may readily arise in death certification as between abdominal and meningeal tuberculosis, both of which may be manifestations of a generalized tuberculous infection.

It is clear that some powerful protective influence has been at work, the nature of which can only be surmised. As regards abdominal tuberculosis, this affection has become more difficult to recognize and more amenable to treatment, while tuberculosis of the glands of the neck, also regarded as mostly a product of the bovine bacillus, has markedly declined in incidence and severity. This reduction in bovine infections cannot be definitely ascribed to any particular underlying cause, but, in the absence of a satisfactory alternative explanation, it appears to me that pasteurization should be included among the likely factors and that public health administration should, for this reason, support the efficient pasteurization of ordinary market milk, excluding, of course, the designated milks from duly attested and inspected herds.

There is, however, another and highly important aspect of the matter, namely, the relative value of raw and heated milk as an article of food especially for children. Little is known about the chemical changes which take place in milk heated to comparatively low temperatures, although certain suggestive observations have been made indicating that pasteurization may assail the delicate nutritive qualities of raw milk to a material degree, and that fresh milk of high quality from accredited herds is best for young children. Such evidence as exists is conflicting, but should it be clearly demonstrated that pasteurization deprives milk of an essential constituent, there will arise the question of a radical change of policy in milk distribution in the interests of the young.

In conclusion, the systematic pasteurization of ordinary market milk intended for consumption in large urban areas is, in my opinion, unavoidable under present conditions where milk is collected and mixed from widely scattered and varied sources, not under such scrupulous control as to eliminate the risk of chance infections—a danger which experience shows to be very real. It is difficult to resist the view, which is supported by experimental evidence, that efficient pasteurization is of real protective value against bovine tuberculosis, and that this practice could not be dispensed with until tuberculosis in dairy herds has been reduced to a minimum.

THE EARLY DIAGNOSIS OF INFECTIVE LATERAL SINUS THROMBOSIS.*

BY

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INFECTIVE lateral sinus thrombosis has for many years been one of the most dreaded complications of suppurative middle ear and mastoid antrum disease. The very high mortality resulting from this condition has of late years been largely reduced owing to the gradually increasing knowledge of the earlier symptoms and consequent earlier surgical intervention, so much so that the prognosis may now be said to be distinctly favourable in all cases of operation previous to the breaking up of the infected clot.

I have thoroughly examined the notes of the last hundred cases recorded at the London Hospital, and it is remarkable how seldom I have found the more serious or later symptoms, such as rigors and alterations of the central nervous system, mentioned in the notes of the more recent cases; the mortality also has dropped over 50 per cent. in the last ten years. It is therefore of the greatest importance to the patient that the earliest symptoms should be most carefully investigated.

Of the 100 cases, 44 were associated with acute aural conditions (six months being taken as the acute period) and 56 with chronic suppurative aural conditions. Six of these cases were admitted to and eventually diagnosed in the medical wards, and one remained undiscovered till the post-mortem examination. The admission diagnoses were pneu-

monia 2, pyrexia of unknown origin 3, typhoid 1, and septicaemia.

It appears that children are more liable than adults, in the proportion of three to one, and males than females in the proportion of two to one.

Aural discharge previous to admission is almost universal, only 5 of the acute cases having no discharge: among the chronic cases 9 are noted as having no apparent discharge, though a history of previous discharge was obtainable in all of the cases.

Herpes and sordes about the lips and gums are extremely common symptoms and were present in almost all the cases. I consider this to be a very early indication.

Severe general malaise is another almost universal symptom of lateral sinus infection. It is probably the earliest of all. In only 3 cases was a positive blood culture obtained out of 42 cases where mention is made in the notes. Examination of the state of the blood does not help diagnosis, as mastoid infection alone would give similar results.

Downey's spinal test is only of value when the sinus clot has completely formed, and is of no assistance in the early stages.

Pain about the ear is another almost constant symptom; in only 2 of the acute and 8 of the chronic cases was this symptom not mentioned, although deep-seated discomfort rather than actual pain is frequently mentioned in many of the chronic cases.

