# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

**February 7th, 1936**

*President*—HAROLD KISCH, F.R.C.S.

### Discussion on the Value of Radiology in Diseases of the Ear

MR. W. STIRK ADAMS: In congenital lesions of the external ear canal it is important to know whether the middle ear and labyrinth exist. The X-ray photograph can show us this. More important still, the X-ray photograph will show us the variable anatomy of the mastoid should the need for exploration occur. Knowledge of the extent of a wide medium-celled pneumatic mastoid is a considerable help in preventing a set operation from becoming a voyage of discovery. Some years ago efforts were made to prove that a particular type of mastoid anatomy determined the prognosis of an acute mastoiditis.

It is, however, in investigating pathological conditions that the radiologist is most frequently consulted. Especially is this so in acute infections, and if it be asked in what conditions this need arises I would suggest: Firstly, when we are dealing with a type of acute otitis which is liable to give local complications; secondly, when complications involving the mastoid or petrous are suspected but not certain; thirdly to reinforce the decision of the surgeon to open the mastoid, and in helping the patient to accept an unwelcome decision.

There is no infection with a worse reputation among otologists than that due to the *Streptococcus mucosus*, from its liability to behave as a silent focus until an intracranial complication occurs.

I meet with three clinical types of the *mucosus* infection: (1) A moderately severe acute otitis media, with great hyperæmia and œdema of the drumhead and adjacent canal wall; after paracentesis resolution of the infection is the rule. (2) The acute otitis with mild nocturnal pain in ear and mastoid. (3) The classical type.

The first radiograph is from a man, aged 50, taken on the twelfth day of a *mucosus* infection in a previously normal ear (Plate I, Fig. 1). It shows a wide rarefaction in the left mastoid. I first saw the



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Left FIG. 1. Right

Mastoid skiagram taken on the 12th day of a streptococcus mucosus infection on the left side; showing extensive decalcification of the upper half of the mastoid process. Man, aged 50.

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patient on the sixth day of the infection, when he gave a history of a subacute otitis media on the left side, with some pain. The drumhead was then bulging and injected and landmarks were obscured. Paracentesis, the same day, was followed by three days of freedom from pain, but on the next night a niggling pain occurred in the left mastoid and this was repeated during the two following nights. Although there was no mastoid tenderness, the presence of pain suggested an unsatisfactory progress, and the skiagram was taken on the twelfth day from the onset of the infection, to help in forming a decision. When the very wide changes in the mastoid were seen I felt it unwise to defer exploration and confirmed the X-ray findings in the mastoid at operation the same day.

The significance of mastoid pain in acute otitis would require a longer time than we have to-day for a full survey. I would suggest, however, that he is a wise otologist who has his patients with a *mucosus* otitis examined by X-rays in the third week.

I will now consider the patient who has had an unsatisfactory cortical mastoid operation after an acute otitis. The textbooks are completely silent on this most difficult problem in otology, yet it is one that is constantly before us and for its solution I find an X-ray examination essential. The radiographs must show: (1) The extent of the previous mastoid exploration—and may show an unopened group of cells responsible for continuation of suppuration; (2) the petrous pyramids, for only by this examination can we hope for an early diagnosis of petrositis. I am not referring to acute petrositis, giving symptoms of frontal headache (and pyrexia), but to what is now called chronic petrositis, showing itself by a persistently raised pulse-rate and perhaps slight pyrexia.

Figures 2 and 3 (Plate II) are radiographs of a patient in this second group, taken seven months after the onset of an acute otitis media in a boy aged 5, who had been previously healthy. His illness began with a severe pain in the right ear, which subsided without rupture of the drumhead. Six weeks later he had a second attack of pain in the right ear and the drumhead burst spontaneously, the middle ear continuing to discharge until a month later, when I was asked to see him. The right mastoid was diffusely tender, the temperature was 100° F., and operation revealed a wide small-celled pneumatic mastoid infected throughout. The general condition after operation gave us no anxiety, but the pulse-rate never fell below 110 per minute and the temperature continued to range in the region of 100° F., while the mastoid wound and middle ear continued to discharge. Further mastoid exploration after the X-ray diagnosis of petrositis showed the previous operation cavity to be filled with infected granulation tissue without a track into the petrous from the mastoid. The evidence pointed to extension of infection from peritubal cells into the petrous apex, but as severe



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symptoms had been absent no operation was performed on the apex, and the patient made a complete recovery, helped by local and general ultra-violet light radiation. The radiograph shows, in the base plate, complete decalcification of the right petrous tip, while in the petrous tip of the left side in the Stenvers position there is evidence of a space which may be a diploic cell, with no evidence of a superior marginal track.

The second example of this group is from a girl, aged 12 (Plate III, Figs. 4 and 5). She had had a mastoid exploration carried out three weeks after the onset of an acute otitis media. Following this the mastoid continued to discharge while the middle ear healed rapidly. No other symptoms were present, but three months after operation a radiograph showed complete decalcification of the petrous tip on the side of the operation. At the second exploration after removal of the infected granulation tissue from the mastoid, a nodule of blue granulation was found sentinel at the opening of a track leading into the petrous tip along the postero-superior margin of the bone. This opening was approximately 4 mm. above and behind the external semicircular canal on the floor of the mastoid antrum. Enlargement of the opening allowed the rubber drainage tube seen in the radiograph to be inserted into the petrous apex. I would ask our radiologists if they can help us to decide what degree of change in the texture of the petrous tip should be regarded as diagnostic of petrositis.

