

THE SUPRACONDYLAR-SUPRAPATELLAR PTB PROSTHESIS

Gustav Rubin, M.D., F.A.C.S.

Consultant on Orthopedics

VA Prosthetics Center, Veterans Administration
252 Seventh Avenue, New York, N.Y. 10001

Robert O. Nitschke, C.P.

Rochester Artificial Limb Co., Inc.
275 Central Avenue, Rochester, N.Y. 14605

Henry F. Gardner, C.P.O.

Technical Assistant to the Director

VA Prosthetics Center, Veterans Administration
252 Seventh Avenue, New York, N.Y. 10001

In spite of its wide acceptance and increasing use, the patellar-tendon-bearing (PTB) prosthesis has been generally considered "contraindicated" for two classes of below-knee amputees. Not considered candidates for PTB prostheses were patients with short stumps (less than 3 in.) and those with knee instability due to ligamentous or muscular dysfunction. Insufficient stump length or knee instability led to the prescription of auxiliary suspensions such as thigh corsets. This solution frequently offset the advantages of the classic PTB prostheses which were the elimination of thigh corsets and the provision of total contact. A recent variation in the basic design of the PTB developed by Robert O. Nitschke of Rochester, N.Y., called the Supracondylar-Suprapatellar PTB prosthesis (PTS), has all but eliminated the "contraindications" due to short stumps and/or knee instability.

The PTS prosthesis is especially designed to stabilize the knee and to suspend the prosthesis without resorting to external components. As shown in Figure 1, it is nothing more than a PTB prosthesis which extends over the patella and over the femoral condyles. By molding the socket above the level of the condyles, an integral "clip" is produced which prevents the socket from slipping distally during swing phase. The areas over the condyles, in combination with the area extending over the patella, stabilize the knee and prevent valgus, varum, and/or recurvatum during stance. Details on the fitting, alignment, and fabrication of this prosthesis are described in Program Guide G-6, M-2, Part



FIGURE 1.—Modular "PTS" supracondylar-suprapatellar prosthesis with custom-shaped polyethylene foam covered by opaque knee length hose.

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The value of the PTS prosthesis for patients with weight-bearing and knee-stability problems is demonstrated by a particularly difficult case recently evaluated at VAPC. The patient was referred by colleagues in Colombia, South America, where she lives, to the VA Prosthetics Center for consultation. The fabrication and fitting of the prosthesis was done by Mr. Nitschke, one of the coauthors of this paper.

Examination of the 20-year-old-female patient revealed a right below-knee stump secondary to elective surgery at 5 years of age for congenital deformity. Although the external appearance of the stump seemed normal, X-ray photographs (Fig. 2) showed all of the bony elements of a foreshortened, congenitally deformed leg, except for the forefoot which had been amputated to permit the fitting of the patient's initial prosthesis. The underdeveloped and malformed tibia and fibula did not articulate with the femoral condyles.

The rounded proximal tibial stump contacted the femur posteriorly on full extension, provide a fulcrum against quadriceps action. The normal stabilizing ligaments were absent, and the fleshy stump with the body segments imbedded was freely movable through a range of 45 deg. of abduction and adduction (Fig. 3, 4, and 5). Since the tibial condyles were underdeveloped, the bony flares ordinarily used for weight bearing were inadequate.

After a short period of adjustment and training, the patient's gait was excellent. Knee extension was limited (approximately 5 to 10 deg. of flexion) to control knee instability. The patient was able to sit, mount and descend steps and ramps, and walk on uneven ground with no difficulty.

The supracondylar-suprapatellar (PTS) prosthesis provided knee stability while permitting freedom of motion. No auxiliary suspension other than the use of garter hose was necessary.