Schäfer, and Silvester; and these studies, made on man, ought to be completed by experiments made on large monkeys after curarization. The comparative study of the various methods could be made (1) when the animal's breathing is stopped but cardiac activity remains, and (2) when breathing and heart-beats have stopped. The study of lung ventilation, chemical composition of expired air, gaseous exchanges, and percentage saturation of haemoglobin with oxygen in arterial and mixed venous blood would give very important indications of the efficiency of alveolar ventilation. It seems also absolutely necessary to study the influence of the angle of tilt on lung ventilation. If the weight of the abdominal contents actuates the diaphragm we may deduce that the volume of lung ventilation must be in relation with the angle of tilt.

A second criterion derives from radioscopic and radiographic study of the chest. This study must be made in the same experimental conditions as those used for the measurement of lung ventilation (subjects in apnoea, apnoeic patients in moderately deep anaesthesia, non-rigid cadaver).

One of the aims of artificial respiration is to stimulate the heart and circulation in order to produce oxygenation of the blood and to supply oxygen to the tissues. Artificial respiration creates an indirect massage of the heart, the intensity of which is shown by differences of pressure in the cardiac cavities during inspiratory and expiratory movements. The measurement of intracardiac pressure made on the non-rigid cadaver indicates that a quick see-saw flow of the blood takes place in the heart cavities, producing a true endocardiac massage. This mechanical stimulation certainly plays an important part in the restarting of the heart's activity. The various manual methods of artificial respiration are far from having the same efficiency on the cardiovascular system. Table IV shows the differences of pressure produced in the left ventricle of the non-rigid cadaver by various methods during inspiration and expiration.

TABLE IV

Method	Lung Ventilation in c.cm. (Non-rigid Cadaver)	Pressure in Left Ventricle (cm. Water)		Difference (cm. Water)
		Inspiration	Expiration	
Silvester (without expiratory compression) ..	200	-8	+1	9
Silvester (with expiratory compression)	280	-8	+18	26
Schäfer	20	+9	+13	4
Combined method: Schäfer's method with raising of elbows	210	-7	+15	22

A study of Table IV shows that the manœuvres of artificial respiration which mobilize the thoracic framework above and below its position of equilibrium—i.e., which provoke an active inspiratory enlargement of the chest and then an expiratory compression—are the most efficient, both on the cardiovascular and on the respiratory system. Silvester's method with expiratory compression and Schäfer's method improved by the addition of an active inspiratory movement (raising the elbows) fulfil these conditions.

The feeble action of Schäfer's method on respiration and circulation can be explained by the conditions of the respiratory system. In the cadaver (and in the apparently dead body) all the reflexes have disappeared, the muscles are slack, and the loss of tonus in the respiratory muscles brings the chest into the complete expiratory position; the diaphragm is relaxed and arches into the thorax.

As a result of these changes the lungs are almost entirely emptied of air and the capacity of the thoracic cavity is much diminished. Therefore the conditions of the respiratory system in the apparently dead body do not lend themselves to methods of artificial respiration which use only expiratory pressure on the thorax and abdomen, since the respiratory system is already in the greatest possible state of expiration. The ventral position in Schäfer's method further exaggerates the diminution of the capacity of the thoracic cavity, because the weight of the spine, shoulder, and back muscles contributes also to the collapse of the thorax. The strong pressure (+9 cm. water) registered in the left ventricle of the non-rigid cadaver lying on the abdomen and the slight manometric oscillations resulting from the manœuvres of Schäfer's method show the complete collapse

of the chest and the resulting compression of the heart. The state of collapse of the respiratory system of the apparently dead body explains completely why Schäfer's method, which compresses the abdominal viscera in the chest, utilizing the piston-like action of the diaphragm to expel the lung contents, has such a slight result on ventilation and circulation. As the rocking method is based on the same principle of stimulation of the inert diaphragm (by the weight of abdominal contents instead of abdominal compression as used in Schäfer's method), and the subject lies on the stretcher in the ventral position, it seems to me necessary to study the efficiency of Eve's method on the cardiovascular system of the apparently dead body.

The measurement of intracardiac pressure on the non-rigid cadaver during rocking and a complete study of the physiology of the circulatory system in large monkeys after curarization (measurement of arterial and venous blood pressure, circulation time, output of heart) under the same conditions as to rocking should yield information of great practical value.

Conclusions

Eve's rocking method certainly has great practical advantages, but the experimental criteria so far employed to study its physiological efficiency seem to me insufficient to prove its superiority to other methods of artificial respiration. A more complete experimental study is necessary before its efficiency can be determined.

