Modified Crutch for the Upper Extremity Amputee with Lower Extremity Involvement

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The Prosthetics/Orthotics and Physical Therapy Departments were faced with the challenge of creating a modified crutch for an upper extremity amputee with lower extremity involvement. A 46-year-old man, with congenital absence of both fibulae and his left arm from above the elbow, underwent a left total hip replacement in March 1979. He then had a left supracondylar osteotomy for valgus deformity in July of the same year. The patient’s left lower extremity was supported in a splint, and he was to ambulate nonweight bearing on the left. He had an upper extremity prosthesis but chose not to wear it because of extreme discomfort.

After surgery, the patient’s goals were to become independent in transfers and in ambulation both on level surfaces and stairs. Therefore, we needed to design a device whereby the patient could achieve these goals. To allow this patient to use crutches, and for ease of fabrication, we made an open-socket mold from the patient’s stump out of Orthoplast* in accordance with general prosthetic principles. We bonded the open socket to a strip of Orthoplast by heating the two pieces together with a heat gun and trimmed the strip to the shape desired. We then brushed carbon tetrachloride over the Orthoplast to enhance its adherent qualities and wrapped the socket and the strip around the vertical sides of the crutch (Fig. 1). The patient wore a stockinette over his stump, which served as a barrier between the skin and Orthoplast to prevent irritation. This device kept the stump firmly supported and enabled the patient.

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to bear weight under his axilla and on the distal end of his stump without discomfort.

A further modification was needed to maintain the crutch in a proper position during walking. Therefore, we attached a standard figure-eight harness from the patient's right upper extremity and across his back to both vertical crutch supports directly under the axillary pad on the left crutch (Fig. 2).

Upon discharge from the hospital, the patient was able to put on his modified crutch without assistance, to transfer, and to walk on all surfaces independently.

**MATERIALS**

- two 12-inch by 20-inch Orthoplast sheets
- heat gun (hairdryer, oven, or hydrocollator may be substituted)
- 4-inch stockinette
- aluminum crutch (wooden crutch may be substituted)
- carbon tetrachloride
- scissors
- brush (sponge may be substituted)

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**Table to Facilitate Donning Stubby Prostheses by Bilateral Above-Knee Amputees**

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The use of short “stubby” prostheses in elderly bilateral above-knee amputees has been advocated by several authors.\(^1\)\(^2\)\(^3\) The major advantages of these prostheses are that they 1) lower the center of gravity, reducing the incidence and seriousness of falls and 2) eliminate the prosthetic knee joint, providing better control and possibly reducing the cardiovascular stress of ambulation.\(^3\) Cosmesis has been the major disadvantage.\(^4\) Another problem, which we recently encountered in training a 73-year-old patient with bilateral amputations, is difficulty in donning and removing the prostheses. A special table was constructed by one of the authors (D.R.) to facilitate this activity. Prior to its construction, our patient had to don his prostheses either while supine in bed (using a wall as counterforce) or balancing on the stubbies while they rested on the floor; both methods were