

THE OHC KNEE-DISARTICULATION PROSTHESIS

Erik Lyquist¹

Because the length and bulging shape of the distal part of the stump of the knee-disarticulation case have made it difficult to provide a functional prosthesis that is reliable and cosmetically acceptable, surgeons have been discouraged for carrying out disarticulation at the knee.

However, amputation by disarticulation at the knee results in a stump with many obvious advantages over amputation at a higher level:

1. The stump is end-bearing, i.e. the major part of body weight can be transmitted through the distal stump surface.

2. The long stump makes possible effective medio-lateral stability in the socket at minimum unit pressure.

3. The stump musculature is well preserved and the extension moment produced in the hip joint will, under normal conditions, be sufficient to secure stability of a prosthetic knee in the stance phase of walking.

4. The bulgy distal part of the stump may be used for suspension of the prosthesis. It also provides good resistance to rotation about the long axis of the thigh.

5. Proprioception is probably better than when the amputation is at a higher level.

While knee mechanisms with built-in friction brakes (extension stabilizing) are not required in the majority of cases, swing-phase control is desirable because of the possibilities of the high and varying walking speeds that are normally possible.

To make the most of the advantages and at the same time reduce or eliminate the disadvantages, the Prosthetics-Orthotics Research Department of the Orthopaedic Hospital in Copenhagen has developed a polycentric knee unit of the four-bar linkage type with a built-in hydraulic swing control unit (Figs. 1-3).

The knee unit has been designated the OHC



Fig. 1. The OHC knee-disarticulation prosthesis in extended position but without cosmetic cover. Note the polycentric hinge arrangement that makes it possible to place all mechanisms distal to the end of the stump and at the same time allow for installation of a fluid-type swing-phase control unit. The piston rod can be seen between the two vertical links of the four-bar polycentric system.

¹The Orthopaedic Hospital, 3 Hans Knudsens Plads, 2100 Copenhagen Ø, Denmark.



Fig. 2. The OHC knee-disarticulation prosthesis in flexion. Flexion is limited to about 100 deg. but this seldom presents a problem to most lower-limb amputees.

UNIT which, of course, is an abbreviation for the Orthopaedic Hospital, Copenhagen.

Use of a polycentric knee unit has made it possible to locate the knee mechanism immediately below the socket and thus obtain cosmetic advantages acceptable even to young female amputees. This arrangement also permits incorporation of a fluid-control type of swing-phase control. The OHC unit can also be used on above-knee amputees.

Knee flexion is limited to about 100 deg. but this seldom presents a problem to most lower-limb amputees.

The OHC unit is available commercially and the manufacturer² furnishes a comprehensive manual covering application and use of the device.

²United States Manufacturing Company, 623 South Central Avenue, Glendale, California 91209.

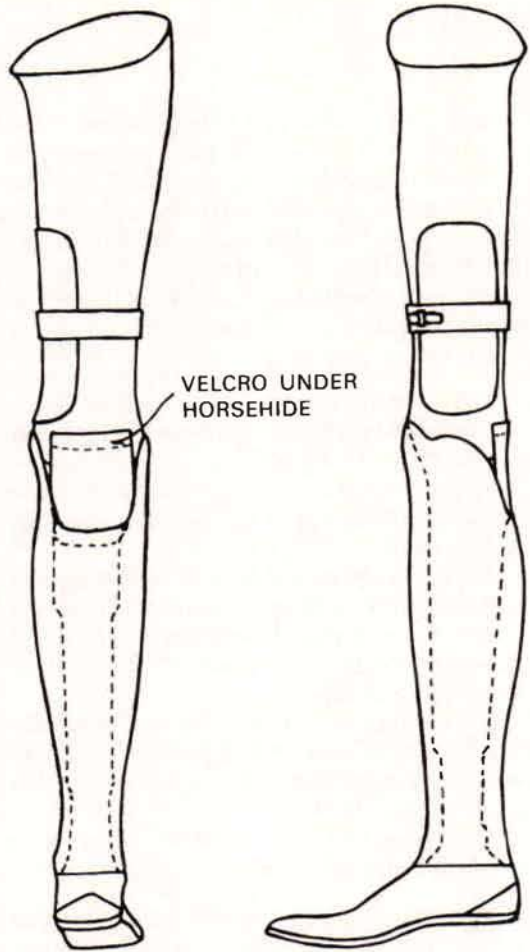


Fig. 3. Line drawing showing the OHC knee-disarticulation prosthesis with cosmetic cover in place.