And now I would ask Members of the Section to consider the problem of the extradural abscess. No complication of acute or chronic otitis is more difficult to diagnose ; you will recollect in the figures so carefully recorded from the Royal Infirmary at Edinburgh that an extradural abscess—perisinus, tegmen or extracerebellar—is an operation finding and not a pre-operative diagnosis. So far no examples have been discovered by X-ray diagnosis, but this does not prove it impossible that they may be. In this radiograph (Fig. 6, Plate IV), taken in a child aged 7, on the twenty-first day of an acute streptococcal otitis, the infected side shows an extremely clearly defined sinus groove, while on the opposite healthy side the groove is much less well defined. At operation a large perisinus abscess was found and it appears to me that the presence of an extremely clearly defined sinus groove on the infected side is suspicious of a perisinus abscess with destruction of bone.

If we now consider what help can be given by the radiologist in a patient with a chronic otitis which has failed to resolve under treatment I would suggest that in both superior and inferior otitis a pre-operative radiograph of both mastoids is advisable. In superior otitis I regard it as essential as it may forewarn us of a large cholesteatoma. If our radiologists can help in diagnosing a small cholesteatoma we should indeed be grateful.



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Plate II



Fig. 2.

D.H., aged 5. Base plate seven months after onset of acute otitis. Shows decalcification of affected petrous tip.

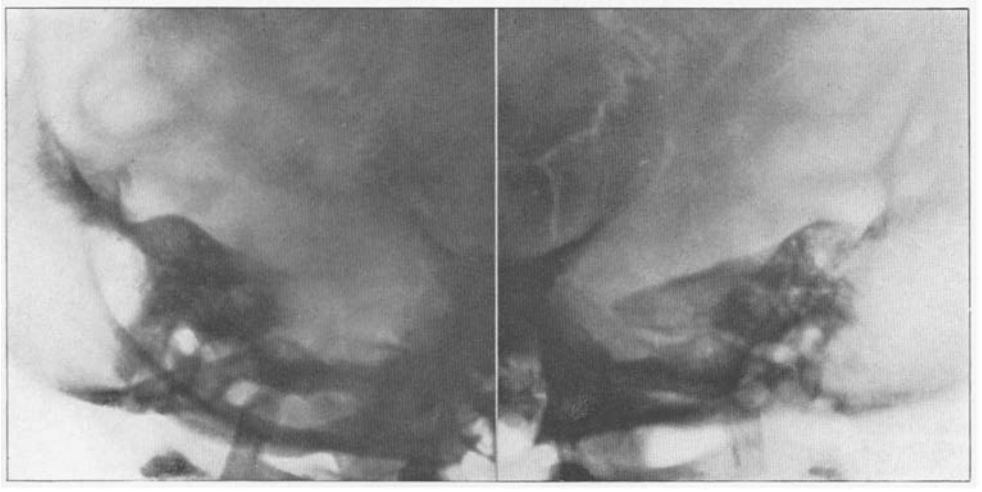


Fig. 3.

D.H., aged 5. Stenvers position: shows decalcification of affected petrous tip seven months after onset of acute otitis media.

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FIG. 4.

M.H., aged 12. Base plate shows rubber tube in track in postero-superior margin of petrous.

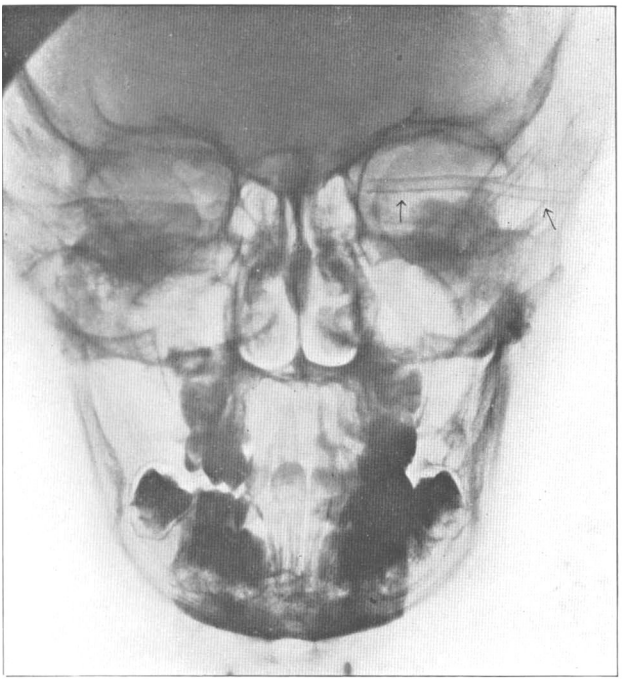


FIG. 5.

M.H., aged 12. Rubber tube in track in postero-superior margin of pyramid, inserted at second exploration of mastoid three months after onset of otitis media.

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But even in chronic otitis media without cholesteatoma I prefer to have a pre-operative radiograph of both sides carried out. The knowledge of the anatomy of the unaffected mastoid gives me considerable help in deciding the life-history of the affected mastoid and of the cell-formation that has probably preceded the sclerosis.