BIBLIOGRAPHY

- Brunis, O. (1927). *Klin. Wschr.*, **6**, 1548.
 — and Thiel, K. (1930). *Die Wiederbelebung*, Berlin.
 Burton-Opitz, R. (1922). *Amer. J. Physiol.*, **61**, 562.
 Cordier, D. (1936a). *Les Méthodes Manuelles de Respiration Artificielle*, Edit. Masson, Paris.
 — (1936b). *Les Méthodes Manuelles de Respiration Artificielle*, Rapport à l'Académie de Médecine de Paris, **116**, 193.
 — (1936c). *Bull. Soc. Thérap.*, **307**.
 — (1937). *Anesthésie et Analgésie*, **3**, 30.
 — (1942). *Les Méthodes de Ranimation*, Editions de la France Combattante, Ltd., 4, Carlton Gardens, S.W.1.
 Eve, F. C. (1932). *Lancet*, **2**, 995.
 Gibbens, G. H. (1942). *British Medical Journal*, **2**, 751.
 Hamburger, H. J. (1909). *Nederl. Tijdschr. Geneesk.*, **2**, 45, 1059.
 Héderer, C. (1934). *Bull. Acad. Méd.*, **111**, 849.
 — (1935). *Ibid.*, **114**, 178.
 Killick, E. M., and Eve, F. C. (1933). *Lancet*, **2**, 740.
 Lancel (1943). **1**, 178.
 Liljestrand, G., Wollin, G., and Nilsson, S. (1913). *Skand. Arch. Physiol.*, **29**, 149.
 Ploman, K. G. (1906). *Ibid.*, **18**, 57.
 Schäfer, E. A. (1904). *Proc. roy. Soc. Edin.*, **25**, 39.
 — (1908). *J. Amer. med. Ass.*, **51**, 801.
 "Suspended Animation" Committee Report (1903). *Med.-Chir. Trans.*, **86**, Supp. 86.
 Waters, R. M., and Bennett, J. H. (1936). *Anesth. & Analges.*, **15**, 151.

MANAGEMENT OF ACUTE PLEURAL EMPYEMA

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The treatment of pleural empyema, whether it be acute or chronic, is simple drainage, and the drainage must remain adequate for as long as there is an abscess cavity. This is a surgical principle which applies to collections of pus anywhere in the body, but it is a principle which, in the case of intrathoracic pus, is in danger of being submerged by a constant flood of new-fangled drainage tubes, new irrigation apparatus, water pumps, and electric suction. The time at which an empyema should be drained is a matter for clinical judgment. The wise surgeon does not incise an infected area until the inflammation is well localized, and this too is applicable to pleural infections. Considerations of cardio-respiratory physiology may call for relief of pressure within the chest before drainage is advisable, and in such circumstances repeated aspiration of an infected pleural effusion may be necessary. Aspiration should be performed frequently, slowly, and without air replacement. In certain cases the same conditions may call for a water-sealed intercostal drain. When an empyema is ready for draining a liberal incision should be made, at least 2 in. of rib removed subperiosteally, and a tube inserted. Only the skin should be sutured. At operation

the pus should be evacuated and any fibrinous masses removed, so that they do not block up the tube. In such cases nothing more than an "open drain" is needed. Any system of closed drainage tends to focus attention on the apparatus rather than the empyema cavity. When drainage has been started—and that word is used advisedly—all that is required to maintain it is a piece of rubber tubing, a safety-pin, common sense, and what the gardeners call green fingers. There are many other useful devices for post-operative treatment, and the thoracic surgeon should have them all if he is to play his appointed part; but these things are no more than useful labour-saving accessories.

Why has empyema acquired such a bad reputation for false healing? Subphrenic, perirectal, and bone abscesses have a similar reputation. In all these the walls of the cavity are not equally elastic, and in three of them they are constantly being varied by the movements of the intercostal muscles, the diaphragm, or the pelvic diaphragm. In the pleural abscess there may be still further inequalities due to scarring in the underlying lung or thickening of the interlobar septum. These factors make for irregular healing and the creation of dead space, so that drainage which is adequate one week may be inadequate the next. The daily dressing of such cases is therefore a matter for a skilled and interested doctor rather than a nurse. Ideally the initial drainage operation should be done by the doctor who is prepared to do the daily dressings.

