SUMMARY

My conclusions are that dislocation of the patella is predisposed by the erect posture and may be due to imperfect development of a recently acquired function of the quadriceps. It results from an abnormality which may be present in: (1) the muscle itself; (2) the articular surface of the femur; (3) the attachment of the patellar tendon to the tibia.

A satisfactory and simple method of correcting this is to displace the muscle and its tendon inwards and to transplant the tibial tuberosity in such a way that the patella is brought down below its normal position. This ensures stability and enables the quadriceps to work with the maximum of efficiency.

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TREATMENT OF CHRONIC SUPPURATIVE DISEASE OF THE MIDDLE EAR *

BY

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I have chosen the subject of the chronically discharging ear for a number of reasons. First of all this is a common disease. In many cases it resists all forms of treatment, and runs its course, not for months, but for years, and a chronic discharge inevitably leads to disability in the shape of hearing—a disability which, in certain cases, becomes profound. Moreover, although intracranial complications are comparatively rare, yet they do arise, and make up for their infrequency by the high rate of mortality.

There is still another reason why I have chosen this subject, and it is that treatment is apt to become stereotyped. We rely on one or two forms of drops, or, alternatively, a course of syringing. Both may be completely inefficient. In this disease treatment must be adapted to the particular case. Each ear has to be separately studied, and an attempt has to be made in every instance to determine the various causes of the chronicity.

THE MIDDLE-EAR CLEFT

The "middle ear" must be understood to include the whole of the middle-ear cleft, which starts in the nasopharynx, runs up the Eustachian tube, enters the middle ear or tympanum proper, invades the upper regions of that cavity which is known as the attic, and from there leads upward through a small tunnel or aditus into the mastoid antrum. From the antrum, in the majority of cases, open numerous air cells which extend throughout the temporal bone and carry the infection to the neighbouring portions of the cranium, to the meninges of the middle and posterior fossae, to the cerebrum and cerebellum, and to the venous sinuses. The nasopharynx, Eustachian tube, attic, aditus, antrum, and air cells are lined throughout by one continuous membrane. The mucous membrane, it is true, differs in different parts—for example, in the Eustachian tubes and in the interior of the tympanum itself it is rich in mucus-secreting glands, whereas in the posterior part of the

tympanum, in the mastoid antrum, and in the air cells, it is thin and deficient in glands.

In a case of chronic discharge from the middle ear, it is necessary to determine in which part of the middle-ear cleft lies the origin of the chronicity. For example, if the cause is in the nasopharynx—perhaps, an infected pad of adenoids—the treatment will have to be aimed at this. If, on the other hand, the condition is due to an osteomyelitis involving the mastoid process, and mastoid antrum and air cells, the removal of adenoids will be of no benefit, and treatment will have to consist of some form of mastoid operation.

SITES OF INFECTION IN CHRONIC OTITIS

I want to describe five typical situations, with the differential diagnosis of each. I shall deal, first, with a chronic discharging ear following a recurrent infection of the nasopharynx; secondly, with a discharging ear due to chronic infection of the mastoid antrum and air cells; thirdly, with a case in which the bulk of the disease lies chiefly in the region of the attic; fourthly, where the tympanum itself bears the brunt of the trouble; and, fifthly, where there is gross involvement of the whole of the middle-ear cleft. Each situation gives a perfectly clear and distinct clinical picture, and the majority of discharging ears can be placed definitely in one or other of these five classes.

FOCUS IN THE NASOPHARYNX

In the first group a focus of infection in the nose or throat leads to a recurrent infection of the Eustachian tubes and of the middle ear. A typical history is that of a recurrent discharge in a child, usually starting with a cold or sore throat. This is quickly followed by an attack of pain in the ear. If this is the first attack, the pain is frequently severe and lasts a few hours or even one or two days. In the untreated cases relief is finally obtained when the drum gives way before the accumulated pus in the middle ear, and a free discharge passes into the meatus. If the attack is one of a series, the pain in the ear is often slight—even absent—and of short duration. The drum, which has been ruptured before and has healed over with a thin scar, easily gives way, and the discharge starts with corresponding ease. After the ear has discharged the patient is relieved, the pain subsides, the temperature—which has been high at the onset—soon returns to normal, and the child recovers from the acute phase.