As with the unsatisfactory cortical mastoid operation, so with the unsatisfactory radical mastoid operation, X-ray help is essential. I have met more than one such case and give as an illustration a search for a focus of infection as a cause for attacks of a lethargic type in a woman aged 60. These attacks had begun two years previously; each lasted about forty-eight hours and began suddenly with slowing of thought, speech, and movement, increasing over a few hours to a maximum and then slowly subsiding. They occurred at intervals of rather longer than a month, and in the intervals the patient made a complete recovery. On one side she had had a chronic discharging ear for fifty years, and attention was naturally directed to this as a possible cause. A radical mastoid operation was performed by a colleague, but in spite of this the attacks continued. It was then decided to examine the accessory nasal sinuses as a possible focus of infection and I was asked to see the patient. Examination of the sinuses by the Watson-Williams' technique discovered no septic focus and the attacks persisted. At a later date, when examining the radical mastoid cavity, I observed that the lining membrane of its lower posterior part had become œdematous and this raised a suspicion of unopened tip cells which was confirmed by X-ray. At operation I found the radical cavity only included the upper half of the mastoid and neither the tip cells nor the petrous angle cells had been opened. Following this exploration she had one further attack of lethargy but has remained well for the past three years. In this patient the X-ray examination was of great value in confirming a suspicion of unopened cells and justified a further exploration which has resulted in cure of the patient (Fig. 7, Plate IV).

In the investigation of a patient with aural vertigo we have so far not thought X-ray examination of importance. I would, however, draw attention to the late Dr. Dan McKenzie's case reported in the *Proceedings*, 1935, xxvii., 233-4 (Sect. Otol., 13). In this case a chronic otitis had been present but appeared to be completely dry, yet a radiograph showed an area of decalcification in the region of the superior semicircular canal, suggesting a low-grade osteitis which was at a later date proved by operation. In one case of my own an earlier radiograph would undoubtedly have provided an earlier diagnosis of secondary hypernephroma of the petrous from an unsuspected primary. The patient, a woman aged 60, two days after a right upper canine tooth had been removed had an attack of aural vertigo, associated with considerable pain in the vertex



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and occiput. The vertigo lasted four days. Two months later the pain returned, chiefly around the right ear and, five days later, her vertigo returned. This persisted and was associated with progressive deafness in the right ear, of inner ear type. No improvement in hearing occurred though the symptoms of labyrinthine disturbance subsided. Three months later facial paralysis developed on the side of the deaf ear, and a radiograph showed a large erosion of the petrous pyramid on the same side.

In conclusion I have to thank my colleagues at the Birmingham United Hospital, and especially Dr. Cecil Teall, for their co-operation. Dr. Cecil Teall has been good enough to allow me to use the radiographs illustrating this paper.

Mr. TERENCE CAWTHORNE : X-rays can be successfully employed in both the diagnosis and treatment of ear disease, but as I have had no personal experience of their use as a form of treatment, I shall discuss them only as an aid to diagnosis. I like to be able to form an opinion on the films of my cases, and this is possible only when the exposure, development and the angle from which the films have been taken are those to which I am accustomed. These technical details vary from clinic to clinic and if X-rays are to be made more use of in this country it is essential that a technique of proven merit should be adopted as a standard.

The nature and extent of the cellular development of the mastoid and petrous portions of the temporal bone, the position of the lateral sinus and tegmen tympani, the auditory meatus, the middle-ear cleft and also possibly some details of the labyrinth may be seen in radiographs, not all on one picture, of course, but all the details I have mentioned should be well seen in a series of, at most, four films. The cellular development of the mastoid may vary from complete lack of cells to an elaborate formation extending into the squamous portion of the temporal bone or even to the occipital bone. Fortunately, for purposes of comparison it is usual to find that in any given individual with no history of previous ear trouble, the mastoids are symmetrical. It is interesting to note that certain observers have found that no two individuals possess mastoid processes alike in structure.

And now we come to the most important factor of the mastoid radiograph : how much will it tell us of any pathological process that may be going on within the temporal bone ? This can best be considered under the headings of (1) non-suppurative, and (2) suppurative diseases in which X-rays may be of assistance.

### NON-SUPPURATIVE CONDITIONS

(*a*) A fracture of the base of the skull involving the petrous bone can usually be seen in a radiograph and its position and extent may have some bearing on the prognosis and treatment.



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Plate IV

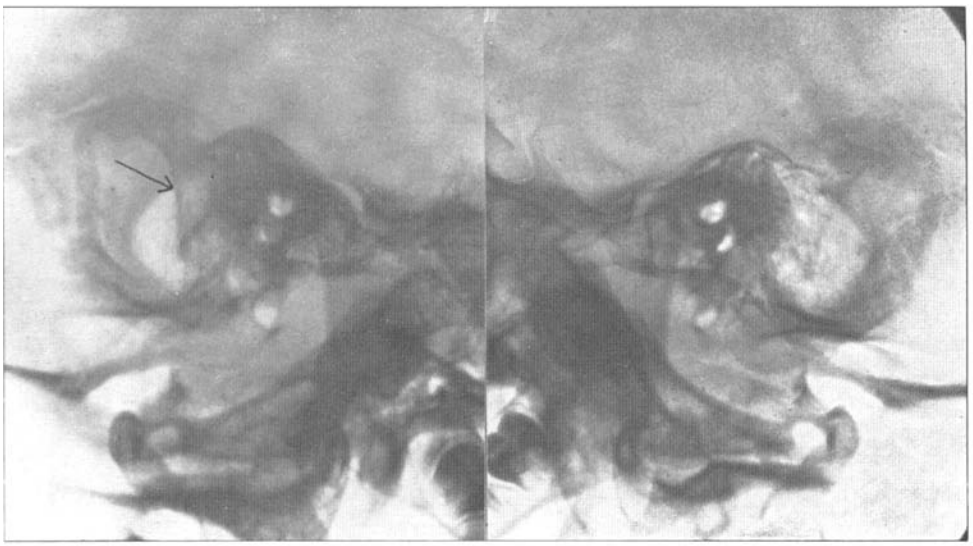


Fig. 6.
B.M., aged 7. Twenty-one days acute unruptured otitis. Pre-operative.

