There is no positive evidence that *B. abortus* infection can cause abortion in women, but it must be regarded as a possibility. Reference to the literature suggests that the cause of abortion in cattle is a pathological change entirely confined to the placenta; and that the animals only abort once, which is unlikely were the uterus the seat of a chronic infection.[3] In guinea-pigs examined after experimental Brucella infection "macroscopic lesions in the female genital organs are so rare that they are of no importance for routine diagnosis."[2]

Although a considerable number of post-mortem examinations have been made on fatal cases of undulant fever (presumably *melitensis* infection), few gross changes, with the exception of an enlarged spleen and superficial lymph glands, have been attributed directly to invasion of Brucella.[2] In the case under discussion there was no palpable enlargement of the spleen or lymph glands, and one may assume that the intermenstrual bleeding was the result of a chronic endometritis due to *B. abortus* infection. There is, of course, no means of proving this, and, as Dr. Hunter's letter (vide supra) points out very clearly, every symptom and sign could be accounted for by a diagnosis of subinvolution. On the other hand, the time factor, the rather sudden onset of symptoms, and the presence of a localized parametritis "probably as the result of a mild degree of infection from the colon," and lastly the onset of acute symptoms following trauma to the cervix and vaginal vault, support the former view. Until corroborative evidence is forthcoming one would hardly dogmatize on this point; it may be that in the textbooks of the future, among the many causes of menorrhagia will be numbered "infection by *Brucella abortus*."

One would like to think that blood transfusion had in this case been the means of conferring a passive immunity, but here again it is impossible to dogmatize. We are, however, satisfied that it saved the patient's life by supporting the failing circulation, on which the brunt of the effects of the infection fell. In spite of the usual assumption that "the treatment coincident with recovery gets all the credit," there is no doubt at all that, clinically, the improvement after each transfusion was very definite and out of all proportion to the change in the blood picture. The significant fall in the agglutination titre is also suggestive, and with the evidence afforded by the chart is in our view conclusive.

Summary

From a consideration of the case above recorded one is justified in assuming:

1. That infection by the *B. abortus* does occur without recognizable clinical symptoms and may remain latent for an indefinite period.

2. That the incubation period in acute infections is probably eight to ten days.

3. That the *B. abortus* may cause localized chronic inflammatory lesions in man.

4. That blood transfusion may be the means of conferring a non-specific passive immunity (complement) in septicaemic infection.

In conclusion, we should like to record our appreciation of the help of Dr. G. J. Griffiths, pathologist to the Devonshire Royal Hospital, to whose willing efforts the successful issue was largely due; and to thank Drs. J. W. A. Hunter and T. H. Oliver of Manchester for their interest and co-operation.

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WEIGHT-BEARING INSTRUMENTS FOR WALKING

BY

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In another paper[1] I have described an instrument which is designed to relieve one of the lower limbs of the strain of weight-bearing in standing and walking. The apparatus provides a saddle upon which the patient sits firmly whilst taking a step with his sound limb. It may be of some interest to contrast the apparatus with the well-known and widely used "calliper" splint, which is a modification of Thomas's knee appliance for walking.

Weight-bearing

The centre of gravity of the body in the erect position lies in the mid-sagittal plane or thereabouts. When a person with normal lower limbs stands with his weight evenly distributed on both he is in a state of stable

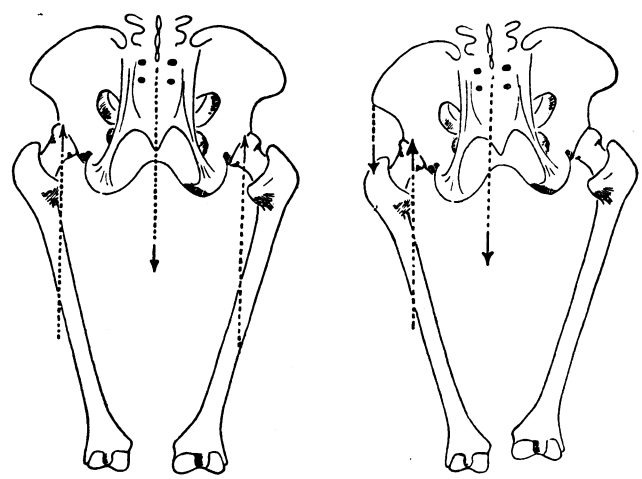

FIG. 1. FIG. 2.

