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TECHNICAL NOTE

The McFarlen Below-Knee Suspension System

From the time of the introduction to the Patella-Tendon-Bearing below-knee prosthesis, I have felt the need for a more adequate suspension system. The criteria for an improved suspension system are:

1. Maintenance of a comfortable residual limb position within the socket when the patient is sitting.
2. Minimum skin stress resulting from intimate contact between residual limb and socket when the patient is walking.
3. Both of these goals should be achieved without the use of a waist belt (Fig. 1) (I believe that a waist belt is uncomfortable and encourages a lordotic posture.)

After much experimentation, a suspension system has been designed that in most cases eliminates the need for a waist belt and achieves all the other design criteria (Fig. 2). In addition, it is interchangeable between left and right sides.

The McFarlen BK suspension System

Fig. 1. UCB system modified with belt, bilateral.

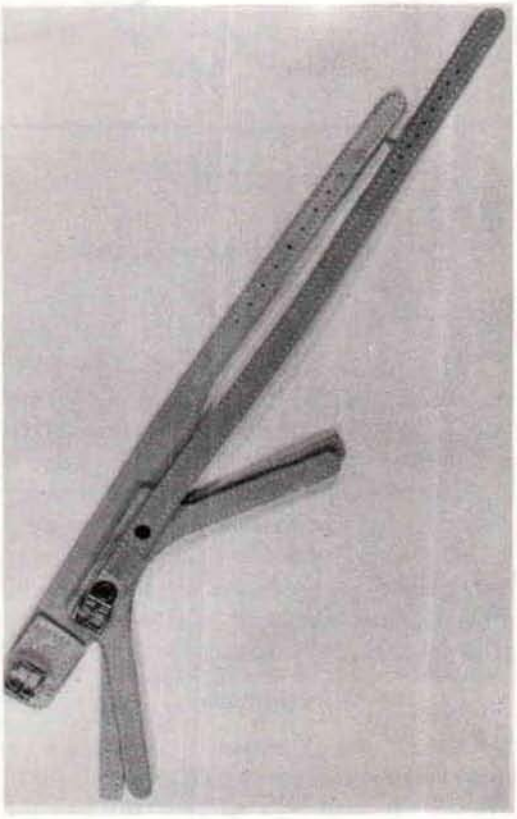

Fig. 2. McFarlen system overlay with UCB system.

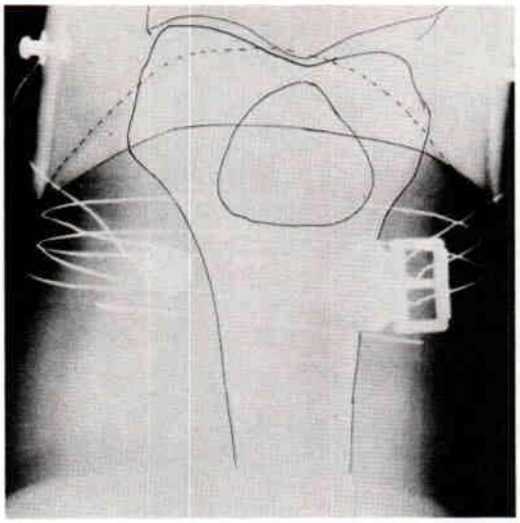

Fig. 3. X-ray anterior view, McFarlen system.

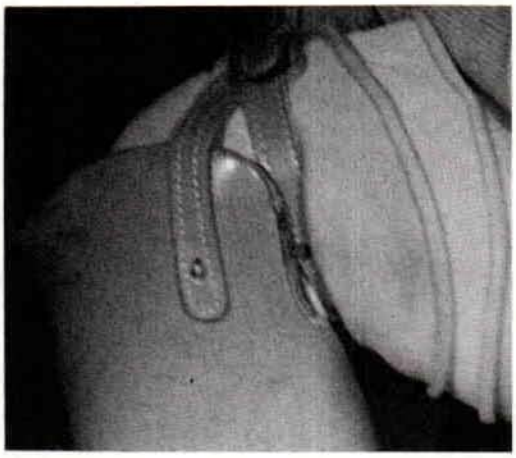

Fig. 4. Sitting, McFarlen system, medial view.