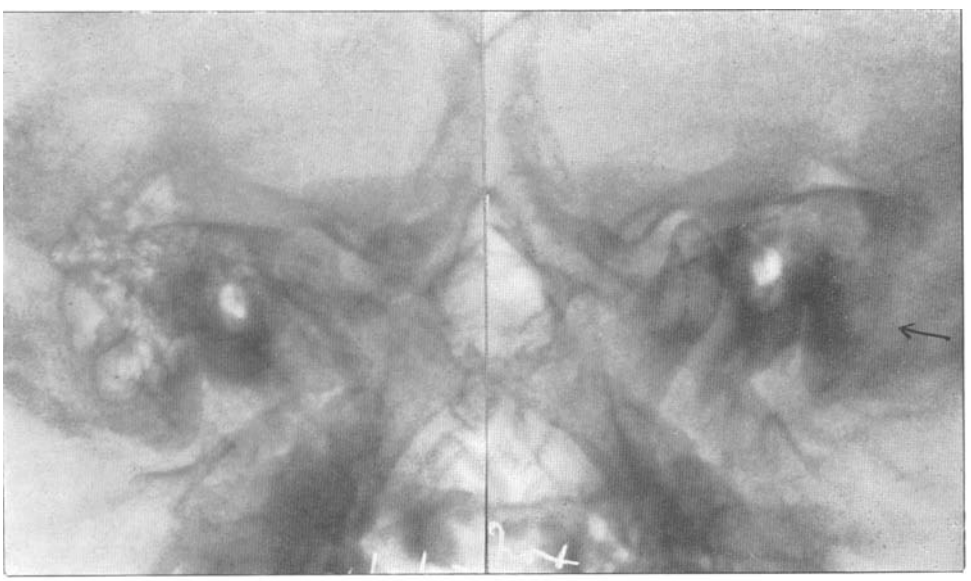


Fig. 7.
Mrs. F., aged 60. Shows unopened mastoid tip cells after radical mastoid operation.

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(*b*) The enlargement of the internal auditory meatus by an VIIIth nerve tumour is a pathognomonic sign and a radiograph should be taken of every suspected case.

(*c*) Chronic progressive deafness may be associated with certain bone diseases such as osteitis deformans and fragilitas ossium whose presence can be confirmed by X-rays.

(*d*) There is a rare group of metabolic diseases classified under the heading of lipoid granulomatosis which may involve the mastoid, and X-rays will help both in the diagnosis and treatment of such cases.

(*e*) The presence and extent of malignant disease in the temporal bone, whether primary or secondary, can be estimated and a radiograph will undoubtedly be of help in determining the correct line of treatment.

(*f*) Dr. Graham Hodgson's beautiful pictures of the labyrinth have demonstrated definite changes in cases of chronic progressive middle ear deafness. The changes he found were those of porosis or rarefaction and not of sclerosis as might be expected from the name of the disease otosclerosis. He found that he could not distinguish radiologically between any of the types of chronic progressive middle-ear deafness, that is to say that all showed a definite change from the normal, but the change was the same whatever the ætiology of the deafness.

(*g*) A negative radiograph may be of great help in excluding the ear in cases of referred aural pain from a tooth, the temporo-mandibular joint or a sinus.

## Suppurative Conditions

The changes which may be seen in the various phases of an aural infection are best described stage by stage:

*Acute otitis media.*—In acute otitis media there is practically always some mild involvement of the mastoid antrum and cells. This takes the form of a hyperæmia and swelling of the mucosa, which in the radiograph shows as a slight cloudiness. The cell-walls, however, appear normal in outline and density. A similar picture is given by well-marked peripheral swellings, such as are seen in furunculosis and post-auricular adenitis.

*Early acute mastoiditis.*—If the disease advances the next step will be an increase in the cloudiness in the cellular system, together with a decrease in the density of the cell-walls which are, however, still intact. This loss of density indicates decalcification which is a precursor to breaking down. Many of these cases get well without operation and if the general symptoms are not severe it is probably wise to postpone operation and await developments. In such a case a further radiograph in three or four days' time may indicate more



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accurately than the general symptoms which way the disease is going.

*Coalescent mastoiditis.*—In more advanced cases, in addition to a diffuse opacity, there may be a loss of cell walls due to coalescence, whilst the outlines of other cells will be blurred and indistinct. This type of case practically always requires operation, and, if left long enough, a defect in the sinus wall or tegmen tympani may be detected, due to perisinus or extradural abscess. In advanced cases of mastoiditis with marked cellular destruction the sinus wall may show up more distinctly owing to the absence of overlying cell-walls. This sign is of especial value in children.

