THE HIP-DISARTICULATION AND SHORT ABOVE-KNEE IMMEDIATE POSTSURGICAL ADJUSTABLE PYLON PROSTHESIS [a]

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INTRODUCTION

The fitting of short above-knee stumps with an immediate postsurgical prosthesis in our experience originally required the use of a balsa wood or styrofoam extension block between the distal cast-socket and the socket attachment plate. This was necessary in order to place the effective prosthetic knee center in a more functional anatomical position corresponding to that of the sound side. Location of the extension block in proper alignment attitude of flexion and adduction including anterior-posterior and medio-lateral placement was considered critical and demanded skill and experience on the part of the prosthetist. With the patient anesthetized and supine, application was under less than ideal conditions. Satisfactory results were nevertheless routinely possible when the prosthetist complied with the recommended Prosthetics Research Study procedure developed for this technique. Failure to follow the prescribed instructions could require complete removal of the socket attachment straps and plate including the extension block from the cast-socket (rigid dressing) to achieve a more desirable and functional relocation. Of course, inconvenience, time consuming delays, and undue pain to the patient would result if this procedure was necessary in the early postsurgical period.

It was also difficult if not impossible to determine the proper length of the extension block preoperatively and therefore required either bringing several extension blocks of varying sizes or carrying a small portable handsaw to the operating room to shorten the extension to its

[a] Based on work performed under VA Contract V5261P-438.

required length. To avoid the obvious shortcomings of this practice, the Prosthetics Research Study redesigned the existing above-knee pylon prosthesis for short stumps by substituting an exteriorized pylon tube as part of the thigh section for the extension block segment of the rigid dressing (Fig. 1).

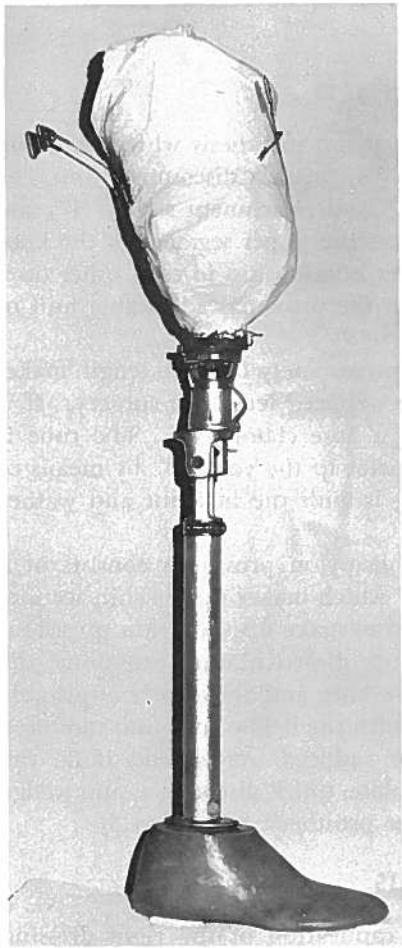

FIGURE 1

It has been our practice in the past to provide the hip-disarticulation amputee with a non-articulating, straight pylon tube combined with SACH foot and a U.S. Manufacturing Co. wedge disk below-knee prosthetic unit with quick disconnect. Light weight and minimum bulk resulted in a relatively uncomplicated prosthetic unit. However, simplicity of design and application was accomplished at the expense of function. In the early postoperative period, the functional demands on

the prosthesis are static in nature but become progressively more critical as the patient proceeds to limited ambulatory activities. At this stage, the non-articulating prosthesis becomes inadequate, contributes to bad gait habits, and thus makes some means of articulation mandatory. The following describes the Prosthetics Research Study articulating hip-disarticulation and short above-knee postsurgical adjustable pylon prosthesis developed to aid the patient as he reaches the stages of limited ambulation.

METHOD (Fig. 2)

The components of the above-knee pylon prosthesis which make up the adjustable section (wedge disks "4," quick disconnect unit "3" including socket attachment plate "2," and attachment straps "1") are removed from the yoke "9" which forms the upper segment of the knee joint. They are reassembled in proper relationship to each other on a below-knee-type base plug "5" to form the proximal adjustable unit of the new modified pylon prosthesis.

A pylon tube with base plug "8" approximately 10 in. in length makes up the thigh section and is cut to the required length in surgery. It is attached to the adjustable unit with a hose clamp "7." The tube is secured distally through its base plug slot to the yoke "9" by means of the distal center bolt "9A," fastening it with the hex nut and washer "9B."

The lower portion of the adjustable pylon prosthesis consists of a 15-in. pylon tube with base plug "8A" which makes up the shin section.

