eyes, and back, with giddiness, shivering, sweating, and marked loss of appetite; prostration may be extreme. The conjunctivae are reddened and the mucosa of the palate and throat injected, whilst the tongue is clean; but occasionally furred. There is no rash, and only very rarely have I seen a slight erythema on the chest.

There is a rapid rise of temperature to 100° or 101° and occasionally to 103° or 104°, but the pulse is not increased out of proportion to this.

The most striking feature, however, is a general lymphadenitis. From an early stage, and increasing rapidly, there is an enlargement of the glands of the cervical region, which can be felt especially in the posterior triangle and above the clavicle, but firm pressure reveals innumerable hard, discrete, fairly prominent chains of glands, even up to the angle of the jaw and evidently beneath the deep fascia. The salivary glands are not affected. In many the axillary or inguinal glands are implicated and even the femoral glands; in several I have noted the epicondylar gland enlarged in the arm. The glands do not suppurate.

In severe cases the splenic dullness appears to increase, but this is always a difficult matter to decide, though there has certainly occurred pain on deep pressure in the splenic region.

The severe symptoms last about two days, and on the third day there is a marked improvement and the disease is practically at an end, and in a day or two many can return to duty. So far, sequelae and complications have been absent, but recent cases give the impression that there is an increase in the severity of the symptoms. In my earlier series of cases the stay in hospital was extended to ten days, as they had been admitted to the infectious block with a diagnosis of rubella, but all were well on the fourth day. The adenitis subsides more slowly, and a few glands can still be felt several days afterwards.

Briefly, then, the condition is one of acute fever with prostration, accompanied by a general polyadenitis out of all proportion to the local lesions and ending by crisis.

The incubation period is uncertain, but cases which have broken out in the wards suggest that it may be as little as two days; it must be remembered that only isolated cases have thus occurred. Bacteriological investigations throw, so far, no light on the etiology. No specific germs have been isolated from the pharynx or the blood.

The blood shows merely a differential change, in that the monomorphonuclear elements (the lymphocytes) are increased (to 40 per cent. or 50 per cent.), a condition one might anticipate with so much activity of the lymphatic system. In a few cases examined no albuminuria has been noted.

The disease is popularly termed influenza, but it is open to discussion whether it be an acute specific infection, as distinct an entity as any of the zymotic diseases, or an anomalous or aberrant form of any one of these, or, indeed, true influenza.

Of the latter it is easiest to speak first, as its causal agent is known. The term influenza has been used in a very loose manner to describe various conditions, but in the absence of the specific bacillus such diagnosis should not be made. This we have not yet found in the present epidemic. Clinically also it differs from influenza, and most especially with regard to complications and sequelae. It is true it resembles it in its epidemicity, its rapidity of spread, and in the great prostration produced. In most works on influenza no mention is made of a glandular complication, but in a small footnote in Notlmagel's *Encyclopaedia* it is remarked that two or three observers have found swellings of the cervical or other glands. It might be supposed, however, that in true influenza epidemics polyadenitis could hardly have been overlooked, had it occurred. Again, with regard to the blood change in influenza, though little is mentioned on the subject, it would appear that no special change occurs. A leucocytosis, varying with the severity of the inflammatory complications, is known, but no actual increase of lymphocytes is found, such as appears in the cases described above. On the whole, therefore, there is no precise evidence that we are dealing with influenza.

With regard to the zymotic diseases, rubella and perhaps mumps are both to be considered. Indeed, as already mentioned, the first cases I saw overseas were sent in to hospital as rubella. It has been suggested that it is an abortive form of rubella, and it is difficult to comment

on this suggestion in the absence of any specific proof of an infective agent. The adenitis is perhaps more marked than rubella and the onset and general symptoms more sudden and severe, and there is no rash. However, it is of interest to note that I have at present in the isolation wards a case of German measles with marked eruption and furnishing all the symptoms, subjective and objective, of the present epidemic.

With mumps, mentioned by Parkes West³ in the article referred to below, there is hardly a superficial resemblance. The salivary glands are never affected, nor have any of the complications or sequelae of mumps been observed. In West's series the majority of the children had previously suffered from mumps.