I should like to mention here the work of Dr. Le Mée and Dr. Paul Bernard of Paris, who, at the Hôpital Necker, have been studying the radiological appearances of the normal and pathological temporal bone in children. They found that in the newborn the dense mass of the labyrinth and the sinus wall show up very distinctly. As the growth of the mastoid process proceeds, so these relatively dense structures tend to be obscured by overlying cells. Any destruction of these overlying cells will lead to a reappearance of the infantile landmarks. Reappearance of the labyrinthine mass and sinus wall in a mastoid already pneumatized is a certain sign of mastoiditis.

In most cases, when there has been such extensive destruction of bone, the clinical diagnosis is obvious, but not infrequently, especially in children, this observation may prove to be of great value.

I have had the privilege of seeing Dr. Le Mée's and Dr. Paul Bernard's work in Paris and what impressed me more than anything was the way in which the progress of ear cases was followed carefully both by the otologist and the radiologist, working in close co-operation.

*Post-operative cases.*—If the progress after a mastoid operation is unsatisfactory, a radiograph may reveal unopened and infected cells. Recently much attention has been given to the type of case in which there is infection in a pneumatized petrous apex.

*Chronic suppuration.*—Cases of long-standing chronic suppuration almost invariably show absence of cells. This is considered by many to be due to a sclerosis of bone, but some people feel—and I belong to this group—that the chronic suppuration is more frequently the result than the cause of an acellular mastoid. Erosion of bone in the neighbourhood of the aditus and antrum by cholesteatoma can usually be well demonstrated by X-rays, and in advanced cases erosion of the tegmen tympani or anterior sinus wall may be demonstrated. The changes which I have just described are easily seen in a good film and in doubtful cases radiographs repeated at several days' interval may be of the greatest assistance.



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Having mentioned the possible advantages that may be gained from the employment of X-rays in the diagnosis of ear disease, I think that in order to arrive at a reliable estimate of their real value, it will be as well to consider their limitations.

An X-ray film is a photographic record of varying densities of the tissues through which the rays pass—no more and no less. In the cellular mastoid small changes in density of the cell-walls and the air contents of the cells are usually fairly obvious, but in the diplœtic and acellular mastoid only very marked destructive processes will be apparent. The X-ray picture cannot show whether any variations from the normal are of recent or of long-standing development ; neither can it tell us whether any increasing density is due to changes in the cellular system or to changes in the subcutaneous tissues. Moreover, in many cases in which there are X-ray signs of cellular coalescence, the diagnosis on purely clinical grounds is so obvious that a radiograph may seem to be almost superfluous.

Also, if the X-ray examination is to be carried out carefully and accurately it is one of the most difficult in the whole field of X-ray technique, and the correct interpretation of the film calls for a considerable amount of experience. Whilst this latter cause cannot really be counted as a disadvantage, it undoubtedly constitutes a limitation of its field of usefulness, at any rate at the present moment.

Generally speaking, I think that full advantage is taken of X-rays in the non-suppurative conditions, but I am not so sure that the same thing can be said when we come to the suppurative conditions.

This, I think, is partly due to the fact that the limitations are generally considered to outweigh the advantages, and also partly to a reluctance to relying too much on laboratory and other non-clinical aids in arriving at a diagnosis. This feeling of reluctance is quite right and proper but it should not be allowed to influence us against the employment of any non-clinical aid that is likely to be of real use, and I have no hesitation in saying that an X-ray film in cases of aural suppuration is always of value. It may not and should not be expected to supply us with a diagnosis and it is not intended to act as an indication for operation. It will, however, give us valuable information which we cannot otherwise hope to get, except by operation ; in other words, it will tell us the degree and extent of cellularity of the mastoid, and the relative positions of the sinus, tegmen tympani and mastoid antrum. It may tell us whether the disease is limited to the soft tissues or has attacked the bony structures and, if so, to what extent they are involved. Repeated radiographs during a case of aural suppuration will give us an indication as to how the tissues in the temporal bone are responding.

Increased co-operation between the otologist and radiologist will lead to a greater appreciation of the pathology of aural suppuration.



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This in its turn should lead to greater accuracy of diagnosis and consequently to fewer errors in treatment ; fewer mastoids will be opened unnecessarily and more mastoids will be opened before severe complications arise.

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Dr. M. MITMAN : I shall confine my remarks to radiological changes in the mastoid. To avoid any misunderstanding, I ought to say a few words about the type of case with which I have had to deal. The X-ray department of the North-Eastern Hospital carries out examinations for the whole of the fever service of the London County Council. A large percentage of the mastoids examined were in children suffering from some infectious disease—usually scarlet fever. The majority were cases of suppurative otitis media which failed to clear up in the usual time. The work was first undertaken by my predecessor at the North-Eastern Hospital, Dr. Elspeth Mann. One advantage of the organization at the hospital was that the medical officer who acted as radiologist was also a member of the " ear-team " supervised by Mr. Layton or his assistant. The opportunity was therefore afforded me, not only of seeing the radiographs of all cases examined, but of watching the clinical progress of a number of them.

The radiological changes observed in the mastoid area are mainly three : (1) A loss of definition of the mastoid cells ; (2) an opacity—a diminution in transradiancy—of the cells ; (3) a loss of intercellular septa.