Causes of Inadequate Drainage

At any time during the post-operative period drainage may become inadequate, and an investigation into the cause of this will probably reveal one of the following:

1. Obstruction by Fibrinous Masses within the Drainage Tube

Where an intercostal drain or a minimal rib resection has been performed masses of fibrin may be left either loose or hanging to the walls of the cavity. Pieces of this may enter the lumen of the tube and block it up partially or completely. The amount of this material varies, but it is found particularly in the pneumococcal empyemas of children and those in which operation is long delayed. Sometimes the cavity is occupied by a mould of fibrin in which are lacunae filled with pus. A high solid content is also found in the empyema which results from an infected haemothorax and in the pleura after pneumonectomy that becomes infected through a bronchial fistula. Sometimes fibrinous masses form during drainage, and this is seen particularly in empyema complicating bronchiectasis. There should be no interference with drainage if the cavity is well cleared out at operation and if the tube is removed each day, sterilized, and put back. Gentle irrigation of the cavity with Dakin's solution may help, but the operator should be certain that bronchial fistula is not present. It should be done through a soft rubber catheter of such dimensions that there is ample room for the return of the displaced air between it and the sinus wall. If fluid is forced into an empyema without adequate provision for escape there is a danger of air embolism.

2. Obstruction by Granulation Tissue

One advantage of a simple open drain is that the tube may be removed, cleaned, sterilized, and replaced each day. If such a tube is left in too long healing may take place over the end and a plug of granulation tissue completely obstruct the lumen. If there are lateral holes in the tube, granulation tissue may grow into these and have a similar effect. In the same way the end of a self-retaining tube is even more likely to become obstructed, as there is a natural tendency to leave these in place much longer on account of the unpleasantness associated with repeated removal. It is not always possible to avoid such obstruction by daily irrigation, as the granulations are often in the form of a polyp, which may be temporarily displaced by irrigation only to fall back into the opening afterwards. Whatever sort of tube is used the danger of this type of obstruction is much increased by any form of suction.

3. Obstruction by Kinking of Tube

Kinking of the tube may occur where a drainage sinus is tortuous, or it may happen in the tissues of the chest wall or,

where closed drainage is used, between the chest wall and the bottle. Such an accident is particularly liable to happen at the point at which a lateral hole is cut in a tube, and is a much more frequent occurrence with the present poor-quality rubber.

4. Tube too Short to Reach the Pleura

It is not an uncommon thing for an uninstructed nurse or house-surgeon to undertake the daily duty of cutting half an inch off the drainage tube, so that in a very short time the tube no longer reaches the cavity it is meant to drain, but lies uselessly in the chest wall. At other times a tube may come out accidentally and be left out for a few hours. In this very short time the chest sinus becomes narrowed, especially in the plane of the periosteum and intercostals. The tube is then often put back as far as it will go easily and the rest cut off. Where closed drainage has been used the tubing connecting the patient to the underwater drain is often anchored to the bed in some way, and it may then happen that a sudden movement by the patient may pull the self-retaining head of the tube out of the empyema cavity into the soft tissue of the chest wall.

5. Tube through the Chest Wall but not reaching the Cavity

This happens only as a result of healing of the empyema. At first the tube may be perfectly placed, but, as a result of elevation of the diaphragm, expansion of the lung, or both, the base of the empyema may heal more rapidly than the upper part, until a cavity is left above communicating with the tube by a long narrow track which is quite inadequate for drainage. This condition is seen particularly in those large empyemas involving the apex of the pleura. In these the expansion of the lung often seems most rapid in the subapical region, so that a residual apical cavity may come to communicate with a basal drainage opening through a narrow sinus 6 or 7 in. long. In these cases the tube must be lengthened in order to pass beyond the constricting area into the cavity. The part below this may then drain through lateral holes in the tube.

6. Tube too Far into Cavity

With both a simple tube and a self-retaining tube the inner end may be so far into the cavity that pus collects below it and only drains as an overflow. In the case of the open drain it is not satisfactory to have a tube which just reaches the pleura, because of the danger of its slipping out. The safest thing is to have the tube projecting a short way into the cavity and to cut a lateral hole in it at the point at which it enters the pleura. As will be mentioned again, it is important that the length of the tube and the position of the lateral hole should be constantly reviewed in the light of changes which the draining sinus undergoes during healing. As the floor of the cavity rises the sinus becomes longer and the lateral hole becomes ineffective. The inner end of the tube may then be above a fluid collection once more. Where a self-retaining tube is used in conjunction with a water-sealed drainage system a similar state of affairs may be produced in a different way. When the tube is first inserted a safety-pin should be passed through it at the skin level or at least in such a way as to allow a small thickness of gauze between the pin and the skin. If this is not done the tube easily works upwards with the movements of the patient and pus collects in the bottom of the cavity. Even when a pin is inserted it needs frequent changing in order that the skin round the wound may be properly cleaned, and it sometimes happens that a patient may lean on the tube while the pin is out, and so push it further into the cavity. Unless it is pulled down before the pin is inserted pus will collect around the stem of the tube.