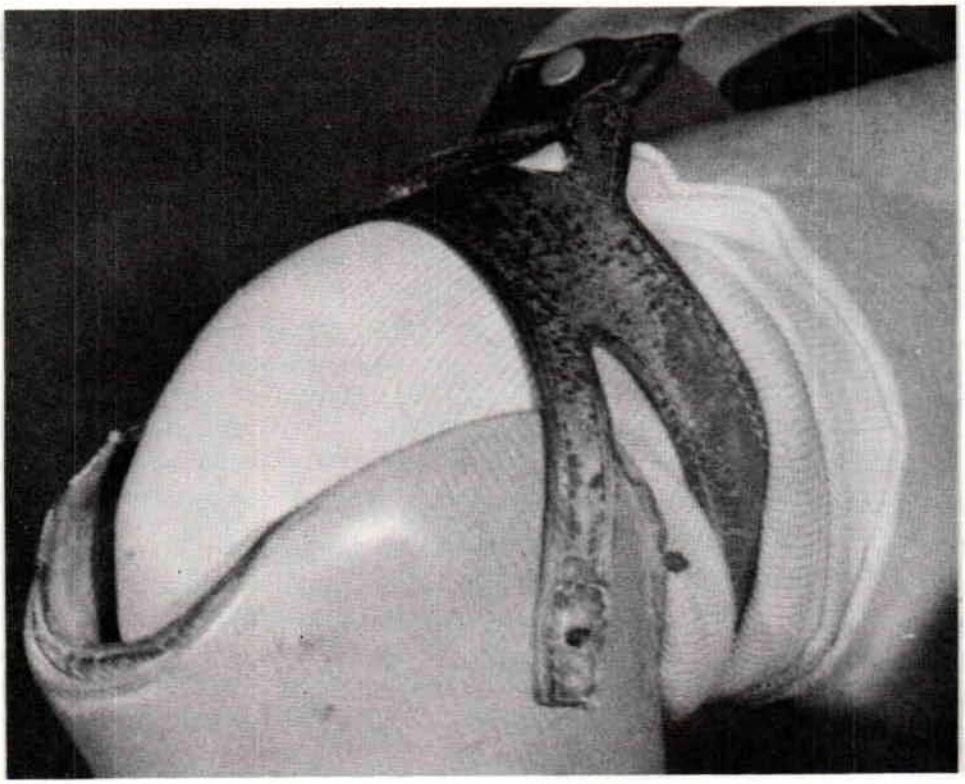

Fig. 5. Sitting, UCB system, medial view.

