H. NILSONNE, STOCKHOLM:

ON PLASTIC OPERATIONS IN PARALYSIS OF THE GLUTEUS MEDIUS

Isolated paralysis of the gluteus medius (and minimus), as a result of poliomyelitis, is a fairly common event. In the upper extremity the deltoid would seem to be analogous with the gluteus medius. Both muscles are often the seat of isolated paralysis (in the region concerned) and I suppose this elective paralysis has to be interpreted as resulting from overstretching during the stage of repair. Paralysis of the deltoid is at once obvious and easy to diagnose but as regards the gluteus medius the clinical picture is not so clear; nor is this type of paralysis so well known and less attention is paid to it in the literature.

Paralysis of the gluteus medius brings with it a very marked state of invalidity. There is considerable weakness of the hip and the patient generally walks worse than in the case of congenital dislocation. If in addition there is paralysis of knee or foot — which in themselves may be overcome functionally by some appliance — the gluteus paralysis is nevertheless often the factor that determines the lack of functional capacity of the extremity in standing and walking.

As I have had the opportunity of operating on 8 cases of gluteus medius paralysis by a special method which has not been in use earlier, and as the results obtained are encouraging I have thought fit to submit them to this Society.

Methods of operation previously suggested:

F. Lange is substituting vastus externus for gluteus medius; its upper part is detached and gripped with long silk sutures which are fixed in a fan-like manner to the iliac crest. In addition to this *Lange* is suggesting two further methods: 1) the

sacro-spinal muscles are freed from their lower attachment and a long silk suture is passed down and attached into a drilled hole in the great trochanter. 2) A flap, the breadth of a hand, of the lower part of the latissimus dorsi of the opposite side is mobilised. A long silk thread is passed down to the opposite great trochanter. Where the silk thread passes the spinous processes or the iliac crest sterile parchment leaves are placed as bearings underneath. *Samter* is making use of the external oblique. He detaches its origin together with a portion of the crest, frees the muscle and pulls it down toward the great trochanter where he sutures it to a 4 cm long thin flap of periosteum and cortex turned up to meet the transplanted muscle. For those, who do not appreciate these operative methods it lends itself more natural to look for a more physiological substituting material, i. e. musculature dynamically belonging to the muscle groups of the hip. *Legg* and *Spitzy* make use of m. tensor fasc. lat. which they suture to the great trochanter. This muscle cannot, however, entirely replace the gluteus medius and *Legg* suggests that this operation should only be employed in cases where the gluteus medius is still retaining a certain amount of strength.

At the Congress of the Northern Orthopedic Society, 1930, *Bentzon*[1]) submitted two cases in which he had used the gluteus maximus as his plastic material with so good results that my interest was stimulated to try the method.

A paralysed gluteus medius combined with a sound gluteus maximus is not unusual. *Bentzon* says that out of a material of 235 cases of poliomyelitis this combination was present in 36 cases. Unless there is total paralysis of the extremity including the hip an elective paralysis of gluteus maximus would seem to be a rare event. The gluteus maximus seems to have a much greater »resistance« to paralysis than the medius (? is not overstretched during the first period of repair). In the event of a poliomyelitic case where the clinical picture is dominated by the gluteus medius paralysis, one can probably as a rule reckon with a powerful gluteus maximus. So at least has been

[1]) This journ., vol. I, p. 310.

the case in the 8 patients I have operated on. Nor have I ever had to face the situation of a paralysis of the gluteus medius where operation was indicated but where this had to be abandoned on account of a paralysed gluteus maximus.