7. Part of the Cavity Below the Drainage Opening

Where an empyema cavity has a broad base it is often difficult to decide on the best position for the tube. Sometimes the floor of the cavity is curved so that the anterior and posterior ends are both on a lower level than the middle. In such a case it may be wise to insert two tubes—one in front and one behind. Where only one is used either the anterior or the posterior end may remain dependent and be occupied by a puddle of pus which never drains away completely. Similar conditions sometimes occur because the drainage tube is not inserted with a view to the ultimate position of the

patient sitting up in bed or walking about the ward. The finding of a dependent part of the cavity is not, however, always a reflection on the placing of the tube, for it may result from the way in which the empyema heals. One example of this may be described. An empyema cavity heals from the edge centripetally. All along the line of junction of visceral and parietal pleura adhesion takes place, gradually pulling out the lung to the chest wall. If the empyema involves the diaphragmatic surface, and if it does so more in front than behind, then the line of junction will reach the chest wall behind first and continue to climb up the chest here while in front it reaches the chest wall later and so lags behind; the front part then becomes dependent from the drainage sinus. The condition can easily be diagnosed by tilting the patient into various positions and finding at what angle the pus starts

resection operation than to use any force in the dilatation of such a sinus. Where force is used there is danger of air embolus, temporary paralysis, or cerebral abscess. When the drainage tube is removed there may be an immediate flow of pus, and this indicates that the tube is too long. It is better in such circumstances to cut a series of lateral holes in the tube rather than to shorten it until a radiograph is available. It is sometimes possible to measure the length of the sinus by passing in a coudé gum-elastic catheter and gently withdrawing it until the bent end catches on the rim of the sinus opening into the cavity, but it is simpler still to explore with an instrument that I have had made by the Genito-Urinary Mfg. Co., which can be passed through the sinus straight and be bent when in the cavity: this I call an "articulated empyema sound" (see Fig.).

The sound is passed into the cavity straight. The end is then bent as in the dotted line and the sound gently withdrawn to the rim of the cavity. The length of the sinus is then measured on the staff of the instrument. The length of tube required to drain the cavity is estimated from this.

to drain, or, more graphically, by injecting an opaque oil into the cavity and taking radiographs in the upright position. When the exact position of the dependent part has been located a second tube should be inserted here. It is usually wise in such a case to retain the original drain as well.

It must be remembered that from the point of view of an empyema the diaphragm forms part of the chest wall. Where the diaphragm is involved in an empyema the drainage opening must be placed lower than usual, and in fact the tube may often have to be placed in the usually forbidden zone of the costo-phrenic sinus. In such cases especial care must be taken to see that the tube is lengthened during healing, to prevent the diaphragm from becoming adherent to the chest wall over the end of the tube and leaving a cavity above. Such truly basal empyemas are sometimes, but not always, secondary to a peritoneal infection.

8. Loculation

When an empyema forms in a pleural cavity intersected by adhesions multilocular cavities may occur. This condition is not met with as often as might be expected. The loculi may be entirely separate, be joined through a very narrow channel, or have a fairly wide communication. In the first and second events drainage may be unsatisfactory from the first, but in the third it may become so by expansion of the lung at the waist of the hour-glass. This is a further reason for wide initial opening of an empyema, with careful note of its shape and size and the presence of any narrow channels, rather than the rib resection which is considered sufficient so long as pus is found and a tube inserted.