The character of the discharge, as well as the history, helps in forming the diagnosis. I have already mentioned that the mucous membrane of the Eustachian tubes is rich in mucous glands. A discharge which is due to infection of the tubes is consequently mucous and, later, muco-purulent. It is thick and sticky, adhesive and tenacious, and can be pulled out in long strands from the meatus. The site of the perforation, determined by a careful examination, is diagnostic. The external auditory meatus is mopped out. (If there is difficulty in getting a clear view by this method, a little gentle syringing will do no harm.) After the drum has been cleansed, the perforation is seen anteriorly, and generally in the lower part. It varies in size from a pin's head to a perforation involving half the drum. When the perforation has been clearly defined the patient is made to inflate the Eustachian tube by holding the nose, closing the mouth, and blowing down. This will blow up bubbles of mucus from the tube into the middle ear, and these will pass through the perforation, giving clear evidence of the source of the discharge. The duration of the attack varies considerably. If the child is otherwise healthy and in good condition the discharge may dry up entirely in a few days. The perforation heals over quickly, and

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often so perfectly that even on close examination the resultant scar will be missed. On the other hand, if the child is weak, debilitated, and living in poor surroundings, the discharge will drag on a weary course for weeks or months before it finally ceases. In either case it is only a question of time until the child gets the next cold, and infection is once more carried up the Eustachian tubes.

So here there is a very clear clinical picture—a recurrent discharging ear, starting with a cold or sore throat, followed by pain in the ear, then by discharge, and running a course of a few days or a few weeks. The discharge then dries up, and the drum heals over—all ready for the next cold and the next attack of earache.

Treatment

Local treatment consists in keeping the ear clean, the discharge being wiped out at frequent intervals, either by mopping or by gentle syringing. The inflamed mucous membrane is soothed by the application of glycerin acid carbolic drops, and care is taken that the presence of discharge in the meatus does not lead to an eczematous infection of the skin round the concha. The original focus of infection in the nose or throat must be dealt with, and tonsils and adenoids, if infected, must be removed. Infected nasal sinuses should be opened and drained, for, without this, recurrence of the discharge is almost inevitable.

MASTOID ANTRUM AND AIR CELLS

When the cause of a chronic discharging ear lies in this region the history is one of a persistent middle-ear discharge, which runs on for weeks or for months, until there comes a time when, for some reason or other, blockage occurs. The pus which is escaping from the mastoid antrum and air cells has to reach the middle ear by flowing through the narrow aditus. It is here that the blockage takes place. When drainage has stopped the patient complains of pain in the ear, and often of an aching, deep-seated pain behind the ear. On examination, pressure over the antrum and the mastoid process elicits tenderness. Again, the pain lasts a variable time—a few hours or a day or two—and is relieved by the re-establishment of drainage. The dam formed in the aditus gives way, there is a free flow of pus from the middle ear, the temperature subsides, and the acute attack is over. The mastoid antrum has no mucus-secreting glands. The discharge, then, from this type of case is purulent, and has not the stringy, sticky, mucous character of the Eustachian infection. Examination of the ear completes the diagnosis. As might be expected, the perforation is situated on the opposite pole of the drum from the perforation of a recurrent Eustachian infection. In other words, it is a posterior perforation, involving mostly the upper half of the drum. The ear must be mopped free of all discharge, and the existence of pus in the antrum determined by means of a suction speculum. This is inserted into the ear, and suction is applied by means of an attached rubber tube: through the lens the pus can be observed slowly trickling down from the region of the aditus, coming from the antral reservoir, and welling into the external meatus.

Treatment

I am not going to say any more about local measures, which are essentially the same as I have already detailed. The correct treatment is an operation which drains the mastoid antrum and its attached air cells—such an operation is a simple cortical mastoid through an incision over the mastoid process. The outer layer of the bone is removed, the mastoid antrum opened up, and the whole of the mastoid area searched for all infected cells.

The mastoid process is drained through the original wound while the whole of the middle ear is left intact. If drainage is thorough and complete, discharge from the ear dries up quickly, and the posterior wound is gradually allowed to close.

INFECTION OF THE ATTIC

The third type of case, in which the disease is confined principally to the region of the attic, is much rarer than either of the two preceding ones. It is more chronic, and is difficult to treat by conservative measures. There is a history of continuous aural discharge for years, without cessation of any kind at all and without such incidents as pain or acute attacks. The discharge is usually thin and watery in character, and is associated with exfoliation and an eczematous condition of the meatus and concha.