On the whole, seeing that the cases have up to the present been characterized by such a constancy of manifestations, it might be better to regard it as a distinct clinical entity. And in this connexion I suggest that it bears a marked similarity to the disease known as glandular fever. This is an infrequent condition, described first by Pfeiffer² in 1889; it occurs epidemically in children in the first decade, and is characterized by sudden onset, fever, slight pharyngitis, and marked polyadenitis, lasting a few days and subsiding without complications and sequelae. Several epidemics have been described, and the subject was exhaustively treated in an article by Dawson Williams in the *Lancet*.¹ In reading this article one is struck by the idea that the present epidemic is of the same nature, but occurring at a different age period. This is no insurmountable objection when one recognizes how all the zymotic diseases under war conditions have produced similar marked changes in the age period, so that mumps, rubella, measles, and chicken-pox, not to ignore the meningococcal infections and poliomyelitis, have all been of epidemic frequency in the armies.

If the facts enumerated here, then, as occurring in a large number of cases are in accord with observations in other districts it is evident that the polyadenitis is the characteristic manifestation of the epidemic. In order to identify the well-defined picture of the disease it might be well to classify it as glandular fever until its true nature can be determined. An opportunity for investigation certainly presents itself at the moment.

The method of infection is still merely conjectural. The pharynx is certainly slightly inflamed in all cases, but the extent of glandular implication is apparently out of all proportion to this, and unlike the ordinary picture presented in tonsillitis and allied conditions. But in this light one is reminded that in recent outbreaks of pharyngitis with severe general symptoms overshadowing the local lesions, the pneumococcus has been the causal factor.

The intestinal path of infection likewise cannot be entirely neglected, and it might even be that the virus arises in certain foodstuffs, the purity of which at the present day may not be always what could be desired.

An investigation of an affected gland itself might be productive of information. So far we have not thought it justifiable to excise a gland for such a purpose.

For the present we can only say that prophylaxis is concerned with proper hygienic conditions and the avoidance of overcrowding and bad ventilation.

June 30th.

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¹ Dawson Williams, *Lancet*, 1897. ² E. Pfeiffer, *Jahrbuch für Kinderheilkunde*, Band xxix. ³ J. Parkes West, *Archives of Pediatrics*, 1896.

NASOPHARYNGEAL CONDITIONS IN MENINGOCOCCUS CARRIERS.

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THE application of antiseptic sprays to the nasal cavities has been the method of treatment mainly used to clear up carrier cases infected with the meningococcus of cerebro-spinal meningitis. Their wide variation in resistance to such treatment suggested that there must be factors in the anatomical or pathological conditions of the

nose or nasopharynx causing this variation which might be discovered by an appropriate investigation, and that as the result of the information so gained modifications in treatment might be devised which, by shortening the period of isolation, would have the effect of diminishing the number of carriers known to be in existence at any one time, and so not only aid in maintaining field strength, but also diminish the risk of outbreak.

Every facility has been afforded me to carry out such a research on the segregated carriers of the London district by the D.D.M.S., by Lieut.-Colonel M. H. Gordon, C.M.G., and by Captain A. Glover, and I am greatly indebted to these officers for this, and for their hearty co-operation and goodwill.

A priori one would expect a wide clean post-nasal space, free from adenoids, combined with a physiological nose, well drained and ventilated, to be favourable to the rapid clearing up of meningococcus infections; whereas unfavourable factors would be found in a nose of small capacity with thick irregular septum, and showing firm mucous contact between the middle turbinal bones and septum on the one hand and the outer wall of the nose on the other, in accessory sinuses draining through small obstructed ostia and possibly showing signs of inflammation, and in a shallow pharynx grossly or partially occluded by adenoids. Good breeding ground would be provided by the nooks and crannies in such a nasopharynx, and the antiseptic would find great difficulty in gaining entrance to the infected areas and spaces.

The method adopted has been as follows: Teeth were examined for caries and pyorrhoea, tonsils for enlargement and presence of septic material in the follicles and tonsillar fossae, while the oropharynx was examined from the point of view of size and the presence of abnormal factors; use of the post-nasal mirror, confirmed or corrected by direct examination with the finger, revealed the degree of adenoid growth present, as well as any enlargement of the posterior extremities of the turbinal bones or other abnormality; the nose was examined anteriorly by speculum to determine the state of the septum and the presence and degree of "firm mucous contact"; and, finally, the maxillary antra were transilluminated. In the later cases the effect on the tissues of the nose was investigated of a 1 in 6,000 solution of adrenalin chloride in normal saline in the form of a spray. Abnormal contact between mucous surfaces resisting this astringent treatment may fairly be called "obstinate."