Tests for Cause of Unsatisfactory Progress

When an empyema is not progressing satisfactorily, therefore, what simple clinical tests can be made to find the cause? This is a problem which frequently faces the thoracic surgeon, often in conditions in which radiographic facilities are poor or absent. First, the patient should be sat upright in bed and the wound inspected. The presence of a sore skin, a rusty safety-pin, and large oedematous polyps of granulation tissue round the tube indicates neglect, and it can be assumed that the inside of the chest is equally unsatisfactory. The tube should be removed. If it is $1\frac{1}{2}$ in. long and falls out easily it is certainly not in the cavity except in the case of small infants. In these circumstances a firm well-greased rubber catheter about size 10 should be passed into the sinus. This may find its way into a cavity without damage to tissues and with relief of pus. A series of catheters can then be passed gently until the sinus is wide enough to take a small rubber drainage tube. The length of catheter in the chest when pus flows is an indication of the length of the tube needed, but it is often safer to make the tube a little longer and cut a lateral hole at the measured length. It is unwise to probe such a sinus with metal or rigid gum-elastic probes except with the greatest gentleness and caution. It is better to subject the patient to a fresh rib-

If no pus drains away when the tube is removed the patient should be tilted into various positions to see if there are any dependent pockets. Another useful guide is to inject a known amount of saline into the cavity when the patient is lying on the good side, sit him upright, and measure the amount of fluid that drains away. There may be some resistance to the withdrawal of the drainage tube, and then it suddenly comes away. The lumen of the tube is found to be filled with wet granulations and the sinus bleeds from the tearing off of this unhealthy tissue. Pus may then drain freely, or it may be necessary to pass a catheter through terminal granulations to effect this.

Just as the experienced operator knows when a needle enters an empyema cavity even when the pus is too thick to be withdrawn, so the same fingers will learn much about a drained empyema by the simple passing of a soft rubber catheter. This is not something which can be passed on to house-surgeons, but something that they must learn for themselves. They should be encouraged to keep constant digital contact with their empyemas and only to use radiographs to verify their findings and to solve problems which exist after the simple clinical tests have been applied. Nothing that has been said must be taken to minimize the most valuable information that can be obtained by radiography. All thoracic surgeons are aware of the immense help obtained from radiographs in the treatment of empyema. In the first place straight radiographs in the upright position, both postero-anterior and lateral, are taken. These will show residual fluid levels, residual opacities, and their relation to the drainage tube. The next step is to fill the cavity with an opaque oil, close the drainage tube, and take further pictures. Finally the tube is allowed to drain in the upright position and further pictures are taken to see if drainage has been complete, or, if not, the position of dependent portions. The size, shape, and position of the cavity in relation to the drain are then known. The presence of bronchial fistulae, disease in the underlying lung, or undrained loculi can also be seen.

An uncomplicated acute empyema, kept properly drained and properly dressed, should pursue an uninterrupted course to recovery. With the help of the physiotherapist trained in thoracic work this should occur without skeletal deformity or impaired cardio-respiratory function. If such steady progress is interrupted by a febrile attack it would seem obvious that it is the responsibility of the surgeon to find the cause of the temperature. Too often, however, is the patient put on a course of sulphonamides, and many valuable weeks of convalescence are wasted and much unnecessary ill-health and discomfort caused. If a patient whose empyema has been drained becomes febrile the most likely explanation is that the drainage has become inadequate. There are other possible causes: cellulitis of the chest wall, which usually results from stitching up the muscles round the tube after rib resection; deep abscess of the chest wall following pre-operative aspiration; or a tube which is "ulcerating" into the lung itself. In

this last case it usually happens that the lung expands and impales itself on the end of the tube. The correct treatment may be either to remove the tube altogether or, if a cavity is still present, to put a longer one in past the site of ulceration. A lung will never ulcerate through contact with the smooth curved side of a tube, but only with the end of a simple tube or the relatively sharp projecting rim of a self-retaining tube. Other causes of temperature may be disease in the lungs or, very rarely, the development of another empyema, or some cause remote from the chest such as a sore throat. Fortunately rare complications are meningitis, encephalitis, and brain abscess, but these things should be kept in mind during the investigation of a case.

Physiotherapy

Next in importance to the maintenance of adequate drainage through the whole course of treatment is the prevention of chest and spinal deformities with their resulting bad posture and impaired respiratory function. The picture of a deformed and rigid chest, with shortness of breath on exertion, dizziness, lassitude, lack of appetite, and even clubbing of the fingers, may closely simulate a chronic empyema and yet the lung may be uniformly adherent to the chest wall. I have seen all these signs and symptoms, including the finger-clubbing, disappear after a month's spinal and breathing exercises. Physical training, starting in a small way, should begin the day after operation. Special exercises have now attained a high degree of perfection. Those who have no highly trained personnel available to carry out this work should remember that any exercise which works the skeleton on the affected side is good. The lung should be forgotten and attention focused on the pectorales major and minor, the latissimus dorsi, the serratus magnus, intercostal, diaphragm, and abdominal muscles. Voluntary deep breathing is only followed by apnoea, but the deep breathing of healthy exercise is good, and for this reason the open drain is better than the closed, for it allows of long walks and hard work.