Examination of the drum shows a typical perforation. The whole of the true drum is intact, but through Shrapnell's membrane there is a small pin-head perforation which leads down through a fistulous track to the region of the attic. Occasionally this perforation is enlarged to include part of the bony outer attic wall, and in this case there is usually a small amount of cholesteatomatous debris to be seen lying within the attic. One other variation is fairly common—the presence of a sentinel polypus growing from the eroded edge of the perforation through the bony attic wall. The polypus is usually small, friable, and very easily removed. In spite of the long duration of the discharge, the patient's hearing in that ear is still very good—a whisper may often be heard at a distance of several feet. This type of suppuration is also frequently associated with the sclerotic type of mastoid, in which the antrum is small and there are no adjoining air cells.

Treatment

It is obvious that substances introduced through the meatus in the ordinary way have little or no chance of penetrating to the tiny fistulous perforation. They merely lie on the surface of the intact drum and are useful only for cleansing purposes. The problem is how to lay open this fistulous track to obtain healing, without, at the same time, doing damage to the intact drum, with the consequent diminution of hearing in that ear. The best method of attack is by operation, and for this purpose the epi-tympano-mastoid operation has been devised. This consists in opening up the mastoid antrum in exactly the same way as for the ordinary cortical mastoid operation. The cartilaginous meatus is pushed forward to expose the tympanic membrane and the outer attic wall. The bridge which roofs the aditus is broken down, and the bony outer attic wall is slowly and carefully chiselled away: the ligaments supporting the hammer and the tympanic membrane must be left intact. Shrapnell's membrane and the bony outer attic wall are removed, so that the whole of the region of the attic is laid open. The cholesteatomatous debris is syringed out from the attic, the posterior wound is completely closed, and the cavity is drained into the meatus. This operation requires care in the performance. The results are good in the majority of cases: the opening which has been made into the attic cicatrizes over, the discharge dries up, and the hearing—which is the important thing after all—remains practically the same as before the operation.

The Sentinel Polypus

Not all polypi are safe to remove, but this one, growing as it does from the outer attic wall, is away from all danger points, and can be taken away with impunity. It is soft and friable, and has a very narrow base of attachment, which can be easily broken through by

pressure with a probe covered with cotton-wool—a practically painless procedure, which can be carried out in children under a local anaesthetic. After the polypus has been removed the stump of attachment should be touched with a drop of 50 per cent. silver nitrate. The simple treatment of the polypus in this manner, in children at any rate, usually leads to an immediate drying up of the discharge, and I have therefore come to look upon the presence of polypus (in these cases only) as a favourable prognostic sign.

DISEASE OF THE TYMPANUM

In the fourth type of case the disease is limited to the middle ear or tympanum itself. There is frequently a history of an ear which has been the site of a recurrent Eustachian infection, the source of which has been cleared up; but discharge continues from the swollen, infected mucous membrane of the tympanum. It has no bad odour, but annoys by its persistence. Examination of the ear shows a central perforation of the drum—that is to say, it involves the membranous part of the drum only, and does not encroach on the bony tympanic ring at any point. I do not mean that the perforation is small: it may involve a very large part of the drum. The mucous membrane of the inner wall of the middle ear can be seen through the perforation, and is usually oedematous, juicy, and succulent. Care over a long period (drops and keeping the ear clean) usually leads to a cure. It is, however, extremely difficult to teach the patient to keep his ear clean, and economic considerations prevent daily visits to a doctor.

Treatment

It is in this type of case that we have in ionization a most powerful ally. Ionizing an ear is a process which is easily performed. The ear is first of all scrupulously cleaned by syringing or mopping and by sucking away the last vestige of discharge from the middle ear by means of a suction speculum. The middle ear and external meatus is then filled to the top with a zinc sulphate solution. Into this pool is introduced a vulcanite speculum, down the centre of which runs a metal electrode. The electrode is attached to a positive pole, the negative pole being attached to a flat electrode applied to an arm or leg. A current of from two to three milliamperes is passed for ten to fifteen minutes. The whole process is completely painless, and can be carried out in very young children without the slightest trouble. Care is required in working up the strength of the current slowly to the maximum to be used, and similarly at the end of the time in decreasing the current equally slowly. Any quick alteration in the strength of the current will produce giddiness and sickness, due to stimulation of the semi-circular canals. When it occurs, it is best dealt with by making the patient lie flat and quiet. It passes off in about a quarter of an hour. For this reason ionization should never be tried in a case in which there is a well-marked history of giddiness, as there may be an erosion present involving the wall of the inner ear and rendering the patient particularly susceptible to such attacks. I have also found it is not without risk to ionize an ear in which there are any acute inflammatory signs, as I think they have become more marked after treatment. With these exceptions ionizing is without risk, and when it is applied to the special type of case which I have described the results are excellent. With one or two applications the discharge dries up entirely. It has the great advantage of taking the treatment out of the hands of the patient and his home, where it is usually very inefficiently carried out, for after ionizing no treatment at all is required until the ear is inspected again at the end of two or three days.