If we examine the course of the fibres of gluteus maximus (demonstration) we shall find that the entire muscle falls behind the fulcrum round which the hip rotates. Its function is

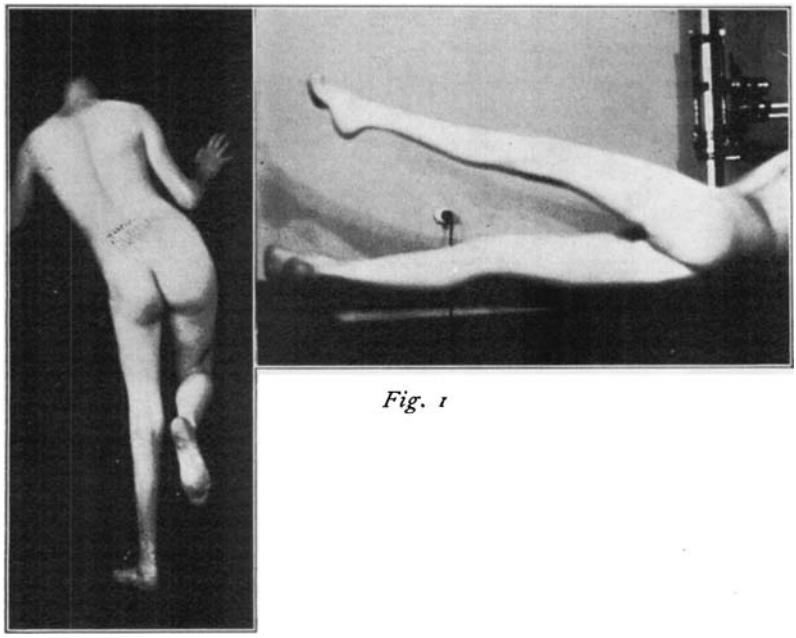

Fig. 1

extension and outward rotation of the hip-joint. Not even its upper portion can be regarded as having any abducent effect. On detaching it from the tractus ilio-tibialis and suturing it to the great trochanter its effect cannot become one of pure abduction, fairly strong outward rotation being also added. M. tens. fasc. lat., on the other hand, is placed in front and on the lateral aspect of the hip-joint and on its transplantation to the great trochanter (*Legg*) we get abduction as well as inward rotation. These two muscles in combination should therefore give the best substitute for a paralytic gluteus medius. *Bentzon*

is also pointing out in his work that if an unimpaired m. tens. fasc. lat. is available — which was not the event in his two cases — *Legg's* operation should be combined with the plastic operation of gluteus maximus. Besides, a fully intact m. tens. fasc. lat. is not, I think, necessary. Its transverse section is relatively small and as a plastic muscle for gluteus medius it cannot make up, dynamically, any sufficient substitute. Its

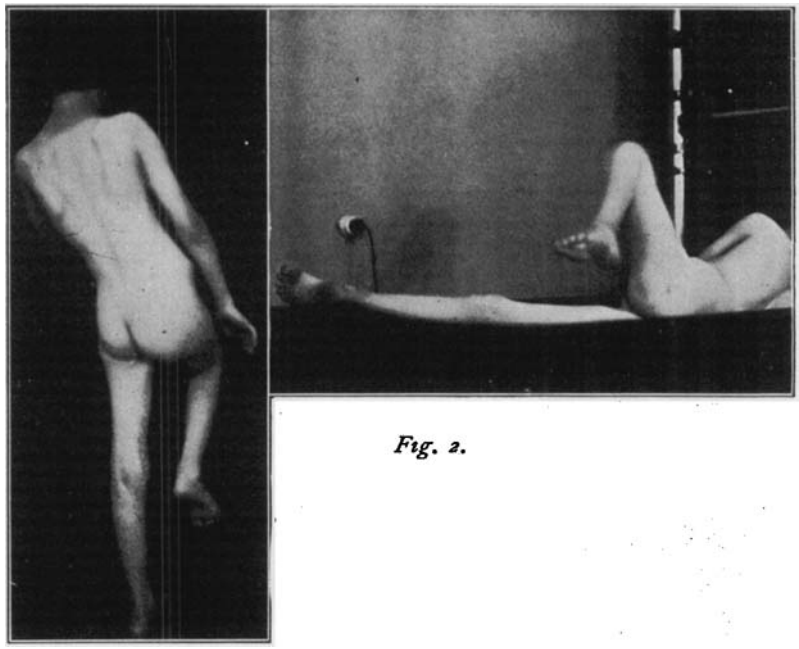

Fig. 2.

outer layer, however, is strongly fibrous and on transplantation to the great trochanter it will serve more as a ligamentous anchorage against adduction and outward rotation. The advantage we thus gain is that the abducent effect of the transplanted gluteus maximus cannot involve any outward rotation, its whole effective capacity being therefore utilized as abduction.