In essence, the components required to make up the pylon prosthesis for short above-knee stumps and hip disarticulations combine the standard U.S. Manufacturing Co. below-knee and above-knee adjustable postsurgical prostheses into one unit, with the below-knee unit mounted on top of the above-knee unit. For reduced weight and bulk, the socket attachment straps, attachment plate, quick disconnect, and wedge disks are removed from the above-knee prosthetic unit (Fig. 3).

RESULTS

The new pylon system simplifies application of the rigid dressing including the short above-knee pylon prosthesis. While the weight of the resulting prosthesis remains approximately the same, less plaster work is required in the application and more accuracy is achieved in the initial alignment process. The new adjustable pylon prosthesis also provides additional ¾ in. horizontal slide adjustment anteroposteriorly and medio-laterally as a result of the anterior-posterior slot provided in the base plug of the pylon tube ("8" thigh section) and the medio-lateral slot in the yoke "9" of the knee joint component.

HIP-DISARTICULATION and SHORT ABOVE-KNEE POSTSURGICAL ADJUSTABLE PYLON PROSTHESIS

1 - Socket Attachment Straps

2 - Socket Attachment Plate

3 - Quick Disconnect Unit

3A - Quick Disconnect Thumb Screw

3B - Proximal Center Bolt

4 - Wedge Disks

5 - Proximal Base Plug

6 - Windows

6A - 9/16 Hex Nut and Washer

7 - Proximal Hose Clamp

7A - Distal Hose Clamp

8 - Pylon Tube (Thigh Section)

8A - Pylon Tube (Shin Section)

9 - Yoke-Knee Base Plug

9A - Distal Center Bolt

9B - 9/16 Hex Nut and Washer

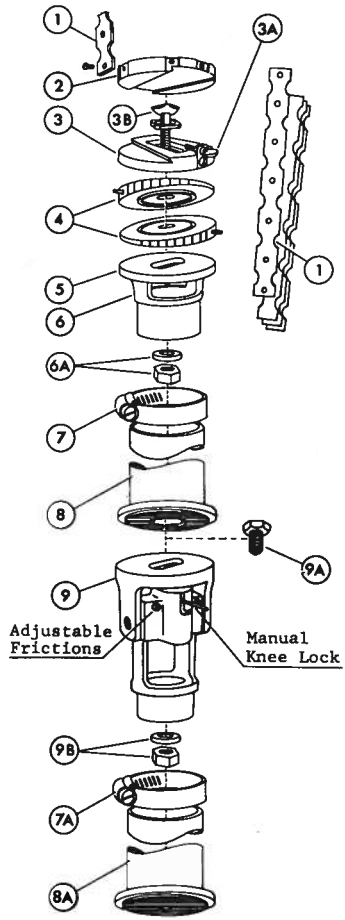

FIGURE 2

The hip-disarticulation amputee benefits are obvious through the improved function of the pylon prosthesis. It is no longer necessary to provide ½ in. shortening of the pylon tube on the amputated side to facilitate toe clearance in swing phase. Circumduction of the prosthetic pylon and hiking on the sound side are also circumvented with an overall general improvement in the patient's gait pattern (Fig. 4).

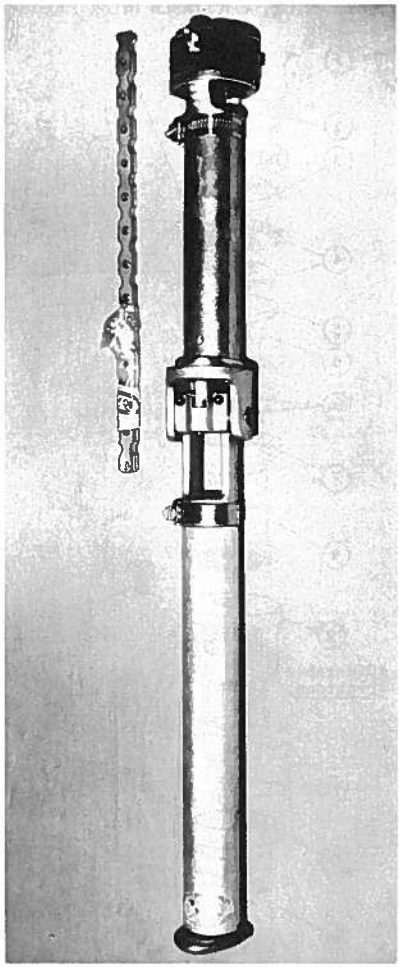

FIGURE 3

FIGURE 4

SUMMARY

An improved adjustable pylon prosthesis for immediate postsurgical prosthetic fitting of short above-knee and hip-disarticulation amputations is described. The system was developed by combining the U.S. Manufacturing Co. adjustable above-knee and below-knee prostheses into one unit. The new pylon prosthesis simplifies the application technique for the rigid dressing and initial prosthetic alignment procedures. It provides significant functional improvements in the gait of the hip-disarticulation amputee.