general blood infection, and two recovered, the osteomyelitic process being checked by timely surgical interference on the maxilla.

Some years ago Mr. Tilley suggested that in these cases the diffuse osteomyelitis arose because of associated suppuration in one or more of the higher cavities, a cancellous area in the bony margin of the surgical opening within the nose becoming infected and the inflammation spreading through the body of the bone.

I have investigated in these 13 cases the question of associated suppuration in the higher sinuses and I found from the notes supplied that in ten of them this existed; that in six of these there was no simultaneous treatment of the higher sinuses, and in four there was, but in two of the latter there was only intranasal drainage carried out. These facts, therefore, tend to support Mr. Tilley's view, and they do more than that; they furnish evidence of the possible risk to which our patients are exposed in the operative surgery of paranasal sinus suppuration through our failure to remove at one and the same operation all the foci of infection."

T. B. Layton: "Accepting antral lavage as the routine treatment of all cases of suppuration in the maxillary sinus other than those in the acute stage, we may consider (*a*) the intervals between the washings, (*b*) the number of the washings to be employed before resorting to a major operation, (*c*) the condition of the patient, (*d*) the character of the pus, (*e*) indications for immediate major operation.

(*a*) From four days to a week is the convenient interval between washings. Under four days the meatus may become so tender that the later washings are unduly painful; over a week the treatment tends to become too prolonged if the lavage proves unsuccessful.

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(*b*) I used always to wash out the sinus four times before considering further operation; after a talk with Sir St Clair Thomson I extended these to six, but I do not remember in the last three years any case in which the extra two has saved the major operation. Certainly a large number of washings will sometimes result in cure, and I have heard of one that recovered after thirty-eight lavages. If for social or other reasons a major operation is inconvenient, it is quite proper to go on washing out the antrum at weekly intervals for this long period and an occasional cure will result. In many cases less than four washings are sufficient. In a recent case, when the acute stage has not been severe, one lavage is often enough, and on the second occasion the fluid is clear.

(*c*) It is remarkable how the general condition of the patient will improve after the first or second lavage. So striking is this that the condition of the patient is never an indication for resorting at once to a major operation. Rather is it the opposite, as the toxæmia can be improved by the lavage before this is done. For this reason a severe toxæmia forms, in my opinion, the only indication for performing even the operation of antral lavage in the acute stage. The great improvement in the toxæmia outweighs the risk of acute osteomyelitis arising therefrom.

(*d*) I used to think that very foul-smelling pus was a sign that the condition would not clear up by lavage. I used to think the same when there was no diminution of the amount after the second or third lavage. The following case shows that both these assumptions are unfounded.

A patient came from the Channel Islands and, hating London, wanted to return as soon as possible after operation. On the possibility of cure by lavage being explained to him he elected to risk the extra time here in the event of failure. The pus was very foul-smelling and very profuse. At the third lavage it was as bad as at the first, and I told him I thought he was wasting time to have the fourth and that we had better proceed at once to the major operation. He replied that having set out on a certain plan we would stick to it. Four days later at the fourth lavage the washings were clear. He came to see me on visits to London on several occasions in the subsequent three years and remained well.

(*e*) If a piece of fang or a tooth has slipped into the antrum during an attempt at extraction, no treatment will ever cure the condition unless it includes the removal of that foreign body from the cavity. Except for this there is no indication for a major operation, whether intranasal or by the sublabial route, before trial of lavage. Certain considerations may, however, lead one to decide on one of these after the fourth washing without further delay.

(i) Sometimes the opening of the antrum is occluded by the swollen mucosa. When this is the case the slightest pressure causes the most

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intense discomfort, with exquisite pain leading to fainting and symptoms of shock. Formerly I have operated on such cases immediately. A patient whom I have shown to-day shows that this is unnecessary, and the device of a two-way cannula should obviate the necessity for it in the future.

(ii) On social grounds the operation may have to be hastened. An Anglo-Indian returning to an outlying station where treatment would have been unavailable in the event of recurrence, and a schoolmistress who had to complete the treatment within the Christmas holidays are examples of this. Another is pregnancy; a mother is able to afford time for operation while carrying her child, but cannot do so once it is born.