The last, the loss of intercellular septa, is evidence of a destructive process—an osteomyelitis of the mastoid process. The softening and erosion of bone may involve not only the septa but also the anterior wall of the canal for the lateral sinus, particularly in the vicinity of its knee. It indicates a stage of the disease in which recovery without operation is highly improbable or impossible. Therefore, these changes are a definite indication for operation. But in the type of case in which a radiological examination is most frequently requested—the case in which the surgeon wants additional evidence or confirmation of his clinical opinion—this finding is rare, because the change is a relatively late one. In the majority of cases, by the time this change appears, the otologist has ample clinical evidence of the necessity for operation.



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The first two radiological changes I mentioned—the loss of definition and the opacity—produce a veiling or shadowing of the mastoid cells which is the most common pathological change seen in radiographs. This shadowing is not always easy to detect. Fortunately, Nature has arranged that the mastoids on the two sides are practically identical in structure. This permits a comparison of the two sides to be made, and renders the detection of a pathological change on one side much simpler. Where the mastoid cells are well developed—in the pneumatic type of mastoid—even a slight haze may be readily detected. On the other hand, with the infantile and sclerotic types of mastoid, it may be difficult to distinguish even marked pathological changes.

When both sides are involved, this valuable procedure of comparing the suspected ear with its normal fellow is denied to the observer ; he must depend upon his knowledge of the appearances in general. When one remembers the considerable variation in anatomical development, with the resulting variation in the amount of air and bone, in normal mastoids, it is easy to understand that a decision may be difficult in some cases.

Assuming, however, that this veiling or shadowing has been established beyond question, what significance must be attached to it ? In my experience it is *not* pathognomonic of " mastoiditis " in the commonly accepted sense of the term. It is not necessarily evidence of a condition which requires operation, for I have observed the change in every case of suppurative otitis media I have examined. Moreover, I have had the opportunity of observing, or of learning of, the subsequent history of a large percentage of the cases examined, and the majority recover without operation.

If it is true that every case of otitis media is associated with changes in the mastoid which can be distinguished radiologically, the obvious inference is that in every case of otitis media there exists an inflammatory process involving the mucosa of the whole of the middle-ear cleft, from the Eustachian tube to the tip of the mastoid process. In my experience the radiograph does not really differentiate those cases in which the mucosa of the mastoid recovers spontaneously (otitis media) from those in which the pathological changes advance to a stage (mastoiditis) requiring operation. In other words, the changes in the mastoid are of degree and not of kind. This appears to be a conception of the disease which should be clearly expressed in every elementary textbook and which should be known by every medical student.

Mr. SYDNEY SCOTT said that he had found stereoscopic radiographs very valuable, but their usefulness depended on the experience and technique of the radiologist.

Mr. Stirk Adams had asked whether members knew of cases in which X-rays had revealed extradural abscess. He (Mr. Scott) had



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some films which showed a very large unsuspected extradural abscess.

X-rays were especially of value in the diagnosis of suspected latent mastoiditis when the patient seemed neurotic or hyperæsthetic. All members must have met with cases in which they were uncertain whether the signs of excessive tenderness were really due to infection; X-rays had helped to decide whether or not an operation was necessary.

There was also the type of persistent otorrhœa due to necrosis—and by that term he did not mean caries or bone absorption, but necrosed bone surrounded by granulations and pus. Occasionally that could be seen in a skiagram. He had seen such a case recently in a patient who had a sequestration of the semi-circular canals. The sequestrum was removed.

In medico-legal cases, skiagrams were often asked for, and it was well to have them taken whenever there was likely to be any difficulty.

Mr. T. B. LAYTON said it was of interest to note that the descriptions given by Mr. Cawthorne and Dr. Mitman, working from different aspects, appeared to be practically identical, and their conclusions very similar.

He wished particularly to draw attention to Dr. Mitman's work. That work could be traced, in origin, to the late Mr. Arthur Cheatle and to the influence of his name which was the final cause of the installation of the apparatus with which Dr. Mitman had worked. In him was best exemplified that "co-operation between clinician and radiologist" which was so much desired, as he was probably the only person who had both studied the cases clinically and taken the radiograms himself.

He wished to lay stress upon the statement of Dr. Mitman that he had observed a change in the mastoid region in every case of suppurative otitis media that he had examined. He thought that this must change all the preconceived ideas of the otologist with regard to the acute inflammation of the middle-ear cleft. This observed fact did away with the late Mr. Charles Heath's hypothesis as to the various dams which prevented the inflammation from extending. It was upon these that the idea that paracentesis saved the mastoid was based. This radiographical work had given a pathological explanation of the clinical work of Dr. Mitman and other medical officers of the Fever Service of London—that paracentesis did not "save" mastoid operation. But it did more, it changed their whole conception of what was "mastoiditis". If there was involvement of the middle-ear cleft in every case of clinical otitis media, he (the speaker) must have opened many mastoids and found pus in the antrum and in the cells and have thought quite wrongly that the



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patient could not have recovered without this operation. When one opened a mastoid it was impossible to tell pus in the antrum from that which was present in the diplœtic cells or in the osseous tissue itself. In many cases in which he thought he was right in operating on the mastoid, he felt now that the patient would have recovered without the operation. He did not know to-day exactly what was meant pathologically by mastoiditis. It was a clinical term which meant that the patient would not get well without operation. It was not mere suppuration of the mucous membrane. It must be that there was some form of osteomyelitis. Now, was it to be considered that no case of osteomyelitis of any degree of severity would recover in the absence of surgical interference? Inflammation of bone must, in its early stages, be recoverable just as inflammation of any other tissue. Therefore mastoiditis must mean an osteomyelitis which had reached such a stage that it would not recover without operation. He did not think it could yet be said what that stage was, nor how it could be diagnosed.