Until the examination of the 47 carriers was completed I was very careful to remain in absolute ignorance of the duration of their previous treatment, being able only in this way to avoid any unconscious bias.

In order to provide a set of control observations an identical number of wounded men chosen haphazard from a military hospital were examined in the same routine way. These men were of about the same average age and previous conditions of life as the carriers.

To make it easy to estimate and compare the importance of the factors observed it was decided to adopt a scale of numerals to represent the degree of abnormality. On this scale "0" implies "normal," "5" that the abnormality was considered maximal. The intervening figures represent graduated degrees of departure from the ideal or physiological condition. This method allows of the ready calculation of averages, and on this system the results have been tabulated. Two tables are subjoined. Table I deals with the carriers. The cases are arranged in sequence, beginning with that of the shortest duration, and ending with that of the longest. Table I is subdivided into a first half, Group A, and a second half, Group B, the average period of treatment for the former being 41 days, and for the latter 164 days. The last case of all, not included in either group, is that of a man who had recovered from an attack of cerebro-spinal meningitis, and on being swabbed was found to be a carrier. Table II deals with the control or "normal" cases. At the end of each table will be found the average figure for each factor.

In the following analysis and discussion of these results each factor will be taken separately.

1. *Pyorrhoea Alveolaris.*

For normals the index average is 0.8, and for carriers it is the same, taking the average of the two groups together. But for Group A it is 0.6 and for Group B 1.1, or nearly

twice as high. Possibly, therefore, pyorrhoea, while not of importance in the genesis of carriers, may, by the maintenance of a condition of sepsis in the upper respiratory passages, contribute to the prolongation of the carrier period.

2. *Adenoids.*

Normals show 1.1, and all carriers 1.7. In other words, the average adenoid mass in the carriers is 50 per cent. larger than in the normals, suggesting that adenoids, as would be expected, may be one of the factors which aid in the creation of carriers. The figure for Group A (1.8) is practically identical with that for Group B (1.6), which may indicate that once a carrier has been created the presence of adenoids does not materially tend to prolong his period of treatment, the antiseptic presumably finding little difficulty in penetrating their interstices, which, therefore, afford but little protection to the meningococci.

3. *Firm Mucous Contact.*

The degree in which this condition was present was estimated by anterior rhinoscopy, and there are naturally many fallacies. In certain cases, for instance, the septum is so angulated that it is not possible to see one middle turbinal at all, while it fairly frequently happens that the middle turbinal of one or both sides is partly obscured. Further, it is not easy to estimate the degree to which the middle turbinal may be pressing against the outer wall of the nose and so interfere with the free drainage of the sinuses. However, the figures represent the best estimate which could be made, and the errors tend to eliminate themselves over a sufficiently long series of cases.

High degrees of contact are frequently accompanied by thickening and deformity of the septum. This condition, enlargement, or deformity of the middle turbinals, and to a less extent narrowness of the nasal cavities, along with perhaps some oedema of the mucosa, are the main factors in producing what has been called in this report "firm mucous contact." Though the inward pressure—that is, against the septum—is the more easy to estimate, it is

TABLE I.—*Carriers: Group A.*

Age.	Teeth.	Pyorrhoea.	Adenoids.	Tonsils.	Mucous Contact.	Sinuses (Antra).	Remarks.	Duration of Carrier Period.
						R. L.		Days.
23	Good	0	2	0	1	0 0		11
20	Good	0	1	0	0	0 0		14
37	Good	0	1	0	2	0 0		14
31	Poor	1	2	1	3	0 3		16
49	Fair	2	1	0	1	0 0	Deep pharynx	17
54	Fair	3	0	0	4	1 0	Marked right septal deviation	18
18	Fair	0	2	2	2	0 0	Right septal deviation	20
18	Fair	1	3	1	2	3 0	Thickened septum	20
19	Good	0	3	1	2	0 0		26
31	Fair	1	1	0	0	0 0	Muco-pus in post-nasal space	33
19	Good	0	2	4	1	0 4		34
19	Poor	1	4	4	1	4 3	Mouth breather	45
18	Perfect	0	3	3	2	0 0	Left middle turbinal and septum in contact	45
40	Poor	1	0	3	4	0 0	Pronounced septal deviation to right	50
33	Fair	0	0	0	4	0 0	Both middle turbinals in contact with septum	52
20	Fair	1	4	2	2	2 0	Right middle turbinal and septal contact	56
22	Poor	2	0	2	0	1 0	Atrophic rhinitis. Pus in post-nasal space	58
23	Fair	0	4	1	0	0 0		59
26	Poor	0	3	2	2	4 0		67
22	Poor	0	3	2	4	0 0	Firm contact between septum and right middle turbinal	69
18	Good	0	3	1	5	3 4	Septum thickened. All turbinals in contact with it	71
22	Fair	0	0	1	3	0 0	Septum in contact with left middle turbinal	71
27	Fair	0	0	2	2	0 0		74
Average:						0.8 0.6		
26.5	—	0.6	1.8	1.4	2.0	0.7		41