FIG. 1.—Diagram to show the distribution of the lines of force when the subject's weight is evenly distributed between the two lower limbs, as seen from behind. The centre of gravity of the body lies approximately in the mid-sagittal plane. The down-pointing arrow represents the resultant of the forces bearing downwards on the femoral heads, which are widely spaced and effectually prevent any rotation of the pelvis in the coronal plane. The muscles passing vertically from the ilium to the great trochanter are not called into play.

FIG. 2.—Diagram to show the lines of force when the subject stands on his left leg, as seen from behind. The body weight centres over the left foot. The head of the left femur supports the body weight, and acts as a fulcrum. The pelvis is prevented from rotating round this fulcrum by the contraction of muscles passing from the iliac wing to the great trochanter and fascia lata of the thigh. Note that the right side of the pelvis is held higher up than the left.

equilibrium in the coronal plane, and little muscular effort is necessary to preserve this state (Fig. 1). When he lifts his right leg from the ground he will fall to the same side unless, consciously or unconsciously, he alters his position so as to bring his centre of gravity over his left foot, and brings into play muscles which oppose the tendency of the pelvis to rotate round the head of the left femur in such a way that the right ilium falls and the left rises. It is well known that when a normal person stands on his left leg the right side of the pelvis rises higher than the left, and vice versa. This is brought about largely by the contraction of muscles passing more or less vertically between the wing of the ilium on the one hand and the great trochanter and fascia lata on the other, on the weight-bearing side (Fig. 2). The

[1] "A Saddle Appliance for Bearing the Body Weight," *Australian and New Zealand Journal of Surgery*, 1934, iii, 270.

action of these muscles is easily appreciated by palpating them whilst the body weight is transferred from one foot to the other. The muscles are felt to harden and relax appropriately. Those chiefly concerned are the gluteus medius and minimus, and the tensor fasciae latae.

When a calliper splint is applied so that it transmits the weight of the body from one ischial tuberosity to the ground, a somewhat similar state of affairs exists. The fulcrum on which the pelvis tends to rotate is shifted from the femoral head to the ring of the apparaus bearing on the ischium. On raising the sound limb from the ground muscular effort is still required to prevent the pelvis falling on the opposite side, and the muscles concerned are the same as before, together with certain others which may now act similarly (Fig. 3). Thus it follows that the neck and head of the femur, as well as the hip-joint and pelvic girdle, are subjected to stresses resembling closely those produced by standing on one leg. If the calliper splint is fitted with the idea of relieving the neck of the femur or the hip-joint of strain, it fails to some extent in its object. Nor is the limb below the

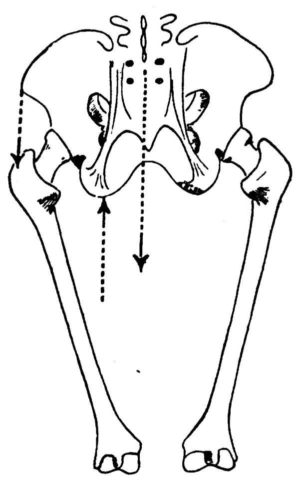

FIG. 3.

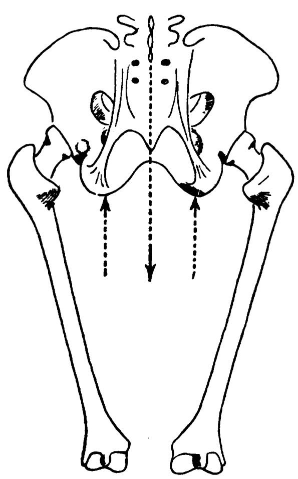

FIG. 4.

FIG. 3.—Scheme to show the system involved when a calliper splint is fitted. The left ischial tuberosity bears on the ring of the splint. The body weight would cause the pelvis to rotate on the fulcrum provided by the ring were it not for the active contraction of muscles passing from the iliac wing to the great trochanter. It is to be noted that this activity tends to force the pelvis against the head of the femur and to bring the limb into a position of abduction at the hip-joint.