Placing of the Drainage Tube

When an acute empyema is ready to be drained by open operation the limits of the cavity should be ascertained as accurately as possible by aspiration of pus and the introduction of a little air. In this way a fluid level is formed, and radiological examination will show the exact position of the cavity. The tube should be placed so that it is approximately half-way between the anterior and posterior margins of the cavity, and in the case of the more common basal empyema about level with the dome of the diaphragm. Though this position may be a little above the lowest point at which pus can be aspirated, it avoids placing a tube in the narrow costo-phrenic sinus, where it rapidly becomes occluded. The main exception to this rule is the one already mentioned in which the diaphragm is extensively involved in the empyema. Apical and axillary empyemas should be drained 1 in. above their lowest points. A chronic empyema should always be drained at its most dependent part.

Infected Haemothorax

A small infected haemothorax differs very little from the post-pneumonic empyema, but under war conditions it is not unusual to find the whole pleural cavity involved. The very large infected haemothorax is generally the result of improper treatment of the original condition. Blood and bloody fluid in the chest which result from trauma should be aspirated without air replacement. They should be aspirated repeatedly and frequently, so that if infection occurs it involves only a small area of pleura. The introduction of air serves no useful purpose and only increases the size of the pleural cavity which subsequently needs drainage. When a lung has collapsed beneath a large infected haemothorax it may take as long as two years to expand. It must be remembered that where clotting takes place in a haemothorax loculi of fluid may form, and some of these may be infected and some sterile, so that aspiration in numerous places may be necessary. When infection is once established the chest should be opened, all clot evacuated, and adequate drainage established. The subsequent management is the same as for a post-pneumonic empyema, but healing may be delayed by scarring of the underlying lung from trauma at the time of the injury.

EAR, NOSE, AND THROAT CASUALTIES IN A GENERAL HOSPITAL IN THE MIDDLE EAST

BY

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Every medical officer has two main duties. The first is to use every means in his power to practise prophylaxis; the second is to ensure that when disease does arise the maximum number of his patients return to a state of health which will fit them for all forms of active service in the shortest possible time. Such a policy applies equally to the specialist as to the unit medical officer, and it was felt that a detailed analysis of the casualties attending the ear, nose, and throat department of a general hospital in the Middle East might form the basis for some constructive suggestions as to how the incidence of the more prevalent conditions might be diminished, the period of admission to hospital decreased, and more adequate treatment in general instituted.

The period chosen was from Sept. 20, 1940, to Feb. 20, 1941 (approximately five months), and, though it is admitted that a longer period would have been preferable, further experience showed that, with the exception of war injuries, no appreciable variation occurred over two years. During the months under review war injuries affecting the ear, nose, or throat were few in number, and the type of disease encountered bore a close resemblance to that found in the ear, nose, and throat department of any hospital in the British Isles. There was, however, a definite alteration in incidence. Statistics make dry reading, and for the purpose of this article it is proposed to abstract the more prevalent diseases only from the detailed analysis that was made of all the cases.

Out-patients

The number of out-patients who attended for the first time was 517. As the numbers in the area were constantly changing no useful information is obtainable from a comparison of attendances in the different months. The more prevalent diseases were:

(a) Aural Diseases

Disease	% Aural Cases	% Total Out-patients
Otitis externa, acute	20.70	10.25
chronic	11.72	5.80
" media, acute	7.03	3.48
" chronic	27.73	13.73
(Ruptured tympanic membrane ..)	2.73	1.55
	34.4	16.05
	34.76	17.21

It will be noted that the gross percentages of otitis externa and otitis media are approximately equal.

(b) Nasal Diseases

Disease	% Nasal Cases	% Total Out-patients
Deflected septum	12.65	4.06
Sinus infection	66.87	20.31

Of the sinus cases 74% yielded to treatment by conservative measures, which included short-wave diathermy and repeated proof-puncture.

(c) Throat Diseases

Disease	% Throat Cases	% Total Out-patients
Tonsillitis, acute and subacute ..	54.65	10.25
chronic	36.91	6.91
	91.56	

A large number of the subacute cases were patients sent down from the medical wards for an opinion on the advisability of operation. In a further 18% of out-patients who came up for different complaints some degree of chronic tonsillitis was noted, but not sufficient to warrant operation.

In-patients

It was found that the total number of in-patients admitted for ear, nose, and throat diseases was 11.35% of the total admissions to the hospital, and comparison with figures obtained from a military