TABLE I (contd.).—Carriers: Group B.

Age.	Teeth.	Pyorrhoea.	Adenoids.	Tonsils.	Mucous Contact.	Sinuses (Antra).	Remarks.	Duration of Carrier Period.
						R. L.		Days.
38	Poor	0	0	2	3	5 4		78
27	Fair	3	0	1	5	3 0	Septal deviation to right	83
28	Fair	3	2	2	3	4 4	Very narrow nasal cavities	86
29	Fair	0	3	0	5	0 0	Almost complete right-sided obstruction	91
29	Good	0	2	1	5	3 3	Very thick deformed septum	91
29	Poor	5	0	0	4	4 5	Both middle turbinals in contact with septum	97
20	Fair	1	0	1	0	2 2		109
31	Good	1	2	0	1	0 0		120
32	Very Poor	0	2	4	0	1 5	Septum irregular	126
33	Fair	0	0	1	5	0 0	Septum broken (old boxing accident)	128
19	Good	0	4	1	1	0 0		150
39	Poor	0	3	1	4	2 0	Traumatic deformity of septum	153
19	Good	4	5	0	4	0 0	All turbinal bones in contact with septum	158
31	Poor	0	1	0	4	4 4	Both middle turbinals in contact with thickened septum	166
23	Good	0	0	0	5	0 4	Septum thickened and deviated to right	169
18	Fair	1	1	5	1	0 0	Tonsils very large and septic	173
39	Fair	3	1	0	1	0 0	Mucus in post-nasal space	176
18	Good	0	2	4	5	2 1	Both middle turbinals in contact with very thick septum	194
24	Poor	3	3	1	3	1 1	Posterior end of right inferior turbinal enlarged	250
21	Good	0	3	4	3	0 0		254
26	Poor	0	1	1	3	1 1	Septum deflected. Left middle turbinal enlarged	262
26	Poor	1	0	2	1	3 2	Readmitted seven weeks later, but cleared quickly	313
18	Good	0	1	0	5	1 0	Both middle turbinals in contact with irregular septum	348
Average:						1.7 1.6		
26.8	—	1.1	1.6	1.3	3.1	1.6		164
Average for Groups A and B:								
26.6	—	0.8	1.7	1.35	2.5	1.2		103
19	Good	1	1	0	5	4 4	Isolated as a carrier after recovery	Long

probably the outward rather than the inward pressure of the middle turbinal which aids most in prolonging the carrier period. For the outward surface of this bone screens the great majority of the ostia of the accessory sinuses, and the sinuses are probably very important dépôts for the concealment of meningococci. From them the organisms can sally forth into the neighbouring parts of the nose, whereas while dwelling in their seclusion they are comparatively immune from the attention of anti-septics, which, when they do gain the interior of a really obstructed sinus, are probably too diluted to produce much effect. If the organisms really do find a home in the sinuses, one would expect them to be discovered in the greatest numbers in the upper regions of the nose and nasopharynx, an expectation in accordance with the known facts. Further, one would expect the index for firm contact to be higher in carriers than normals, and especially high in the more stubborn carriers. The figures actually do show this to be the case. They are:

Normals	...	...	...	...	...	1.5
All carriers	...	...	...	...	...	2.5
Group A	...	...	...	...	...	2.0
Group B	...	...	...	...	...	3.1

The highest index, 5, is attained only once in Group A, but no less than seven times in Group B. The fact that in the latter group there are several low indices may be due in these cases to a combination of light internal or septal contact with firm external contact.