Headache is specially noted in 24 acute and 29 chronic cases, while a feeling of general malaise and ill-being is noted in almost all cases as having occurred in the earlier stages of the illness. Vomiting occurred in 16 acute and 31 chronic cases. The notes prove this to be almost invariably a late symptom, occurring in very acute or advanced conditions. Giddiness was noted only in 3 acute and 8 chronic cases, and I do not think that it is of any special significance in lateral sinus infection.

Temperature on the first day of admission was generally high. It was above normal in 36 and subnormal in 8 acute cases, while in the chronic the numbers were 46 and 8. In 68 per cent. of the cases the high night and low morning temperature predominated. Rigors were noted in 26 acute and 31 chronic cases. An early rigor or shivering fit was noted as an early symptom in almost 30 per cent. of all cases, but the subsequent frequent rigors were invariably a late and ominous symptom.

Signs.

Tenderness over the mastoid process occurred in 38 of the acute and 36 of the chronic cases, the most frequent sites mentioned being the tip and directly over the antrum. It was specially noted that in several chronic conditions tenderness was found only on deep pressure.

Tenderness down the neck along the course of the jugular vein was specially mentioned in 11 cases, two only being of the acute variety; all except one chronic case were in advanced conditions.

Swelling about the mastoid or oedema was noticed in 27 cases, 9 being chronic. It is interesting to note that all these were in children, and it certainly seems that while the path of infection in the young tends to early involvement of the superficial mastoid cells and therefore a more ready diagnosis, in the less frequently affected adult the infection tends to remain in the deeper mastoid cells.

On examining the meatus, no discharge was discovered in six of the acute cases, though in all these the drum is mentioned as red and in four as bulging. Similar signs are mentioned in three chronic cases.

Redness or oedema of the posterior part of the meatal wall (post-meatal spot) near the drum is mentioned in 31 acute and 39 chronic cases. This I regard as the most important sign of mastoid disease and is alone a certain indication for operation. The presence of this "spot" is invariably mentioned in all cases during the last six years. As an indication of the great value of this sign, nine of the above cases were unsuspected and were found during the course of operation for chronic mastoid on patients with prolonged ear discharge and general seediness, and in whom the meatal spot was the main indicating sign for operation. Where this sign is definitely established I regard operation as imperative, even in

* The opening paper of a discussion in the Section of Laryngology and Otology at the Annual Meeting of the British Medical Association, Winnipeg, 1930.

the absence of any other operative indication, and I firmly believe that if this rule is observed the dangers of lateral sinus disease will be almost entirely eliminated both in acute and in chronic cases.

Ophthalmic changes appear to be rare, and except for a very occasional squint (five cases in all, two being chronic) are rather late signs. Papilloedema was noticed in 12 cases (7 being chronic) and nystagmus in 15, 9 being acute.

Changes in the central nervous system were also very rare. Definite signs of cerebral irritation were noted in 8 cases altogether, 5 being of the chronic type, while disturbances of various reflexes were noticed in 14 cases, 9 being chronic. Facial paralysis occurred only in two chronic cases. Examination of the cerebro-spinal fluid is of no early value. It will only show whether there is any meningitis or not.

Diagnosis.

Having enumerated the various symptoms and their relative frequency I am now in a position to give a short clinical picture of an early case of lateral sinus infection.

If a patient with acute or chronic suppurative otitis media is found to be abnormally ill, yet with nothing definite to account for the grave general feeling of ill-being, suspect sinus infection; look into the meatus and should the red oedematous meatal spot be present—operate! The accompaniment of deep mastoid tenderness, herpes and sordes, a swinging temperature and auditory pain should complete the early diagnosis, and operation should then prevent the occurrence of the more obvious signs.

Another necessary early diagnosis may occur during a mastoid operation when it may be difficult to tell whether the interior of the sinus is infected or not. I make the following observations on this.