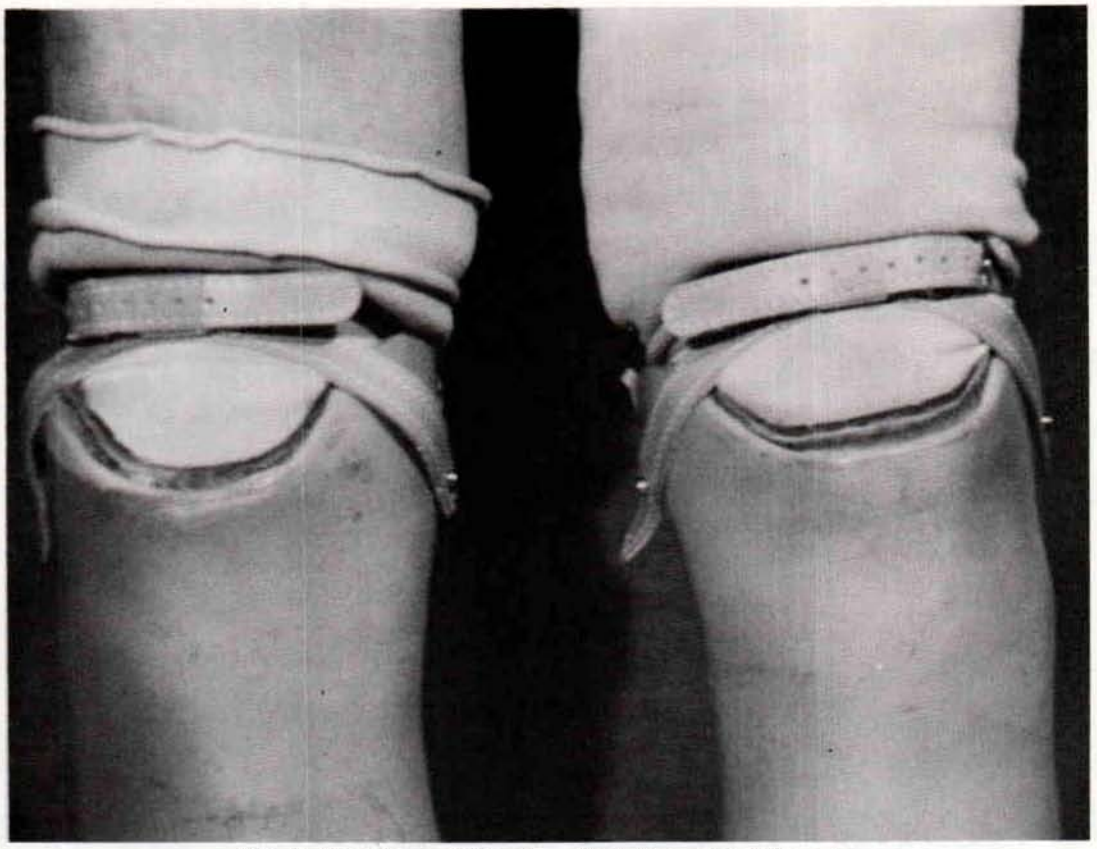

Fig. 6. Standing, anterior view, McFarlen system, bilateral.

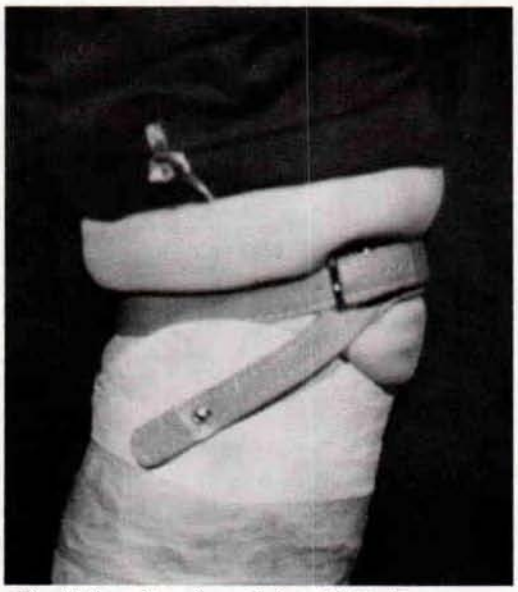

Fig. 7. Standing, lateral view, McFarlen system.

when located properly anteriorly is *at the proximal edge of the patella,* which I believe to be the most suitable position for the strap.

The strap when positioned in this manner requires a one to two cm. reduction in height of the medial and lateral trim lines to avoid "bridging." Because it is necessary to extend the socket walls only as far proximally as the condyles for stability, this reduction will have no effect on the medio-lateral stability of the prosthesis. Just proximal to the condyle is soft tissue where the strap can attain a good purchase on the femoral epicondyles. An X-ray view is shown in Figure 3.

When placed correctly, the strap upon knee flexion will come to rest on or near the posterior trim line of the socket (Fig. 4), thereby eliminating the common and

Fig. 8. Sitting, medial view, McFarlen system.

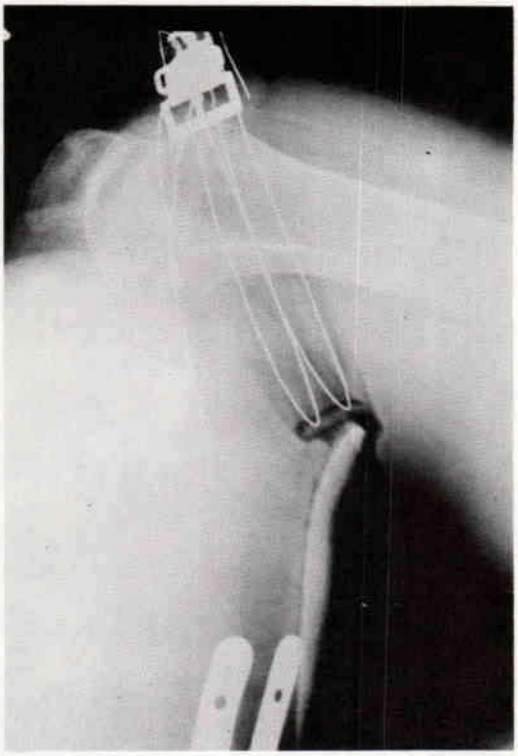

Fig. 9. X-ray, sitting, medial view, McFarlen system.

