its opposite sides. For further safety these stitches were made to cross in pairs. The clamps were released in order, first from the branches, then the distal, then the proximal, and, as the severest test, the distal clamp was tightened again. There was not the slightest oozing. In view of the exposure of the site of suture to strain, a graft of fascia lata was fixed as a collar round the vessel at this point, with its fibres transverse to the line of the artery, and with slits to allow the passage of the circumflexes. Above and below a loose stitch in the fascia near by prevented telescoping. The wound was then closed and dressed with gauze wet with 1 in 2,000 flavine. At the close of the operation the radial pulses were equal.

After-History.

Convalescence was uneventful. There was pain referred to the index and middle fingers for three days. The wound healed by first intention, and physiotherapy appropriate to the nerve condition and to the axillary scar was adopted from the twelfth day.

Three months later there was no sign of yielding; at the site of the suture was a thickening due to the presence of the graft. The brachial pulses were equal and the index showed almost complete recovery. Pulsation, though slight, indicated that thrombosis and obliteration of the artery had not occurred at the point of suture.

FRACTURE OF FEMUR: A SIMPLE METHOD OF EXTENSION.

BY

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FRACTURE of the femur in private practice is always looked upon with apprehension, and even in hospital work with some degree of anxiety.

One great reason for this attitude is the necessity for having a complicated apparatus made up of iron framework, a mast and guy-ropes, all requiring frequent adjustment and refitting, to the pain and distress of the patient. This, perhaps, may not be true of fractures below the middle of the shaft, as in these cases fair results may be obtained by use of foot extension with the limb lying straight along the bed.

The method I am about to advocate is for fractures above the middle, where the upper fragment is flexed forwards. As this fragment is too short to be maintained in any other position than that allowed by the muscles attached to it, it becomes necessary for the lower fragment to be brought into line with the upper, at the same time keeping up extension in that line. In such a case the patient is placed in bed on his back, the head and shoulders being supported by two or three pillows. The knee of the injured limb is raised until the femur is at the required angle, which is generally about 30 to 40 degrees to the horizon. It is maintained in this position with a knee pillow, or better still by a pyramid of sand-bags. A ring-shaped air-cushion is slipped over the foot, drawn up to the knee and inflated as fully as possible, the foot being allowed to fall back on the bed. A strong bandage is tied round the air-cushion exactly opposite the knee and the other end carried to a pole or mast fitted to the foot of the bed; strong traction is made in the line of the upper fragment, lower fragment, diameter of cushion, bandage and point on mast, until the ring becomes definitely oval, when the bandage is fixed to the mast. It will be seen that the extension is procured by a pneumatic pad in the flexure of the knee, and that the strain is transmitted to the femur through the head of the tibia and the ligaments of the knee-joint. These being rigid structures serve the purpose well.

Pneumatic pressure at the point indicated is justifiable, because all the great nerves and blood vessels dip deeply here under the heads of origin of the gastrocnemii, which being massive and fibrous in this situation are well adapted to support continuous pressure and protect underlying structures.

The advantages attendant on this method are:

1. Simple apparatus. A few pillows, a long piece of stick, a bandage and a ring air-cushion or inner tube of a motor tyre. Such things can be obtained almost anywhere at very short

notice, and there is no need to keep apparatus of various sizes in stock.

2. Ease of application. No skilled assistance required.

3. Once fixed adjustment is very seldom required. The bed-clothes are arranged so that the ring-cushion is uncovered and visible, a glance at its shape informs one immediately of the degree of tension and inflation.

4. The foot hanging over the pneumatic pad acts as a kind of rudder and prevents rotation of the lower fragment, or if desired it can be pushed inwards or outwards, rotating the lower fragment in any required direction.

5. There being no pulleys, guy-ropes, weights, or iron frame, there is very little necessity for disturbing the patient, which saves much anxiety and suffering. A bed slipper is easily adjusted.

6. The thigh is supported underneath by sand-bags, and others may be used at the sides if required to give a sense of security, but these are not necessary. The thigh can therefore be fully exposed, permitting easy examination, dressing or massage of suitable type, all without any disturbance of the fragments whatever.

I have treated only one case by this method:

A boy, aged 10 years, sustained a simple fracture of the right femur above the middle of the shaft. He remained in the apparatus for four weeks with the very slightest adjustments. At the end of that time, union being quite strong, the limb was removed from all restraint. At first any attempt to straighten the limb caused pain in the knee-joint, but full flexion and extension returned without assistance within forty-eight hours. The only evidence of pressure by the pneumatic pad was a very superficial blister, which no doubt would have been obviated by binding lint over the rubber before application. The shortening was under a quarter of an inch. At no time was there any numbness, tingling, or oedema of the leg or foot.