In the case of a perisinus abscess and a pulsating sinus surrounded with normal granulations, I have never known this condition not clear up with ordinary drainage. The wash-leather sinus is the other difficult type. Pulsation may be hard to get, though the sinus is felt to be full. Inserting a needle is dangerous, as is also opening, on account of the possibility of infection. If on compressing the sinus wall with a blunt probe and suddenly releasing I find the wall return to normal evenly and instantly, I always leave alone and watch for further indications later. This sign has proved to be of great value.

It will probably be a surprise to some of the specialists present that so little has been stated of pathological aids. I wish to make this point very definitely, that the early diagnosis of this condition can only be done on purely clinical grounds; if the surgeon waits till the pathologist has made his diagnosis for him the chances of the patient are greatly minimized.

The time to make the diagnosis is in the phlebitic stage, or not later than that of the mural clot. The pathological changes in the blood and cerebro-spinal fluid should have been prevented by the surgeon, and even if the patient is seen only at a late stage, there should be no need for a good clinical observer to lose valuable time in awaiting laboratory tests.

The differential diagnosis at this stage is rendered difficult by the absence of any definite symptoms in an otherwise generally ill condition. Unless the great importance of a previously discharging ear is recognized, it is quite easy to slip into such diagnoses as pyrexia of unknown origin and typhoid fever.

In all symptomless febrile conditions a thorough search of the usual toxic foci should be undertaken, and it ought then to be wellnigh impossible to overlook the existence of a suppurative otitis media. The resulting aural examination would disclose the presence or absence of the red oedematous meatal spot and offensive discharge. Having now been placed on the right track, the observer should easily elicit the other abstruse signs of an infective sinus. Being absolutely sure of the meatal spot I would definitely insist on a mastoid operation. If there is one thing that has impressed itself on my mind it is the mistake of looking for two morbid conditions in the same person. Coincidences of this character are extremely rare.

The alleviation of a chronic mastoiditis, even if the sinus is not yet infected, must surely be helpful; on the other hand, the finding of a recently infected sinus not only clinches the diagnosis but saves the patient from a much graver situation.

FRACTURES OF THE ARTICULAR SURFACES OF THE KNEE-JOINT.*

BY

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Of all the injuries which affect the knee-joint those which cause most concern in practice are the fractures of the weight-bearing surfaces of the joint.

Statistical evidence is of little value in dealing with such a subject as this, because fractures of the articular surfaces of the knee-joint, exclusive of fractures of the patella, occur by no means commonly. At Salford Royal Hospital, Manchester, in the centre of a great industrial area, about 250 fractures of the lower limb are admitted to the wards each year. Two periods of three years were selected, and it was found that in the first period (excluding fractured patella and epiphyseal separations) 14 fractures of the articular surfaces of the knee were admitted, and in the second period 17 cases, an average of about 2 per cent. of all leg fractures admitted.

Fractures of the Femoral Condyles.

I intend first to deal with examples of the minority group—namely, the fractures of the femoral side of the joint. There are, in the first place, the gross fractures which split the two condyles apart and extend upwards along the shaft with more or less displacement of fragments.

FIG. 1.

FIG. 2.

FIG. 3.

This is usually spoken of as a T-shaped fracture into the joint. A typical example of this injury is shown by an outline sketch from the radiogram of the right knee of a man, aged 51, who received direct violence from the impact of a motor car (Fig. 1). Under general anaesthesia extension was applied and adequate reposition of the fragments obtained. A Thomas splint bent at the knee to an angle of 150 degrees was applied. Union was firm after eleven weeks, and massage and active movements were commenced. A calliper walking splint was worn for a further ten weeks, and the end-result is shown, so far as knee movement is concerned, by further radiograms, which demonstrate the fullest voluntary extension and flexion—namely, 180 degrees to 75 degrees. Stability of the joint was good. The man returned to work twenty-five weeks after his accident. An example of a more severe fracture of this type is that shown by the next patient, a man aged 50. His right knee was crushed between two buffers and the joint surfaces of both femur and tibia were shattered (Fig. 2). A moderately good reposition of the fragments was obtained and a Thomas splint with extension applied. The end-result, as might

* Read in opening a discussion in the Section of Orthopaedics at the Annual Meeting of the British Medical Association, Winnipeg, 1930.