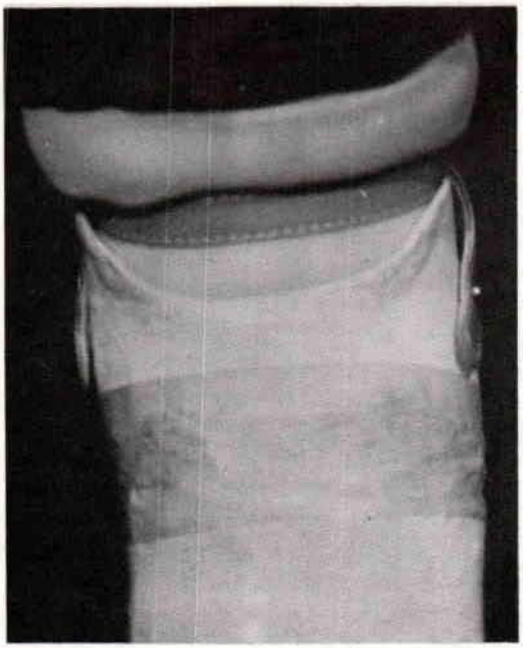

Fig. 10. Standing, posterior view, McFarlen system.

sometimes uncomfortable popliteal bulge (Fig. 5). Figure 6 illustrates the same patient standing with the McFarlen B/K Strap. It is interesting to compare this with Fig. 5, which shows the same patient and the UCB type suspension with waist belt. Note the popliteal bulge when the patient is sitting. Fig. 7 clearly illustrates a sagittal view of an active male patient (5'10", 210 lbs.) with a temporary plaster prosthesis, note the distal placement of the McFarlen BK Strap. Notice in Figures 8 and 9, two views of the same patient, that with knee flexion the strap actually disappeared into the posterior fold of the knee, thereby supporting the soft popliteal tissue. Figure 10 shows a posterior view and Figure 11, an anterior view of

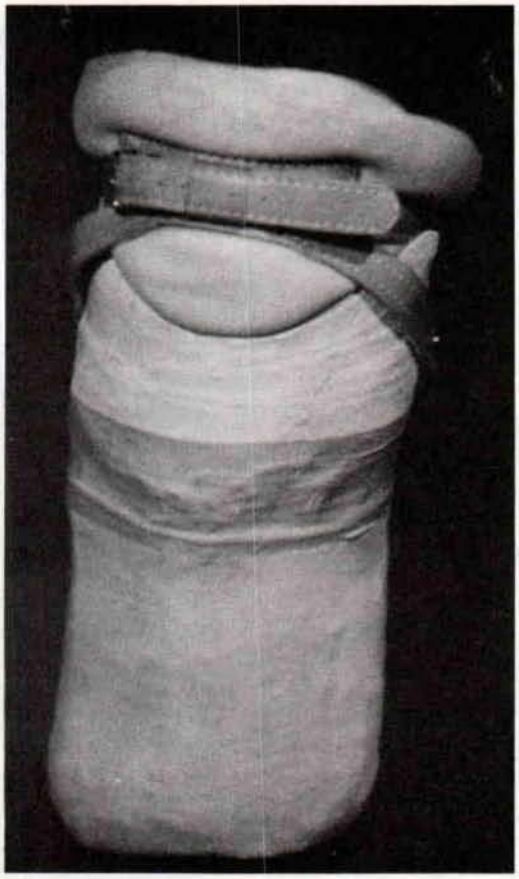

Fig. 11. Standing, anterior view, McFarlen system.

the same patient with the McFarlen Suspension System.

As seen in the illustrations, this suspension system allows for superior sitting comfort and suspension than that provided by any other supracondylar strap now available. Personally, I have used the system with great success on over 100 patient fittings since its original design in 1975.

The McFarlen B/K Suspension System, available through Pope Brace Company, is complete with four oz., top grade smoked elk, including buckle, rivets and keeper. It is adustable in length to 17¾" and can be assembled either right or left. This is a savings in itself by eliminating the need for excess inventories.

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