The operation as I perform it is carried out as follows:

An S-shaped incision is made, commencing at the anterior iliac spine, passing down along the m. tens. fasc. lat. for about 10 cm, then turning backwards around the great trochanter and

continuing down along the shaft of the femur for about 10 cm below the tip of the trochanter. M. tens. fasc. lat. is detached downwards for 10 cm. at the most (only the anterior portion of the tense part of the fascia attached to the spine being spared). The anterior portion of the gluteus maximus (10 cm. at most) is detached from the tractus. The trochanteric bursa is removed.

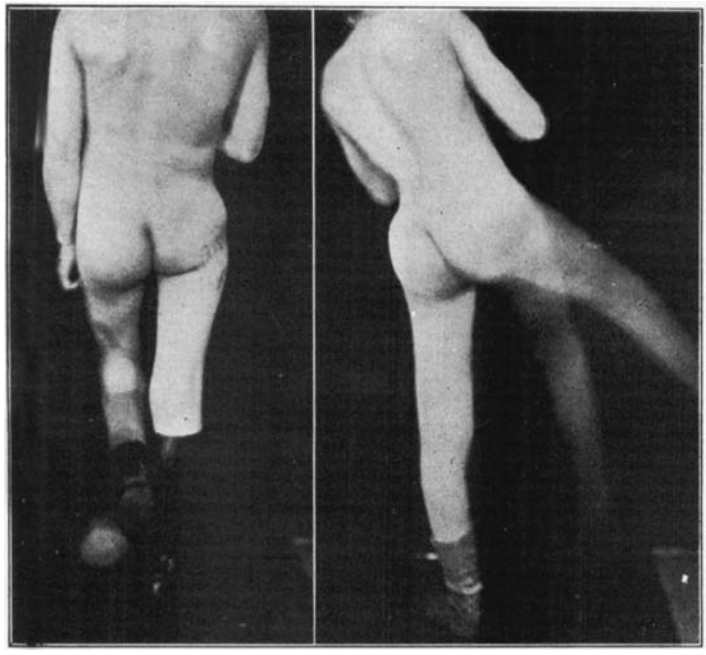

Fig. 3.

A thin flap of periosteum and cortex is lifted up with the chisel from the lateral surface of the trochanter, the two muscles being anchored here subperiosteally with silk while the leg is held in 30° abduction. This position is retained by plaster of Paris for two weeks after which re-educative movements are commenced. After about 5 weeks the patient is allowed to try to walk without the plaster.

All the 8 cases I operated on by this method obtained a functionally good substitute for the gluteus medius. One must not expect, however, to be able to make up entirely for the function

of this muscle, as the substituting muscles do not give us a sufficient muscular cross section or an ideal direction of pull. To the patient, however, the functional improvement obtained is considerable. A relative amount of stability in the hip is obtained, so that on walking there is none or very slight »dropping of the pelvis«. The patient is generally able to abduct in standing position and sometimes when lying down.