The extreme simplicity and efficiency of this method, as compared with many devices advocated, are my excuse for seeking publication.

AN UNUSUAL CASE OF MYELOCELE.

BY

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In practically all the standard textbooks myelocoele is stated to be incompatible with life, the infant being either stillborn, or dying within a day or two. Bland-Sutton holds a somewhat different view. He states:

"Many children in which this condition is present are still-born: the few that survive their birth rarely live longer than three days, the continual leakage of cerebro-spinal fluid being sufficient to explain the invariable brevity of their lives." (*Tumours: Innocent and Malignant*. 1917.)

He thus admits the possibility of survival beyond the first day or two.

In inquiries, admittedly limited, which I have made on this subject, I have been unable to trace a single case in which the duration of life exceeded a period of three days. I have therefore thought that the following case, in which life was prolonged for twenty-three days, merited publication.

I was called to see the patient, a male infant, an hour after its birth, at the Ilford Maternity Home, during the early hours of September 18th, 1920. The reason for the early call was that the infant seemed very feeble and had difficulty in breathing. On arrival I found a well-nourished, good-sized baby, which soon revived and cried lustily. He had a well-shaped head, with no evidence of hydrocephalus.

The lower limbs were held rigidly flexed to a right angle at the hips, and rigidly and completely extended at the knees. The legs resisted straightening, and were paralysed, wasted, and, as far as could be made out, anaesthetic. There was double talipes equino-varus, the varus element markedly predominating, with a well-marked crease on the soles, corresponding to the transverse tarsal joint.

Looking at the back, there was a large, raw, circular area, somewhat depressed, and corresponding to a deficiency in the neural arches and failure of closure of the neural groove, opposite the lower three lumbar and upper two sacral bodies. The open spinal cord was seen in the middle line at the upper part of the defect, while the nerves of the cauda equina could be distinguished in the lower part. The myelocoele narrowed and deepened as it was traced upwards into the funnel-shaped termination of the central canal. Cerebro-spinal fluid was constantly, though slowly, dripping out of the apical opening, bathing the raw area, and then running in drops over the buttocks. The surrounding skin was rendered as far as possible aseptic, and a dressing applied. The next day the flow of cerebro-spinal fluid was freer, and some congestion developed round the myelocoele. During the first week the child's condition remained good. The raw area gradually contracted down and became deeper, while the inflammatory redness subsided.

The child now passed temporarily out of my care, being transferred to the Ilford Isolation Hospital. Here it was kept for several days, during which its condition was reported to be quite satisfactory. It was then sent back to the mother. When the child was over a fortnight old the mother naturally began to doubt the soundness of my prognosis, which had already been belied by the child living as many weeks as I had assured her was his maximum expectation of days. She expressed herself anxious for further advice, and I was making arrangements for the infant to be seen by Mr. W. H. Clayton Greene, when, during the third week, meningitis set in, and the little one died on October 11th in a storm of convulsions. It was thus twenty-three days old on the date of its death. Owing to the fact that both mother and child left the district a few days before the latter's death I was unable to witness the end. For the information about the date and manner of the infant's death I am indebted to Miss Roberts, the matron of the Maternity Home, who obtained it in a personal interview with the mother.

Another point arising in connexion with this case is the frequency of myelocoele when compared with the other types of spina bifida. Sir John Bland-Sutton is quoted by many authors as stating that myelocoele is the commonest variety of spina bifida; he admits, however, that of all cases that survive birth probably two-thirds are meningo-myelocoeles. Of the seven cases of spina bifida of which I have personal knowledge the one here described is the only case of myelocoele; one was a meningocele, one a spina bifida occulta, and the remaining four were diagnosed as meningo-myelocoeles. I have yet to see my first case of syringo-myelocoele.

In reference to the frequency of spina bifida in general practice the experience of a local practitioner of thirty years' standing is instructive. He has met with but two cases during this period in a practice which, to my knowledge, is exceptionally busy.

THE ACTION OF THE INTRINSIC MUSCLES OF THE FOOT AND THEIR TREATMENT BY ELECTRICITY.

BY

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Most of the intrinsic muscles of the foot and the long flexors of the toes play important parts that do not seem to have been recorded. The flexors of the toes raise the longitudinal arch of the foot, because when the weight of the body is thrown forward, as the heel leaves the ground in walking, their action is to draw the heel towards the toes, acting as bowstrings across the arch from heel to toe. For this reason the correct way to land from a jump is to have the whole weight of the body borne between the balls of the feet and ends of the toes, and, when patients are doing this or being given heel raising exercises in the standing position, they should be told to "grasp the floor with the toes," which thus become the fixed points from which their flexors act.