MASSIVE INFECTION OF MIDDLE-EAR CLEFT

There is usually a history of a profuse purulent discharge, continuous, often blood-stained, and almost always foul-smelling. Acute attacks are common throughout the disease, bringing with them pain and headache, associated with slight rise of temperature and tenderness over the mastoid. This is a type of ear in which we have to beware of extensions to the inner ear and the intracranial structures. Examination in such a case usually shows gross destruction of the drum, with only the remains of a hammer handle adherent to the inner wall of the middle ear and surrounded by granulations or polypi. The bony tympanic ring, and even the bony wall of the external meatus, are frequently eroded, and the presence of white, foul-smelling flakes of cholesteatomata is common.

Treatment

The great problem is how to treat the condition so as to dry up the discharge completely. This, it should be said at once, is impossible in a certain proportion of cases. It is quite obvious, surely, that for an operation to have any chance of success it must clear out the chronically infected mastoid process, and also deal with the middle ear and the disintegrated ossicles—in other words, a radical mastoid, which lays open the tympanum, the attic, and the mastoid antrum into one cavity, and removes the remnants of the drum and the disintegrated ossicles.

There would be a perfectly clear-cut indication for operation but for one or two stumbling-blocks. The first is the all-important question of hearing. It is amazing how much destruction of the drum and middle ear can be present with the retention of a very acute degree of hearing. As a rule, it may be stated that the performance of a radical mastoid will lessen the power of hearing in a case in which this is good. And, further, even in the hands of the most expert operator, there is not anything like 100 per cent. cures following a radical mastoid. In a large proportion of cases (I should put it at from 20 to 30 per cent.) a certain amount of discharge persists after the most carefully performed operation. This is due to a variety of factors, the chief among them being the difficulty and danger of too thorough removal of disease in the middle ear itself, the danger of exposing and injuring the facial nerve or of carrying infection to the inner ear, and the difficulty in obtaining closure of the Eustachian tube. So here we have the problem of a chronically discharging ear in which a most carefully planned and executed operation can promise a complete cure only in 70 per cent. of cases, and in which there is also a certain loss of hearing following the operation.

Clear indications for operation are: (1) evidence of impending involvement of the inner ear, given by attacks of giddiness or the presence of a fistula; (2) symptoms of intracranial involvement, such as persistent and severe headaches; (3) frequent recurrence of acute exacerbations with temperature and attacks of pain; (4) signs of involvement of the facial nerve; and (5) evidence of a progressive bony necrosis, as shown by the rapid and frequent recurrence of granulations and polypi following removal. When any of these indications are present, a radical mastoid has to be performed.

CONCLUSION

Finally, I should like to add a word about preventive treatment. It is, I am sure, by preventive treatment that the problem is ultimately going to be solved. In most cases of chronic middle-ear suppuration there are two factors which stand out clearly. The first is that the most persistent forms of chronic discharge are directly traceable to the infectious fevers of childhood—measles,

scarlet fever, and diphtheria. Is it too much to hope that immunizing methods on the lines already introduced in the case of scarlet fever and diphtheria will eventually abolish these diseases, and at one stroke remove a large percentage of the worst type of discharging ear? The second factor is this: Chronic discharge of the middle ear is a disease of the poorer classes. It is a disease which is fostered by poor feeding and bad housing. Many an ear which has failed to respond to all methods of treatment has dried up entirely when the unfortunate child is removed from his own surroundings and sent to a convalescent home in the country or seaside for three to six months. Unfortunately economic conditions prevent the parent from keeping him in decent surroundings, and when the child returns home it is only a question of a few weeks before the discharge recurs.

THE SIGNIFICANCE OF URINARY "PROTEOSE" IN IDIOPATHIC EPILEPSY

BY

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Of recent years idiopathic epilepsy has come less and less to be looked upon as a disease of the brain and has become to be considered a symptom-complex with cerebral and nervous manifestations. With this changed outlook it is natural that various theories of extracranial causation should have been more or less completely investigated.

