

Technical Note: The Soft Socket

by Arthur Forman, B.S., M.A.

INTRODUCTION

Oftentimes we are presented with an above-knee amputee who poses difficult problems for a successful prosthetic fitting. Some of these problems include advanced age, atrophy, trigger points, bony prominences, surgical implants, cardiopulmonary problems, short residual limbs, and other complications. Any one of these conditions might make for a difficult fitting, but any combination of these could contribute to an unsuccessful fitting, or a situation which precludes ambulation.

It is my contention that given the current generally accepted practices and when presented with an involved patient as indicated above, we are doomed to failure, in terms of comfort and ambulation. Further, it is my contention that very often, although these patients may be confined to a wheelchair even after prosthetic fitting, it is of paramount importance that they be fitted as comfortably as possible. Although they have lost a limb, they may be just as motivated as any other patient and can suffer psychological stigma.

Therefore, it is our duty as prosthetists to provide a prosthesis that will allow these patients to ambulate as much as possible, resulting in both psychological and physical benefits.

SOFT SOCKET RATIONALE

As we all know, the quadrilateral above-knee socket was originally designed and fitted for World War II traumatic amputees. They were

fairly young, usually with no other complications, good musculature, and in many cases of long length. Today we are faced with a high geriatric amputee population with conditions quite different than the World War II veteran. The quadrilateral above-knee socket design impinges directly on the neurovascular bundle in the area of the scarpa's triangle. The posterior seat area bears directly on an anatomical area which is usually atrophied to the point of being uncomfortable. These features alone call into question the viability of the quadrilateral design when considering an involved patient as described previously. The soft socket design as described, owes its inception to the CATCAM design.

The soft socket is almost an exact anatomical negative duplication of the residual limb without extreme scarpas impingement and without concentrated ischial weight bearing. It is lined with 1/2" thick Plastizote, or similar forgiving material that enhances soft tissue bearing, hence "soft socket." It is compatible with all existing above-knee components, far more cosmetic, aligned using current practices, and is fabricated only in a slightly different fashion. Also, it will allow the amputee to ambulate in a comfortable non-restrictive manner.

CASE STUDY

A seventy-six year old man was presented for prosthetic fitting. He was a traumatic amputee who had lost his leg during the Korean War and was left with a four inch length femur. He had been wearing an exoskeletal system

with an hydraulically controlled knee, conventional quadrilateral socket, hip joint, and pelvic belt. The prosthesis weighed approximately 13 pounds. The lateral wall of the socket was modified at mid-femoral length to impinge on the femoral shaft. The patient had recently undergone surgery to repair a fractured femoral head on the amputated side due to a fall. He had also recently developed emphysema and had lost a significant amount of weight. During weight bearing on the sound leg, he exhibited extreme fatigue and loss of breath. Despite these contraindications to prosthetic fitting, he expressed great motivation.

I proceeded with the standard impression technique using the Berkeley brim. The patient experienced discomfort while suspended in the Berkeley brim. He indicated specific areas of discomfort including the ischial/gluteal area and the lateral femoral area. This continued despite angular adjustments to the brim. An impression was taken. Upon examination of the impression and after discussion with col-

leagues, it was decided that a conventional fitting would not work. After mulling over the situation, it was decided to hand wrap a new impression, while the patient laid on his sound side. This was done in a very particular way, encompassing the gluteals, and hand forming the medial and posterior wall. A very anatomic impression was obtained. Modification was minimal and consisted mainly of smoothing up and adding a layer of 1/2" Plastizote (Figure 1) after lamination. The prosthesis weighed 7 1/2 pounds. This included a modular safety knee, extension assist, hip joint, pelvic belt, foam cover, foot, and shoe (Figure 2). The patient has been wearing this prosthesis and is quite satisfied.

CONCLUSION

It is my belief that we, as prosthetists, should approach our patients as individuals and if necessary, modify or completely discard commonly accepted techniques in order to success-

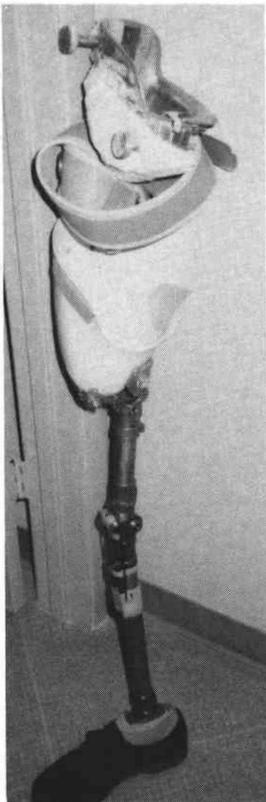


Figure 1. The Berkeley brim above the AK prosthesis with hip joint and pelvic band. Note presence of Plastazote pad in the ischial seat area.

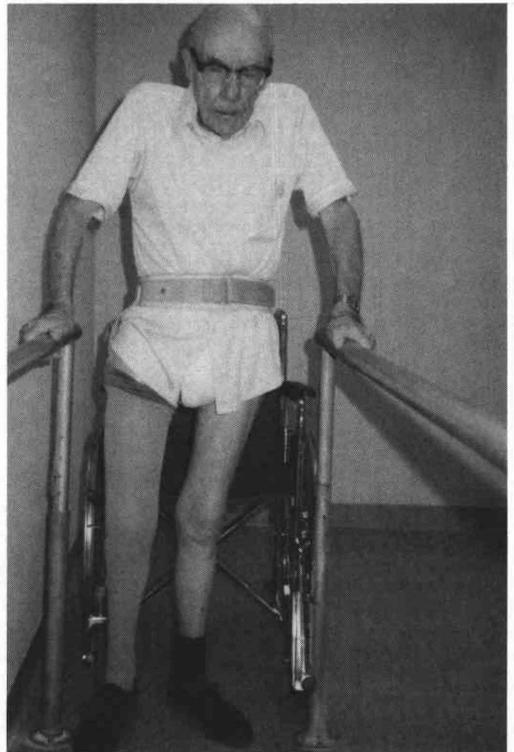


Figure 2. The completed prosthesis.

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fully fit the uncommon patient. We should continue to examine our techniques in order to upgrade our profession and better serve the community.

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