FIG. 4.—Diagram to show the state of affairs when the saddle splint is used. The lines of force are disposed in a way somewhat similar to that seen in normal standing on two legs (Fig. 1). The vertical muscles passing between the iliac wing and the great trochanter are not called into play, so that the left limb merely dangles from the pelvis by its own weight.

great trochanter altogether spared. Suppose that the shaft of the femur has been fractured three inches below the great trochanter. When the patient stands on the calliper the muscular effort described above tends to draw the great trochanter towards the wing of the ilium, with the result that the upper fragment tends to become abducted at the hip-joint. The weight of the limb below the seat of fracture and the splint itself (including the boot, which is really part of the apparatus) prevent this part of the limb from conforming to any such movement of the upper fragment. If, however, union at the seat of fracture is weak and bending is still possible, angulation is likely to result. The nearer the fracture to the great trochanter, the greater is the danger of angulation resulting. As the distance increases, the forces tending to produce the deformity act at a greater disadvantage and eventually become negligible.

When my instrument is fitted and the patient raises his sound limb from the ground the pelvis is supported by the apparatus at two points—the ischial tuberosities—and the centre of gravity of the body lies in a sagittal plane approximately midway between these points (Fig. 4). The pelvis displays no tendency to rotate in the coronal plane, and no muscular effort is required to counteract the force of gravity. The affected leg merely dangles from the pelvis. Thus the hip-joint and the whole of the limb below this are entirely freed from the strain of weight-bearing and also from the stresses set up by the action of muscles in the region of the hip-joint. The weight of that part of the limb situated below any lesion, whether in a joint or in the shaft of a bone, acts as an extending force, thus militating against angulation or compression at the site of the lesion. The patient provided with a saddle splint may reasonably be permitted to walk at an earlier date than with a calliper splint.

Comfort

The calliper splint bears on one ischium only. If it does its work efficiently a very small area of skin is called upon to withstand compression between bone and splint brought about by the whole weight of the body. When the saddle splint is used, the compression is so distributed that its intensity is approximately halved. In practice patients do not complain of discomfort from pressure when the saddle splint is properly fitted, and some, with only partly consolidated fractures of the femoral shaft, have walked five miles without ill effects. I have not been able to satisfy myself that a calliper splint, which is really transmitting the whole of the weight of the body to the ground, can be made so comfortable. If the splint is too short, it does not serve as anything but an encumbrance.

Fitting of the Apparatus

It appears that the fitting of a calliper splint is peculiarly difficult. I have heard it said by a surgeon in London that there is only one firm in that city which is able to manufacture a satisfactory apparatus, while he understands that in a certain provincial centre it is held that there is no such firm outside that centre. Be this as it may, the fact that experts have difficulty in obtaining efficient splints may be used to emphasize the point that others less expert and with less expert technical assistance seldom obtain happy results.

The saddle splint, on the other hand, has proved to be quite easy to make and so adaptable that one size of saddle may be used for many patients. The same splint may be used for a right or left limb, the change over necessitating only minor alterations at the lower end of the apparatus. Many of the parts may be made of standard sizes and kept in stock for use when required.

H. Curschmann (*Deut. med. Woch.*, February 22nd, 1935) challenges the textbook teaching that chronic leukaemia is a disease of middle age. An analysis of fifty-one cases observed in Rostock showed that only seventeen patients were between the ages of 14 and 49, whereas thirty-four were between the ages of 50 and 70. More recent statistics in the same town and hospital tell the same tale. During the past nine years Professor Curschmann has observed about 100 patients, twenty-seven of whom were between the ages of 61 and 75. He finds it difficult to explain this hitherto unobserved preference shown by leukaemia for elderly persons. There are, to be sure, comparatively more elderly folk in the community than there used to be, and it may be that diagnosis in this respect has improved of late. But probably these two factors do not account for the whole of the rise in the number of these cases, whose genesis remains as obscure as ever. As for diagnosis, most of the chronic and all the acute cases came to hospital under mistaken diagnoses, such as cardiac insufficiency, cancer, influenza, bronchopneumonia, purpura rheumatica, etc. Were the frequency of leukaemia in old age to be generally appreciated, these mistakes would be avoided.