4. Translucency of the Maxillary Antra.

For the carriers this was observed in a dark room in circumstances identical for all, so that the two groups can be compared without fallacy. But in the case of the con-

TABLE II.—"Normals."

Age.	Teeth.	Pyorrhoea.	Tonsils.	Adenoids.	Mucous Contact.	Sinuses (Antra).	Remarks.
						R. L.	
33	Good	3	2	1	0	1 1	
19	Poor	2	0	1	4	0 0	Both middle turbinals and right inferior turbinal in septal contact.
22	Good	0	1	1	1	0 0	
24	Good	0	0	2	1	0 0	
24	Fair	1	1	0	0	0 0	
19	Good	0	1	3	0	2 2	
25	Good	1	2	3	3	2 2	Left middle turbinal in contact with septum deviated to left.
19	Good	0	1	0	0	0 1	
20	Good	0	3	2	2	0 [5]	Bullet wound, left antrum.
23	Fair	0	2	0	1	1 0	
21	Good	0	0	3	1	0 4	
21	Good	1	3	0	3	3 3	
25	Good	0	0	1	3	3 2	
22	Poor	3	0	3	2	4 4	
21	Good	0	2	3	4	4 4	Irregular deviated septum.
34	Good	1	0	1	3	3 1	
26	Poor	1	2	1	0	3 3	
20	Fair	1	0	0	4	0 0	Both middle turbinals in contact with septum.
36	Fair	1	2	0	0	0 0	
21	Fair	1	0	0	0	0 0	
41	Poor	3	0	0	2	4 3	Right middle turbinal in contact with septum.
24	Good	0	3	3	1	4 4	
25	Fair	3	2	1	3	3 0	Septum deviated and in contact with right middle and inferior turbinal.
36	Fair	2	1	0	0	4 4	
23	Fair	0	3	0	2	0 0	
19	Good	0	0	3	3	3 0	Right middle turbinal in contact with septum.
27	Good	0	1	1	0	0 0	
20	Perfect	0	0	2	0	0 1	
26	Fair	1	2	1	1	4 4	Chronic rhinitis.
28	Fair	0	1	1	0	4 4	Irregular septum; no contact seen.
29	Fair	0	0	1	0	0 0	
22	Perfect	0	2	1	4	3 2	Both middle turbinals and septum in contact.
40	Poor	3	3	0	3	3 1	Irregular septum in contact with right middle turbinal.
27	Fair	1	1	1	0	4 4	
20	Fair	0	3	0	0	4 0	
24	Fair	1	3	0	1	0 0	Man in same but died of cerebro-spinal fever. Swabbed three times (all negative).
27	Good	1	0	0	4	2 2	Both middle turbinals in contact with septum.
39	Bad	4	0	0	1	4 0	
25	Fair	1	1	1	0	1 0	
20	Perfect	0	1	1	1	0 0	
25	Perfect	1	0	2	1	1 0	
27	Good	0	1	2	3	3 1	Right middle turbinal in firm contact with septum.
24	Fair	1	2	0	3	0 0	Left middle turbinal in firm contact with septum.
19	Good	0	1	1	2	4 0	
20	Good	0	1	2	2	0 1	
20	Fair	0	1	1	3	2 2	
20	Poor	1	3	2	0	1 1	
Average:						1.8 1.3	
24.5	—	0.8	1.2	1.1	1.5	1.5	

trol series, except for the last eleven patients, an ordinary imperfectly darkened room was used, with a cloth over the heads of observer and patient. The observer's eye was therefore less perfectly dark-adapted, and the antra in

consequence probably appeared less translucent than they would in an absolutely dark room, so that the index may be slightly too high. This does not apply to the last eleven cases on the list, but as the first eleven (to whom it does apply) also show a low index, the average error is probably hardly appreciable.

The figures obtained are as follows:

	R. Antrum.	L. Antrum.	Average. R. and L.
Normals ...	1.8	1.3	1.5
Carriers ...	1.2	1.1	1.2
Group A ...	0.8	0.6	0.7
Group B ...	1.7	1.6	1.6

The two striking features of these figures are:

(a) The average for the forty-six carriers as a whole is 1.2, which is less than the "normals" average—1.5.

(b) There is a very marked difference between Group A with 0.7 and Group B with 1.6.