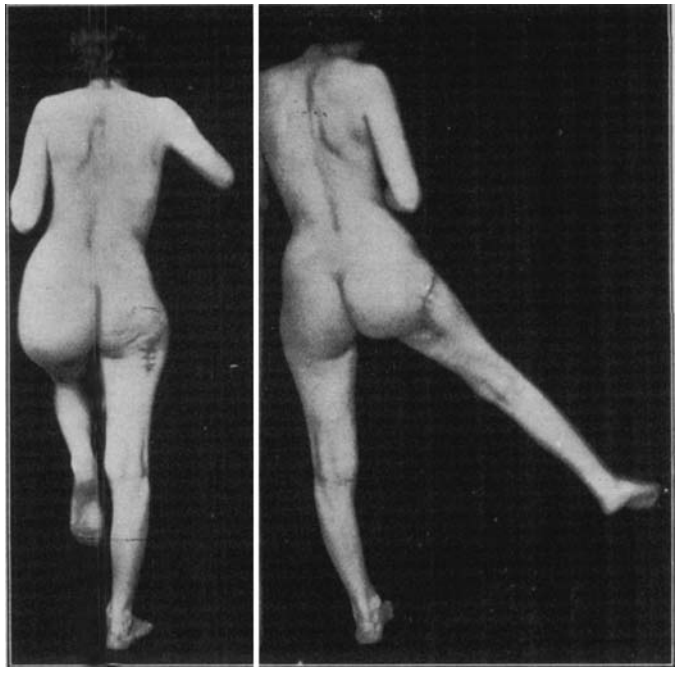

Fig. 4.

Case 1, aged 17. J. no. 19854. Poliomyelitis at the age of 14. Generalised mild paresis of the whole of the left lower limb. Hip abduction nil; other muscles functioning but strength somewhat impaired. Foot markedly paretic. Great inability of left hip in walking, simulating dislocation, but with more marked waddling. Unable to stand on left leg. Op. 1930. After-examination 1932: considers herself walking with much greater steadiness and endurance. Gait much less waddling. Can stand

on the left leg but in so doing she is leaning over somewhat toward that side. In side-lying position she is able to abduct to 20 ° (fig. 1).

Case 2, aged 7. J. no. 21711. Poliomyelitis at the age of 5. Generalised mild paresis of the whole of the right lower limb. Hip abduction nil; other muscular functions present but slightly impaired. Patient is walking badly, with poor weight-bearing on the right leg. Op. 1931. Discharged after 4 months

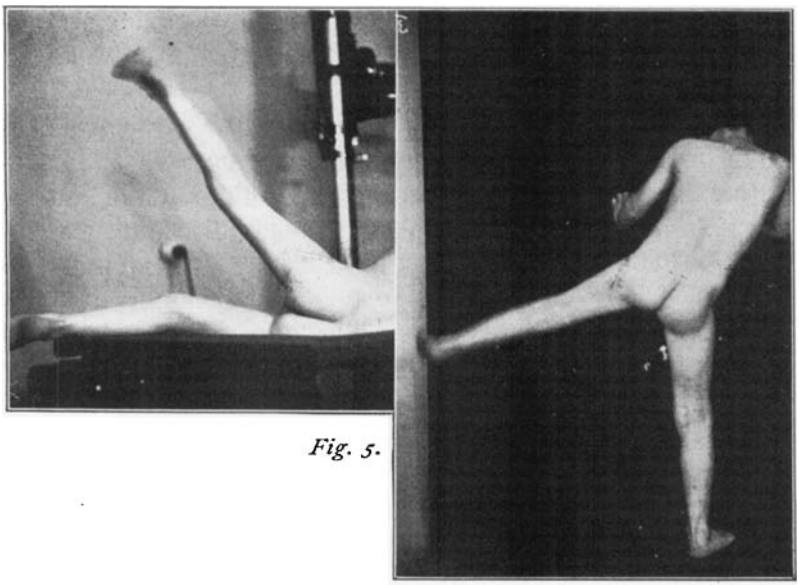

Fig. 5.

(intercurrent infected throat): in side-lying position active abduction to 15 °. With leather brace for foot and knee (hip free) patient stands with Trendelenburg's sign negative.

Case 3, aged 9. J. no. 12149. Poliomyelitis at the age of 5. There is almost complete paralysis of the whole of the right lower limb except knee flexors and hip-muscles; abduction, however, nil. Walking very badly with keeping the hand on the knee. Op. 1931. Discharged after 8 weeks: trace of abduction in side-lying position; unable however to lift the limb without concurrently moving the pelvis. With leather brace for foot and knee (hip free) patient stands with Trendelenburg's sign weakly

positive; yet there is much greater stability than before the operation.

