

Clinical Study of the Application of the PTB Air-Cushion Socket¹

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From January 1966 to September 1968, the Orthopaedic Hospital in Copenhagen conducted a clinical evaluation study of the patellar-tendon-bearing (PTB) air-cushion socket (see p. 1).

The Prosthetic/Orthotic Research Department at the hospital fabricated the sockets, using the casting procedure described by Wilson and Lyquist (2) and the fabrication procedures described by Lyquist and his associates (1). These procedures and the results of fitting 45 amputees were published in September 1968.³

Forty-five amputees were selected for the test series and fitted with air-cushion sockets. Four patients were eventually dropped from the study, three because of their inability to return for re-examination, and one because of her confinement to a wheelchair as a result of progressive vascular disease.

The group of 41 amputees consisted of 30 males and 11 females, with ages ranging from 7 to 74 years (average age: 44).

CLINICAL EVALUATION

Seventeen of the amputees had been satisfied wearers of a PTB prosthesis for at least 12 months. After being fitted with air-cushion sockets, 13 noted improved

comfort and function, 3 found no change in comfort and function, and 1 was dissatisfied because of nocturnal stump pain.

Seven patients had previously been fitted with the standard type of PTB prosthesis, but satisfactory fittings had never been achieved. With fitting of the air-cushion socket, 4 amputees obtained satisfactory comfort and function. One patient was able to wear a modified air-cushion socket with a soft insert. The remaining 2 had to abandon the socket; both had short stumps (2-1/2 in.) with distal hypersensitivity.

Seven amputees had previously worn prostheses, but with complications such as ulcerations and secondary distal edema. Six obtained satisfactory comfort and function with the air-cushion socket, but one who had a short stump (2 in.) and extensive skin transplants was fitted after four weeks with a standard PTB prosthesis.

Four amputees had successfully worn conventional BK prostheses for periods of 40, 30, 13, and 6 years. Nonetheless, when fitted with an air-cushion socket, each preferred it to the conventional prosthesis.

Of the remaining 6 amputees, 5 had never worn a prosthesis. Two of those had distal edema and ulceration, which healed when an air-cushion socket was applied. Another had stump problems not attributable to the prosthesis, but he managed well with the air-cushion socket. A fourth patient had no stump problems, and successfully wore the socket. One amputee had to be fitted with a different type of prosthesis because his stump was hypersensitive distally and the volume was constantly changing.

¹ Adapted from an article in *Below-Knee Prosthetics*, a report of a symposium sponsored by the Committee on Prosthetics Research and Development, held at the Veterans Administration Center, New York, N. Y., Dec. 16-18, 1968.

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³ Prosthetic/Orthotic Research Department technical report (Danish).

SUMMARY

Of the 41 amputees fitted with the air-cushion socket, 36 had previously worn prostheses. In that group, 27 noted increased comfort and function, 4 were considered unchanged, 3 returned to wearing a standard PTB prosthesis, and 1 required fitting with a conventional prosthesis. One amputee had previously been fitted with an air-cushion socket by a private prosthesis, and got along very well. Of the 5 amputees who had not previously worn a prosthesis, 1 was not successfully fitted, but 4 were able to manage well with the air-cushion socket.

At the time of this report, 36 of the 41

amputees evaluated in this study were wearing the air-cushion socket. Although extensive final medical examinations of the entire group have not been completed, it is unlikely that the information resulting from those examinations will differ greatly from the results presented in this report.

1. Lyquist, E., L. A. Wilson, and C. W. Radcliffe, *Air-cushion socket for patellar-tendon-bearing below-knee prosthesis, principles and fabrication procedures*, Technical Memorandum, Biomechanics Laboratory, University of California, San Francisco and Berkeley, 1965.
2. Wilson, L. A., and E. Lyquist, *Plaster bandage wrap cast*, *Pros. Int.*, 3:4-5:3-7, 1968.