The question to be discussed is the significance which can be attached to these results. It is a fair assumption that the cases showing a high antral index include among them those cases in which there is antral sepsis, and in which the lining membrane is thickened, with or without pus or muco-pus. That is to say, in a series with a high antral index, the average amount of antral sepsis would be greater than in a series with a lower index. So that to some extent the index for a sufficiently large number of cases must reflect the amount of antral sepsis encountered. Further, since in many cases it is well known that the antrum may act as a reservoir for the discharges from septic frontal and ethmoidal sinuses, even when not itself infected, and also that in a fair percentage of cases where the antrum is septic the other sinuses, some or all of them, are septic too, we may assume, again in a sufficiently large number of cases, that a high antral index would be indicative of a higher average amount of sepsis in the other sinuses than would a lower one. In other words, in a series of cases sufficiently long, the curves of the antral index and of the degree of sepsis present in the accessory sinuses as a whole may be assumed to move together.

The present series—and this cannot be too strongly insisted upon—is, unfortunately, too short to allow any certain conclusions to be based on it, but the figures are nevertheless suggestive, and as such they may be examined. Taking first the significance of point (a)—that the index for carriers as a whole is actually lower than that for the normals—this may mean that a nose whose accessory sinuses have already been effectively occupied by the usual organisms of nasal sepsis is unfriendly to the meningococcus and resists its incursion more successfully than would an uninfected one. And inasmuch as it is already known that streptococci, for instance, are inimical to meningococci, this conclusion does not seem unreasonable. Taking next the second point (b)—that the index for the more obstinate Group B is more than twice that for the more tractable Group A—it may perhaps be inferred with fairness that, once the meningococcus has succeeded in establishing itself in coexistence with the previous sole possessors, it then shares in the benefits of the umbrella which has enabled the septic organisms themselves to live on in the sinuses. They are sheltered by bad drainage from the sinuses into the nose and so forth—by the factors, that is, which have already been discussed under the head of "firm mucous contact"; and, becoming correspondingly difficult to evict, the carrier in question strongly resists treatment. In other words, a high antral index implies conditions unfavourable to the genesis of a carrier, but which tend to make him obstinate in his refusal to clear up, once his "carrying" has been established.

5. Tonsils.

The indices for normals and for Groups A and B are so similar that probably the condition of the tonsils is not of much importance in determining the origin or resistance to treatment of carriers, and will not further be considered. But in any future work done separate indices will be allotted for enlargement and for sepsis.

Conclusions.

The conclusions suggested by the above analysis may be summarized thus:

1. Factors favouring the genesis of carriers—
 - (a) The presence of adenoids.
 - (b) The conditions implied in the term "firm mucous contact."
2. Factors unfavourable to the genesis of carriers—
 - (a) Already existing septic infection of the sinuses.
3. Factors favouring resistance to treatment—
 - (a) Pyorrhoea alveolaris.
 - (b) Firm mucous contact.
 - (c) Already existing septic infection of the sinuses.

These conclusions are based on so short a series of cases that they must be accepted with the greatest reserve, and may or may not be confirmed by more extended observations. Indeed, they are little more than very suggestive indications, but even so they offer the strongest inducement for a similar investigation on, say, three to five hundred carriers. *In general, it may be said that they point in the direction of the accessory sinuses as being the main seat of meningococcus infection in carriers; these cavities being often difficult to disinfect, and therefore able continually to reinfect the upper and more secluded portions of the nasopharynx, even though these may be swept clean periodically by the antiseptic used. Moreover, the lymphatics surrounding the olfactory nerves, which are in close relation to the ethmoidal cells, may possibly provide an easy avenue for infection of the meninges.*

As to any practical application of this work: already some assistance has been rendered in the matter of treatment. Captain Glover in his recent report says, among other kind references: "This" (some of the above observations on mucous contact) "led to a valuable suggestion . . . namely, that the flavine or other spray treatment should be preceded at a fixed time by a spray of adrenalin chloride, 1 in 6,000, in normal saline. The effect of this reagent is, by shrinking up the mucosa, to increase the airway, dilate the ostia of the accessory sinuses, and allow of a much freer access of the antiseptic spray to all parts of the nose. The chart showing chloramine irrigation shows also the material improvement in results shown by this method over the plain flavine method. It is apparently the best method of treating chronic carriers tried this year in the laboratory. . . ."

It may eventually be possible, as the result of a routine examination similar to the one described in this report, to predict the degree of obstinacy or otherwise, with a rough approximation to accuracy, which any given carrier will exhibit.