Case 4, aged 9, J. no. 21822. Poliomyelitis at the age of 7. In the left lower limb there is entire lack of knee extension and hip abduction. Patient is walking with the leg swinging and with waddling gait. Unable to stand on left leg. Op 1931. At a first sitting quadriceps plasty was performed — one month later plastic operation of the gluteus medius. After-examined 1932: patient is walking well without supporting appliances; no waddling. Standing firmly on the left leg. In side-lying position active hip-abduction 45° (slightly in a direction of flexion). No supporting appliances (fig. 2).

Case 5, aged 10. J. no. 20429. Poliomyelitis at the age of 8. Right foot paralytic in well marked valgus position with excavation. Knee normal. Isolated abductor paralysis in hip. Patient is walking with great unsteadiness; unable to stand on right leg. Op. 1931 (at a first sitting plastic op. of gluteus med. was performed; one month later *Cramer*'s graft arthrodesis of the foot). Patient discharged after 4 months: walking very well with arthrodesis boot and with scarcely any instability of the hip. Can stand on right leg with Trendelenburg's sign weakly positive. In side-lying position active abduction 20°.

Case 6, aged 26. J. no. 23372. Poliomyelitis at the age of 23. Right foot completely paralysed. Knee normal. Isolated abductor paralysis in hip. Walking with great instability in hip, like a well marked dislocation. Unable to stand on right leg. Op. 1932. Discharged after 10 weeks: walking with arthrodesis boot. Gait much better, slight weakness in hip. Can stand on right leg with Trendelenburg's sign weakly positive. In standing position there is active abduction to 30°, in side-lying position 15° with conjoint movement of pelvis. The patient was sent to us by the Royal Board of Pension for being trained in some trade. Is resuming his occupation as a farmer (fig .3).

Case 7, aged 17. J. no. 24005. Poliomyelitis at the age of 16. Patient is walking with great weakness of hip like a well marked dislocation. Isolated abductor paralysis. Op. 1932. Discharged after 9 weeks: walking practically without any

limping. Trendelenburg negative. In standing position there is active abduction of 30 °, in side-lying position 20 ° (fig. 4).

Case 8, aged 8. J. no. 13072. Poliomyelitis at the age of I month. Patient is walking with great weakness of hip like a well marked dislocation. Isolated abductor paralysis. Op. 1932. Discharged after 10 weeks: walking practically without any limping. Trendelenburg negative. In standing position there is active abduction of 45 °, in side-lying position 30 ° (fig. 5).

DISCUSSION:

P. G. K. Bentzon, Copenhagen:

Dr. Nilsonne's communication about the excellent results with Legg's transplantation of the m. tensor fasciæ latæ in connection with the plastic operation on the gluteus maximus in paralysis of the abductors, as stated by me in 1930, of course interested me very much, and I am very grateful to Dr. Nilsonne for the energy with which he has taken up this method of operation. In the two patients I demonstrated in Copenhagen in 1930 there was no m. tensor fasciæ latæ at my disposal, so I had to be content with the transplantation of the gluteus maximus. In the adult patient with the highly paralytic leg the muscle never became so sufficient as to diminish her claudication materially, but her gait became more persevering. In the boy, however, the power of the transplantation material has constantly been progressing, so that he now walks with normal movements of the hip and has got so good an active abduction that not only is Trendelenburg's sign negative but there is a considerable »reserve power«. A completely paralytic crus, for which an arthrodesis in the foot will be made when he gets old enough, marks his gait so much that it cannot be called completely normal. I myself have only had the opportunity of performing the gluteus maximus transplantation once more, and it was in a highly disabled young woman who had both a right-sided spastic hemiplegia and sequelæ poliomyelitidis, especially interfering with the left lower extremity. On this side the plastic operation on the gluteus maximus was performed (the

tensor fasciæ latæ could not be used) with improvement of the persistence of the gait but without demonstrable influence on the marked claudication, which was not expected either under these circumstances.