(iii) The involvement of other sinuses is another reason for not continuing with lavage too long. The diversion of the stream of antral pus from the middle to the inferior meatus affords a better opportunity for the fronto-ethmoidal cells to recover than any operative treatment in the middle meatus.

That a major operation is not essential under these conditions is proved by the two cases I have shown to-day.

The success of antral lavage is the chief reason why I seldom do an intranasal operation on the maxillary sinus. I believe that the majority of cases in which success is claimed for this operation are ones which would have recovered with the simpler treatment of antral lavage. One hears of the unsatisfactory nature of this operation from anæsthetists and general practitioners rather than from rhinologists. This failure is due to the ease with which the hole may close when edge is opposite edge. With the sublabial operation it is possible to make Hajek's flap from the mucous membrane of the inferior meatus, with the result that cut edge opposes a surface and the opening cannot close. Further, it is but rarely that the intranasal operation can be carried out without removal of a part of the inferior turbinal which I think is a wrong proceeding."

H. Bell Tawse: "There are two points in the treatment of chronic suppuration to which I wish to refer:—

(1) I remove a small piece of the anterior end of the inferior turbinate in the intranasal operation, on every occasion, unless there is so much room under the inferior turbinate that a large hole is ensured.

When the anterior end has been preserved, I have had so much trouble with the hole contracting and closing up before the cavity has healed that I hesitate to rely on it.

I find it difficult to understand why the anterior end is treated with such great respect by some, and I should like to ask why more respect is not shown for the anterior end of the middle turbinate.

I have rarely been troubled with crusting after a small piece of the anterior end has been removed, but I cannot say that the same applies to the middle turbinate.

I do not wish you to think that I advocate the use of the spoke-shave or that I approve of this ruthless and barbaric treatment of the

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inferior turbinate. But I am at a loss to understand why the removal of a small piece of the inferior turbinate should be followed by crusting in the hands of some and not of others.

(2) I seldom employ the Caldwell-Luc operation as the great majority of cases can be cured by the intranasal one.

I disagree with the text-book statement that 'until evidence is forthcoming which will furnish reliable information, the canine fossa route is to be preferred to the nasal.' This operation should be reserved for cases in which the mucous membrane is known or strongly suspected to be polypoid, either from skiagrams or from the limited inspection that is possible through an intranasal opening, or in which malignant disease has to be confirmed.

In my early days I always employed the Caldwell-Luc operation. Then I began to ask myself, 'What additional benefit have I conferred on the patient by opening the canine fossa?' and in the great majority of cases the answer was 'None.' Again, although one inspected the lining of the cavity, it was almost invariably left untouched, and one had frequently to enlarge the opening to facilitate removal of the inner wall. Not infrequently the patient had a swollen, painful cheek for at least a week, toothache was not uncommon, the wearing of a denture was occasionally impossible for some days, and infra-orbital neuralgia was not unknown.

I believe that efficient drainage by the intranasal operation followed, preferably, by lavage with normal saline solution, should replace the Caldwell-Luc operation in every case except those in which gross lesions are present, indicating that drainage alone will not suffice."

C. A. Scott Ridout said that the guiding rule in every acute condition should be to do as little as possible, but any pent-up pus, particularly if it was under pressure, must be evacuated. In the early stages of an acute maxillary sinus case, 2 per cent. cocaine was more useful than the spray which Mr. Mollison had suggested.

He agreed that it was important to preserve the inferior turbinal, for if that was removed crusting of the nose and constant irritation would ensue. That should be avoided in doing intranasal antrotomy. If closure occurred it could be repeated; but one could not replace the removed turbinate.

Suppuration in this region was becoming more frequent in children, and he did not agree that in suppuration of the antrum the removal of adenoids alone was sufficient.

Lavage should be carried out if pus was seen in the nose at the operation for adenoids.

In cases of naso-antral polypi he did not hesitate to perform the Caldwell-Luc operation. Or if there was constant suppuration with a thickened mucosa he saw no method of dealing with it except by

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