Flexor brevis digitorum has the strongest arch-raising action, owing to its insertion into the second phalanges, placing it at a disadvantage in bending the toes compared with flexor longus. The flexors of the toes should be used to assist progression in walking fast or running, and most people use them for this purpose. They thus support the arch at the moment when the greatest strain falls upon it. Flexor brevis hallucis, pulling from the cuboid to the first phalanx of the great toe, probably assists considerably in supporting the transverse arch.

The transverse arch is maintained chiefly by the dorsal interossei, and this is their most important action. In a demonstration given recently at the Royal Society of Medicine, I think I showed this clearly, using the method I shall describe shortly, and giving a clear picture of these muscles with their bipennate origins, drawing the metatarsal bones together. To describe the action of one of these muscles will suffice to explain the action of the rest. We will consider the second metatarsal bone as the "keystone" and as the middle line. When the second

dorsal interosseous muscle contracts, it performs the following rôles, in the order given. These rôles have been carefully observed during electrical stimulation, first of individual muscles and then of the group as a whole.

1. Feeble contraction. Abduction of first phalanx from middle line.

2. Stronger contraction. Flexion of metatarso-phalangeal joint *plus* the pull on the extensor tendon. End of toe brought into contact with the ground. (In voluntary movement this contact is of course strengthened by the long and short flexors.)

3. Powerful contraction. The fixed points from which the muscle acts are now (a) the second metatarsal bone, (b) the insertion of the tendon into the first phalanx. As the muscle contracts, the third metatarsal bone is drawn towards the second—that is, towards the middle line. In voluntary movement the second metatarsal is fixed by the opposition of the first dorsal interosseous muscle, which also fixes the first phalanx of the second toe while it is drawing the first metatarsal bone towards the second, and so on. As each metatarsal bone is drawn towards the second, it is pulled into a plane below that of its more mesial neighbour, so that the second metatarsal—the keystone—is raised upwards. This movement is aided by the metatarsals being brought into line with the arch of the cuneiform bones.

The following is the method by which all the muscles I have mentioned may be exercised and brought into a state of efficiency, even when they are wasted and unhealthy from prolonged pressure and disuse. It demonstrates conclusively also the actions I have described above.

The foot is placed in an ordinary porcelain arm bath containing a sufficient depth of warm water to reach just below the external malleolus. The heel rests on a carbon electrode, to which is connected one of the terminals of a Smart-Bristow coil. Another carbon electrode, connected with the other terminal, is held in the left hand. It is dipped into the water in front of the toes. The right hand manipulates the core of the coil so that a surging faradic current is sent streaming through the intrinsic muscles of the foot. Experience will teach the operator how the position of the electrodes may be altered so as to obtain contraction of the different muscle groups at will, and their action is thus displayed in a particularly useful and pleasing manner.

As we proceed to carry out this treatment and place the electrodes in the required positions a clear view is gained of the transverse arch of the foot, rising and falling in time with the contraction and relaxation of the dorsal interossei. It is seen that this is a powerful action and emphasizes the importance of these muscles. The best position for the electrodes varies in different patients, but as a rule in treating the transverse arch I have them on each side of the front of the foot. The longitudinal arch, lateral and medial, is best operated with the heel on one electrode as first described. No stimulation of the long flexors takes place with this technique, and the action of the short flexors of the toes in raising the longitudinal arch will come as a complete surprise to those who see it for the first time, as it is so very marked. The long toe flexors and tibialis posticus can be stimulated in turn by detaching the cord from the electrode at the heel and fixing it to a disc electrode covered with a handful of wet lint so that it can be applied to their motor points, the other electrode occupying a suitable position in the bath. Flexor longus hallucis and flexor longus digitorum when stimulated in this way will be seen to raise the longitudinal arch to a very marked extent.

As to the indications for the application of the above technique as a method of treatment, these are several. It is applicable when the preliminary stages of flat-foot are curable by physiotherapy, and to the after-treatment of those more advanced cases which have been wrenched and fixed in plaster or have undergone surgical operation. Regarding the first class, there are many people walking about the streets suffering from what they describe as tender feet, and these people, experiencing pain on movement of the tarsal joints, avoid this as far as possible by planting their feet flatly on the ground with the toes pointing too far outward. This leads them through the successive stages of flat-foot.

Common causes of tender feet are deformity of the first metatarso-phalangeal joint owing to the fashion, common to almost the whole of civilization, of wearing boots shaped like a lead pencil, and, in women, the wearing of high