Later on I hope to have the opportunity, with Captain Glover, to investigate the points of densest population of the meningococcus in the nose and nasopharynx, and also during *post-mortem* examinations of fatal cases of cerebro-spinal meningitis to take swabs from, and specimens of, the mucous membrane of the sinuses, in order to test the importance of these structures which has been suggested above.

It would be well also to examine as many men as possible who have recovered from the disease. One such appears at the end of Table I, and it is interesting to note that his contact index is 5, and his antral index is 4 for each side. He carried for a long time after his recovery, but I have not been able to ascertain the exact period. He is not included in any of the averages previously discussed.

Further, I should very much like to have the opportunity of seeing as many men as possible who, having been in actual contact with cerebro-spinal fever, have been subsequently found not to be carriers. These men should give valuable indications of those conditions which are unfavourable to the genesis of carriers.

Just as an obstinate carrier of the diphtheria bacillus may often be made to clear up quickly as the result of the removal of his tonsils, so it may be that some simple surgical procedure, such as the removal of the anterior half of the middle turbinals, by throwing open the ostia of the majority of the accessory sinuses, might lead to a shortening of the period of isolation for meningococcus carriers.

One case in the table of normals was in a hut in which a man died of the disease, and was, after three swabs, found to give a negative result in each. His contact index is 1 and his antral index is 0 for each side.

In these various ways a mass of data could be obtained which, being collected by a single observer, should be free from differences of personal equation, and which on analysis should yield really valuable and well founded information.

TWO CASES OF VULVITIS CAUSED BY THE ACCUMULATED SECRETION OF TYSON'S GLANDS.

By JOHN D. MALCOLM, F.R.C.S. EDIN.

CHRONIC inflammation of the vulva is often difficult to cure and a source of much distress from the persistent itching. Local cleanliness is recommended in all the textbooks as an essential of treatment, but an accumulation of secretions under the prepuce of the clitoris is not generally mentioned as a special source of trouble. The following case shows that an irritation there may be easily overlooked:

CASE I.

I removed the prolapsed and gangrenous portion of a urethra which stood out quite half an inch from the meatus. The patient's age was 75. She had every advantage of circumstances for keeping the parts clean, and she was scrupulously careful in this respect in all ordinary ways. A good nurse was engaged, and during the operation I did not notice anything that suggested a need for particular examination of the prepuce. The gangrene seemed to account for the vulvitis. Ten days later the urethra was healing well though slowly, but the patient complained much of itching, which was a long-standing trouble, and on lifting up the prepuce a layer of stale secretion was discovered, under which the parts were obviously irritated. This patient's medical attendant writes that "after two or three cleansings of the prepuce the irritation, which had been a cause of constant suffering, entirely disappeared." He adds that he has found a similar condition and treated it with success in two other cases.

CASE II.

A healthy-looking, well-cared-for country child, 2½ years old, was sent to the Samaritan Free Hospital on account of a vaginal discharge which was said to be at times so offensive that all who came near were conscious of it. No proper examination was possible until an anaesthetic was given. Then it was seen that the clitoris was completely covered by its prepuce, the edges of which were adherent back to the junction of the labia minora. The whole vulva was inflamed. A knife was required to expose the clitoris, which was only partially adherent. Under the deepest part of the prepuce the secretion of Tyson's glands was found in small inspissated granules exactly as in a case of persistent phimosis in the male. These granules were big enough to be seen and felt through the skin. The offensive discharge ceased very quickly after the parts were exposed and cleaned.

These cases have led me to examine carefully the fold of skin over the clitoris as occasion offers in the course of operations. This fold must, in some cases, be lifted from its position before its under surface can be fully seen, and a white sticky secretion may be found there, although there are no signs of irritation. Occasionally it is quite difficult to clean the parts even under an anaesthetic, because of the tight fitting of the prepuce over the end of the clitoris. It would appear therefore to be worth while, in all cases of intractable vulvitis, to make a thorough examination of the under surface of the prepuce, with the aid of an anaesthetic if necessary.

THE VALUE OF ARTIFICIAL PNEUMOTHORAX IN THE ARREST AND PREVENTION OF HAEMOPTYSIS IN PULMONARY TUBERCULOSIS.