AETIOLOGY

The most widely accepted hypothesis of the causation of epileptic fits is that which postulates the presence of some convulsant toxin in the circulating blood. Much experimental work has been done to demonstrate the plausibility of this, and fits closely resembling, if not identical with, those found in clinical epilepsy have been produced by the administration of various toxic substances. Magnan,¹ one of the earliest workers in this line of approach, produced fits, both in human beings and in dogs, by oral administration and intravenous injections of absinthe, while Rhoeber² and others produced similar results with picrotoxin. Purkinje succeeded in obtaining epileptiform fits in himself by taking appropriate doses of camphor, and Muskens³ and others have carried out extensive experiments on the fits produced by camphor monobromide.

The conclusion reached by all the observers was that the fit was a direct response to the presence of the particular poison in the circulating blood. It was a normal physiological response, the result being to "discharge" the animal for the time being—probably by breaking down the toxic material to some innocuous substance. Thus Wiedemann⁴ found that when recovery took place from the epileptiform fits produced by camphor, all the camphor was excreted in the harmless form of uramido-camphoglycuronic acid and camphoglycuronic acid, and he considered that the fits themselves had caused this breakdown.

All this work, though of considerable value from the point of view of pure science, in the demonstration of the exact nature of myoclonic reflexes threw no light on the actual causation of true epilepsy.

Periodically observers (particularly Pagniez, Mouzon, and Turpin⁵) have reported that they have withdrawn the blood from epileptics during fits and have injected this into normal people, producing in them convulsions. This seems to support the hypothesis of a circulating con-

vulsant, but Goodall⁶ and others, working at the Cardiff City Mental Hospital, report that they have been unable to demonstrate the toxicity of either the blood or cerebrospinal fluid in epilepsy or in psychotic conditions. On the other hand, Loewe⁷ has stated that he has been able to extract from the urine of epileptics an insoluble adialysate which, when injected intravenously, was capable of producing convulsions identical with those of epilepsy, though an adialysate similarly prepared from the urine of normal people proved non-toxic.

To explain the periodicity of epileptic fits and the production of an endogenous convulsant poison various views have been brought forward, and many observers consider that the disease should be grouped with migraine and asthma as an allergic manifestation. In 1924 Collier⁸ suggested that epilepsy was probably a metabolic dyscrasia, and cited reports of good results obtained by removing the blood from epileptics and attempting to desensitize the patients to their own serum—presumably on the assumption that it contained some fit-producing material (see above). On the other hand Worster-Drought⁹ reported that, working on the idea of the supposed relationship between epilepsy and asthma, he had carried out a series of cutaneous reactions for protein sensitization with common food extracts on forty cases of idiopathic epilepsy, and had failed to obtain a single positive reaction.

ACCOUNT OF INVESTIGATION

In view of these conflicting results it was decided to carry out certain tests on the epileptics in this hospital.

Favourable results having been reported in the district on the treatment of cases of asthma and migraine by injection of "urinary proteose" as recommended by Oriel and Barber,^{10, 11} it was decided as a preliminary to examine the urine of epileptics for the presence of these substances. Sixty-eight unselected cases were taken and all treatment temporarily stopped. The urine was tested, and in forty-eight cases (71 per cent.) "proteose" was found to be present; in 47 per cent. of these it was found to be present in considerable amounts. It was decided that no useful purpose would be served at this stage in attempting to estimate the amount quantitatively. Urine specimens were next taken and actual specimens of the "proteose" extracted by the method recommended by Oriel.¹² The so-called "proteose" we found to be a greyish-white powder, insoluble in water or ethyl alcohol, but readily soluble in ether. Fresh specimens, it was found, dissolved rapidly in decinormal sodium hydroxide, though specimens that had been kept for two or three days dissolved less easily, probably indicating that they had undergone some chemical or physical change. Solutions were made in decinormal sodium hydroxide and subjected to various chemical tests. Consistently negative results were obtained with Millon's test, the biuret and xanthoproteic reactions, to which positive results were reported in all cases by Barber and Oriel in the urinary "proteose" of asthmatics.¹¹

Ten epileptics were next taken and, all treatment having been stopped, urine specimens were collected and extracted, the resulting "proteose" being made up into sterile solutions at dilutions of 1 in 10, 1 in 100, and 1 in 1,000. Into the anterior aspect of the forearm of each case 0.1 c.cm. of a 1 in 1,000 solution of the patient's own "proteose" was injected intradermally; while into the other arm a corresponding volume of similarly diluted caustic soda was injected as a control. The arms were examined every ten minutes for an hour, and then at half-hourly intervals for four hours. In all cases a slight area of erythema rapidly developed round the site of inoculation, but in no case was any characteristic wheal produced indicating hypersensitivity towards the injected material, and in no case was the erythema more marked in the