Let them carry that train of thought farther. There was evidently some stage of osteomyelitis which could recover by itself. In inflammation of soft connective tissues there was a stage when the inflammation was recovered from with induration. Sclerosis was to osseous tissue what induration was to soft tissues. He therefore thought there must be many cases of inflammation of the middle-ear cleft in which there had existed osteomyelitis which had been recovered from sclerosis just as, had soft tissue been attacked there, would have been induration.

He wondered whether that was the explanation of many, possibly of all, dense mastoid bones. He was beginning to think that the normal mastoid was the diplœtic one and that when there had been recurring inflammations of slight type, passing up the middle ear into the mastoid region, this was the cause of the dense bone which was found. Both Mr. Cawthorne and Dr. Mitman had said that in Nature the pattern of the cells on the two sides was practically identical. He (the speaker) used to teach that sometimes both mastoids were dense, sometimes both diplœtic, but that there might be one type on one side, and another kind on the other. He now believed that the explanation was that the dense mastoid, unilateral or bilateral, was the result of some pathological condition having been in progress. That brought one back to Mr. Arthur Cheatle because Mr. Cawthorne had said that, in his opinion, chronic suppuration was the result rather than the cause of the acellular mastoid. He believed that it was Mr. Cheatle's teaching that it was the dense mastoids which went on to chronic suppuration. As the result of radiography he (Mr. Layton) now thought it was chronic suppuration on top of other minor attacks of inflammation which was the cause of the mastoid bone becoming dense.



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Mr. WATKYN-THOMAS said that a point which was germane to the discussion was the value of the radiogram in otitis mucosus. He would like to hear more on that subject, and especially as to what extent one encountered an early breakdown of bone in that condition. In many of the cases seen the disease had gone very far indeed before much destruction of bone had occurred.

Mr. HERBERT TILLEY said that he agreed with Mr. Layton's views with regard to osteomyelitis of the mastoid cells, and the same pathological processes could be observed in the nasal air-cells, e.g. a frontal sinus might be almost entirely obliterated by osteogenetic thickening due to a prolonged and mild pathological stimulus (*vide* Skillern, *Trans. Am. Laryrng. Ass.*, 1935, p. 158) or its walls destroyed by an acute or subacute spreading osteomyelitis.

He (Mr. Tilley) would stress the necessity for caution even when evaluating excellent radiograms of the temporal bones. One of his own patients who suffered from severe tinnitus in the left ear was advised by one of his medical friends to " have an X-ray examination ". The skiagram was then seen by a cranial surgeon, who concluded that " the case should be watched "—because of a small dark area on the upper surface of the petrous bone in question. The patient took this to mean the possibility of graver issues, and being a highly intelligent man holding a responsible position, he passed through many weeks of great and unnecessary anxiety.

Similar experiences in the wider fields of pathology went to prove that while radiography was, more often than not, an invaluable servant, it might be a dangerous master if allowed to dominate a clinical diagnosis based on the history and nature of the patient's symptoms.

Mr. SOMERVILLE HASTINGS agreed with all that Mr. Layton had said. He was sure that some of the cases which were diagnosed as cases of mastoid disease, and which in the ordinary way would be operated upon, might recover by themselves if left alone. Many years ago a woman had come to his out-patient department with a temperature of 103° F., and every possible symptom of mastoid disease. When he told her the condition was very dangerous she said she would risk it. Three months later she was well, and was good enough to come back and show herself and prove that he had been wrong.

Mr. Mitman had shown that when there was a markedly opaque mastoid with diminished translucency and bone trabeculae intact, it did not of necessity indicate a need for operation. But if the bone trabeculae were lost to any extent it suggested that there was absorption of bone at that site, and therefore also, in all probability, of bone leading into the cranium. In such cases he (the speaker) would almost invariably operate. He was speaking here of the risk to life only and not of the risk to hearing. When the bony trabeculae



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were disappearing he was usually prepared to operate, even in cases in which, without that, he would have been inclined to leave well alone.

Mr. MICHAEL VLASTO said he would like to draw attention to the investigations on otitis media due to *Pneumococcus mucosus* carried out in this country by Mr. I. Vitensen, and published in the *British Medical Journal* in 1933, i., 651. The insidious and malignant nature of this type of infection made it imperative to use every possible means to try to determine what pathological changes—if any—were occurring in the mastoid bone. Although it was true that in some cases the interpretations of radiograms were subsequently confirmed by the clinical and operative findings, it was also true that in some cases there was a definite discrepancy. Improvement in the radiographic technique and study of interpretation might alter this balance. Nevertheless, he felt that the time had not yet arrived when the information derived from X-rays was going to take precedence over the clinical appreciation of a case of suspected osteomyelitis of the mastoid.

