

motion the foot is no longer everted, as in the attitude of rest. The foot, under muscular control, propelled, by the raising of the heel by means of the calf muscles, becomes somewhat inverted—or should do so.

The correct attitude in walking is with the feet parallel, and, as the last part of the push off in each step comes from the great toe, there is really a slight amount of in-toeing in the correct and powerful walk.

To repeat—there are two attitudes to be borne in mind: the foot in rest, and the foot in motion.

The strength of the foot depends on ligaments and muscles. The muscles play an extremely important part—to my mind by far the most important part—in maintaining the normal foot, both as regards structure and function. The ligaments are of importance, too, but the strain on the ligaments is felt when the support of the muscles is lost. The muscular support is obtained by the bracing action of their tendons as they pass to their various points of insertion. If the muscle is normal, the tendon is tense and supports the structures in its neighbourhood. The small muscles of the foot—the intrinsic muscles—are also of enormous importance. So much for the normal foot.

#### FLAT FOOT.

We now pass on from a consideration of the normal, and are in a position to understand the various deviations from that normal, and we will commence with a brief consideration of the common disability of flat foot.

It is well put by Whitman that "There is one feature common to every grade of the so-called flat foot: the foot regarded as a mechanism is weak as compared to the normal standard. Weak because of the persistence of the attitude of rest and relaxation, as contrasted with that of elasticity and strength.

Even the inherited flat foot, or the flat foot which has never caused symptoms, is weak in the sense that in use it lacks the spring and elasticity of the perfect machine. The term weak foot may be used then to indicate all types of the disability."

*Causes of Flat Foot.*—These are:—(1) Congenital; (2) Acquired. The latter may be due to overwork and overstrain, adolescence, predisposing occupations (*e.g.*, that of hospital nurse), bad shoes, &c. Or may be secondary to (1) genu valgum; (2) injuries, *e.g.*, Pott's fracture; (3) inflammation—rheumatism; (4) trench foot; (5) wasting disease, *e.g.*, typhoid; (6) spasm of peroneii; (7) infantile paralysis.

*Symptoms and Physical Signs.*—The flat foot may cause no symptoms, and no disability whatever. Examples are common in everyday life.

The flat feet which do cause symptoms are feet weakened owing to some of the causes shown in the classification, and which are strained.

The pathology—*i.e.*, the actual lesion—varies. In the milder forms it is simply muscle-insufficiency of the big muscles, and atrophy of the small muscles of the foot, allowing too much strain to fall on the ligaments, which yield.

The ligament most markedly at fault is the inferior calcaneo-scaploid—sometimes called the spring ligament—which normally supports the head of the astragalus. When this ligament weakens, from strain or inflammation, the head of the astragalus slips downwards and inwards off the os calcis, and later the os calcis becomes inverted in relation to the tibia and line of the leg.

The most important symptoms are:—(1) Pain, which is really a sign of overstrain; (2) Gait, a certain awkwardness of movement; (3) Weakness—the patient is easily tired, cannot walk far.

Later still the bones adapt themselves to the new conditions and form new facets for articulation with one another. Some ligaments stretch, others undergo adaptive shortening, until finally you get a perfectly rigid foot—which is known as the osseous flat foot.

In acute flat foot the whole foot may be swollen and puffy, blue, and tender, and exquisitely painful. In the spasmodic flat foot the peroneii stand out in spasm, and it is from this that this type receives its name.

Various other symptoms occur at times. The alteration in the alignment caused by the abduction may cause pain under the heel, various corns and callosities of the sole, &c.

#### TREATMENT.

Turning to treatment, the first important thing is to diagnose the cause, and if possible remove it, and in this connection we must remember that certain predisposing causes—*e.g.*, prolonged recumbency during a long illness—such as typhoid fever, are likely to give rise to flat feet unless adequate measures are taken. Massage and electrical stimulation are necessary measures in this and similar conditions, if we are to keep up sufficient tone in the leg muscles to allow them to support the tarsal joints.

(To be concluded.)

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