The management of children with bilateral phocomelia is very difficult. In these patients the whole or greater portion of the femur is absent, as is usually also the tibia. Conventional prostheses have, at the best, given laboured, restricted and unstable walking. The problem is made worse by the fact that many of these children have shortened and deformed upper limbs which are too weak to permit the use of sticks and crutches or to assist in maintaining balance. McLaurin (1967) developed a novel design of lower limb prosthesis known as the swivel walker for use in such cases in order to initiate a more successful and less tiring pattern of locomotion. We have followed his initial design with modifications in the light of experience, and have now used this pattern of prosthesis successfully in nine children. We are satisfied that we have been able to achieve two objects. Firstly, we have been able to provide a means of locomotion which makes few demands on their physique, and secondly, we have been able to bring the children safely up to their estimated normal height.

We have trained children for the swivel walker in three stages, but before any child has been fitted with a prosthesis he has been trained in the rocking horse devised by McLaurin. The socket, made by a suspension method (Fig. 1), is mounted first on the trainer until the child learns the movements, and then is used for the walkers.

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Figure 3—Second stage. The temporary wooden platform has been removed. The leg pylons have been set at the position of maximum stability. The permanent supporting platform is now much reduced in size enabling a dress or trousers to be fitted satisfactorily.

Figure 4—Once the child has settled on Stage 2 and is fully stable the wooden foot pieces can be replaced by shoes and the leg pylons covered with cosmetic shin-pieces.

Figure 5—Showing third stage of development with a jointed hip to allow flexion and enable sitting. The swivel units are now fitted at the upper end of the metal pylons beneath the socket instead of at the lower end above the ankle as shown in Figure 3.

Figure 6—Third-stage prosthesis in use showing appearance of child when fully clothed.

Figure 7—Child sitting in third-stage prosthesis.
Stage 1—This is as described by McLaurin (Fig. 2) and allows the child to gain confidence in its stability. It is usually started with the ischial tuberosities at a height of about 30 centimetres from the floor. As the child gains confidence the platform can be raised, usually by 5 centimetre increments, until what is considered to be normal leg length for the child’s age is reached. An increase in height of 15 to 20 centimetres in three weeks is easily accepted by the child.

![Image](image1)

**Fig. 8**

"Instep" to give stability.

We place great importance on achieving the greatest possible stability (Fig. 3), and the upper mountings for the leg parts are moved about the platform to maintain this condition as the height is increased.

After a period of some weeks during which the child gains confidence in standing and walking and also learns to get in and out of the socket unaided, the second stage of walker is introduced.

Stage 2—In this stage the temporary wooden support and platform are removed, making the prosthesis less bulky and unsightly, and dressing easier (Fig. 3). The appearance can be further improved by putting the feet into shoes and adding a cosmetic shin-piece (Fig. 4).

Stage 3—We have recently introduced a third stage in the development of these swivel walkers (Fig. 5). The socket is the same as in stage 2 but a hip joint and lock are fitted to allow sitting (Fig. 7). The swivel units are fitted at the upper end of the metal pylons underneath the socket instead of at the lower end as previously, and the "legs" rather than the shoes are angled, giving rotation about a vertical axis. This has removed the tendency for the toe to "dig in" at the end of the forward movement, because the axis of rotation is now vertical.

We have not introduced knee flexion at this stage because we have found that the combination of a knee and hip joint gives the children a feeling of insecurity and prevents them from indulging in normal activity in the legs.

**DISCUSSION**

We have recently been greatly impressed with the ready acceptance by both child and parent of this method of walking and in particular with the confidence which the children show. While we realise that there are limitations with this type of device, many have previously had unsatisfactory experience with standard prostheses and have been unable to walk. The appearance of a child when fully clothed is nearly normal on this type of walker (Figs. 6 and 7).
THE MANAGEMENT OF LOWER LIMB PHOCOMELIA

One of the limitations of the swivel walker is the difficulty found in negotiating inclines and irregularities on the ground. We have found that creating an "instep" along the full length of the foot by building up at heel and toe has helped to overcome the latter by limiting the angular tilt which may be caused by any particular obstacle (Fig. 8).

Over the past two years we have found this pattern of walker to be safe, and it has required very little repair or adjustment.

SUMMARY

1. Experience with the McLaurin swivel walker for children with bilateral phocomelia of the lower limbs is described.
2. Modifications to the prosthesis and the method of fitting in stages are recorded.

This development could not have taken place without the interest and cooperation of the Department of Home and Health, and the ready help of Messrs Kellie of Dundee who manufactured the various stages of prosthesis. We wish to thank Miss L. Penny, physiotherapist, for training the children, Mr Alan Dodds and Mr Michael Devlin for the photographs and Miss Christine Telford for help with the manuscript.

REFERENCES