Mr. C. HAMBLEN THOMAS said that if clearer pictures could be supplied by a definite technique, so that they were comparable with each other, they would be a helpful guide in estimating the amount of disease present in an ear. One should not be satisfied that the mastoid was the same on both sides in the normal person. He had under his care a neurasthenic girl who had complained of pain in one ear. The physician had sent her for X-ray examination. There seemed to be some sclerosis in the mastoid on the side complained of, but there had been no symptoms referable to the ear. She recovered from the discomfort in the ear, and then had pain in a frontal sinus; she then appeared to forget that, and complained of pain in the other ear. She was kept under observation for some time and no infection of the sinuses or of the mastoids developed, yet the X-ray pictures of the two sides differed and one might have been led astray by that radiological difference.

Mr. H. V. FORSTER said that a Continental otologist, Van Voorthuysen,* had on two occasions written of the possible therapeutic effect even of photographic X-ray exposure in apicitis.

Mr. T. A. CLARKE asked Dr. Mitman what conclusions were to be drawn from his work. He had stated that all cases of acute middle-ear suppuration showed radiographic changes in the mastoids, but in most of these cases the condition subsided without operation. Some cases gave X-ray evidence (destruction of intercellular septa) of the necessity for operation, but in these clinical evidence of the necessity was already apparent. It would appear, then, that X-rays

* *Acta Oto-Laryngologica*, 1934-5, xxi., 190; 1932-3, xviii., 265.



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had no clinical value; did Dr. Mitman intend to discontinue the work?

Mr. BROUGHTON BARNES said that when mastoid signs existed one was clinically aware of them usually before there was X-ray evidence. There might be clinical evidence in a case that a mastoid operation was needed, and if on opening it was found that pus existed under pressure without necrosis of bone, that fact was a justification for the operation. Even though occasionally a patient who refused operation recovered—so escaping the usual serious consequences—that was not evidence that the policy in general was wrong.

Mr. HAROLD KISCH (President) said that it was valuable to have a correlation of the clinical with the radiological findings in these cases.

In cases of otitis media there was usually tenderness over the antrum; tenderness over the mastoid process indicated necrosis in the region of the mastoid bone. In an epidemic of mastoiditis there were six cases of post-aural œdema with no beds available, and he was prompted to make an incision through the periosteum to relieve tension, as an ordinary surgeon would for periosteitis; in four of the cases pus was evacuated but only two came to mastoidectomy.

Mr. STIRK ADAMS (in reply) said that the proportion of mucosus otitis met with in his practice was small, yet he felt that the knowledge that a radiograph could show such extensive decalcification of the mastoid in the early stages of the infection was of exceptional importance and justified more frequent use of X-rays in diagnosis at this stage.

He had hoped to hear more from Members of the therapeutic value of X-ray exposures in the treatment of acute mastoiditis. W. P. Cherniak and A. A. Gorodetzky had published an article in the *Journal of Laryngology and Otology*, 1934, claiming that resolution of the infection had occurred in a large proportion of patients suffering from clinical mastoiditis as a result of this treatment. Yet to show the necessity for care in selecting the patient for this treatment, he would report a case of his own met with immediately after this article had been published. The patient was a nurse in his own hospital, who had not reported an acute otitis media for twenty-four hours. Paracentesis was immediately performed yet symptoms of otitic bacteræmia immediately supervened, with a continuous temperature of 104° F. for three days, associated with an acutely tender mastoid. At operation on the third day the periosteum over the mastoid bled very freely, but the whole of the mastoid process was avascular and its pneumatic cells were filled with a blackish grey fluid. In the mastoid antrum the membrane on the deep wall bled profusely. His reading of that case was of a severe infection which had passed through the mastoid within forty-eight hours, leaving a



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necrosis of all soft tissue and bone in the mastoid. X-ray therapy in such a case would have been a matter of lasting regret.

Dr. MITMAN (in reply) said that he could not be held responsible for any therapeutic disagreement which members might have as a result of his remarks. All he had said was that in every case of otitis media he had found changes in the mastoid which he attributed to changes in the mucosa and that the patients in such cases could recover without operation on the mastoid.

With regard to early changes in measles, a paper would be published shortly by the L.C.C. in its *Annual Report on Measles*, concerning routine examinations of the drumheads in this disease, by one of the medical officers, and he would not attempt to anticipate this report.

He did not deny that radiography had some value in disease of the mastoid; it gave additional information which must be taken in conjunction with the rest of the clinical picture. It was of particular value in excluding infections of the middle ear, e.g. in cases of external otitis—in which there might be doubt as to whether the middle ear or the mastoid was infected. X-rays might show that there was no change in the mastoid process, and in those cases one could say that there was no infection of the middle ear and that the condition was external.

# ABSTRACTS

## EAR

*Fistula Sign on Catheterization.* ERNST URBANTSCHITSCH. (*Monatsschrift für Ohrenheilkunde*, lxx., 1936, 724.)

A case is described in which catheterization of the right ear produced a brisk nystagmus to that side with vertigo and falling to the left.

The patient, a 38-year-old waiter, had complained of deafness for eighteen years, tinnitus for six months and attacks of vertigo for four to six weeks. The last symptom was accompanied by nausea and sensation of rotation.

Examination revealed dry chronic middle-ear catarrh; no spontaneous nystagmus and no fistula sign on compression and rarefaction of air in the meatus. Wassermann reaction negative. Catheterization of left ear,—no nystagmus.

As the direction of the nystagmus was homolateral, it could not be due to the injection of cold air producing a caloric reaction. A definite explanation of the phenomenon is impossible, but it might be due to a dehiscence in the bony capsule of the inner ear.

DEREK BROWN KELLY.



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