BY

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THE article in the BRITISH MEDICAL JOURNAL of March 16th, 1918, on the collapse treatment of pulmonary tuberculosis has induced me to record the following consecutive cases treated by me during the last year in which severe and persistent haemoptysis was arrested, and in all but one, in whom the treatment was not continued, so far prevented. All the patients believe in the efficacy of the

treatment, and the majority willingly continue it after leaving the sanatorium; they come in the morning for an induction, and by the evening feel fit to get home.

The cases recorded are only those of severe and persistent haemorrhage in which the usual rest, dietetic, purgative, and time-honoured morphine injections, calcium lactate in large dose, and terebene had been of little value.

CASE I.

Labourer, aged 52. Active signs in right upper lobe. Tubercle bacilli in the sputum. Haemoptysis 2 to 3 oz. daily for a month. The first induction with 300 c.cm. of oxygen reduced the amount, and the second with 600 c.cm. of oxygen, four days after, completely arrested the haemorrhage. A third induction of 600 c.cm. was given a week later. The sputum, after a temporary rise the day after the induction, fell to 4 oz. daily, then to ½ oz., and later to less. For the last six months he has had no haemorrhage, and when I saw him last he was working with very little discomfort.

CASE II.

A soldier with active disease of the right lung and arrested disease of the left. He had had intractable haemoptysis, varying from 6 to 10 oz., for the last two years. He came under my care early in 1918 with haemoptysis nearly a pint a day for a week. I gave him an induction of 550 c.cm. oxygen, but owing to fibrosis there was some difficulty, and the operation took nearly an hour. The next day the amount of haemoptysis was considerably lessened. On the third and fifth days I gave him an induction of 600 c.cm. of oxygen with very little difficulty, and the bleeding was completely arrested. He had three more inductions, varying from 1,200 to 1,800 c.cm., before being discharged, and for the last five months has been free from haemoptysis.

CASE III.

In a nursing sister with severe haemoptysis and active disease of the left lung, the haemorrhage was arrested after two inductions of 600 c.cm. each at the interval of a week. She has had over eighteen inductions during the last ten months, and her general condition has been considerably improved. She has had no further haemorrhage.

CASE IV.

A girl typist, with active disease of the left lung, with a basal cavity, and characteristic amphoric breathing and slight involvement of the right lung, had had occasional haemoptysis of 5 to 10 oz. for a month, and the sputum was always stained. On admission she was very ill, and the prognosis was not good. Treatment of artificial pneumothorax was proposed, but the patient was reluctant to consent. The staining of the sputum continued, and eventually she asked to be submitted to the treatment. After two inductions of 500 c.cm. of oxygen every other day the haemorrhage was arrested. She had four more inductions, from 800 to 1,200 c.cm. of air and oxygen, with the result that the cavity signs disappeared, the moist signs became dry, and she gained over a stone in weight. She was discharged fit for light work in four months, and she has had no further haemorrhage.

CASE V.

This was a sturdy man who had profuse haemorrhage and tubercle bacilli in the sputum. He was admitted almost collapsed. There were very few signs in the left lung. Four inductions of 600 c.cm. of oxygen and air in a week were followed by complete arrest of the haemorrhage. He is still going on with the treatment and has been free from haemorrhage.

CASE VI.

A girl with fibrotic disease and continuous bleeding and tubercle bacilli in the sputum, had bilateral disease. On two occasions left artificial pneumothorax was tried, but the bleeding, though lessened, was not arrested; the right side was then tried with 600 c.cm. of oxygen on four occasions; complete arrest of the haemorrhage ensued.

CASE VII.

In a bricklayer with persistent haemoptysis of three months' duration and bilateral disease induction on the right side was tried twice (200 c.cm. each) with some benefit, and as the haemorrhage persisted I tried induction on the left side with 200 c.cm., which completely arrested the bleeding. This was repeated on two occasions (500 c.cm. each). He has been doing well ever since.

CASE VIII.

A foreign university student with profuse haemorrhage, who had over twelve inductions, varying from 600 to 1,200 c.cm., of air and oxygen. After three months without haemorrhage, he discontinued the treatment, but returned recently with a haemorrhage which has now been arrested.

In the three other cases of less severity the bleeding was arrested after one induction, but the treatment has been repeated. I have also given over 300 inductions in cases of unilateral disintegrative type and in a few bilateral cases with marked benefit. I have been fortunate enough to have no accident or complication whatever in the mode of treatment.