THE USE OF CHECK SOCKETS IN LOWER-LIMB PROSTHETICS

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Prosthetists have for years accepted and valued the use of a "check socket" in the fitting of upper-limb prostheses (4). However, prosthetists seem to be extremely reluctant to use check sockets in fitting lower-limb prostheses.

A check socket, for the purpose of this paper, is a socket in a relatively rigid material molded directly over the modified model of the amputation stump, and is used to determine the extent of additional modifications that will be required to obtain an optimum fit for the definitive prosthesis.

We began using check sockets for lower-limb fittings several years ago and have found them to be invaluable in determining the optimum fit of a socket. So useful were check sockets that they were adopted very quickly for routine use in our lower-limb prosthetics practice.

In the early days our check sockets were made by laminating three or four layers of cotton stockinette and polyester resin. Holes, ¼"-⅜" in diameter, were drilled in areas of the socket that the prosthetist felt he wanted to check. A blunt object such as a pencil eraser is used as a probe to indicate the pressure present in a given area. While these laminated check sockets were quite satisfactory and beneficial, the new *transparent* sockets (1) (2) (3) now available make the use of a check socket even more valuable.

To date the use of check sockets has provided only subjective information. We have found no way to compile quantitative, objective, or statistically useful information on the subject. Nevertheless, use of check sockets are well worth the effort.

In our group there are eleven certified prosthetists in eight patient-care facilities (Branch Offices) who are fitting patients daily. In addition there are seven other practitioners who are at various levels of experience in a supervised training program. All but two of the eleven certified prosthetists use check sockets as a routine part of their practice, and all seven of the other practitioners use them routinely on every fitting. The two prosthetists who do not use them routinely do use them selectively, and are using them more and more as they begin to appreciate their worth.

Because the technical part of prosthetics care is of primary interest to most prosthetists, we will discuss the use of check sockets from a technical standpoint first. The discussion will be in reference to the use of transparent, rather than laminated, check sockets.

USE OF THE TRANSPARENT CHECK SOCKET

The check socket is trimmed and prepared in the same manner as the definitive socket (Fig. 1). Numerous holes of ¼" to ⅜" in diameter are then drilled in any area of the socket from which information by "feel" is desired. Most common are those areas underneath the femoral and tibial

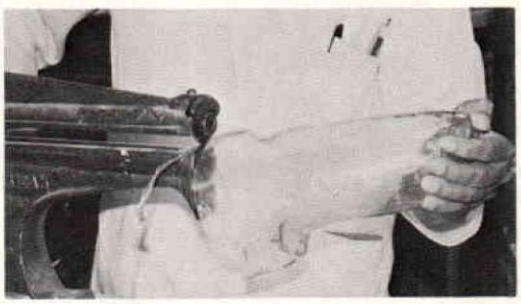

Fig. 1. Trimming the proximal border of a transparent socket for a below-knee patient.

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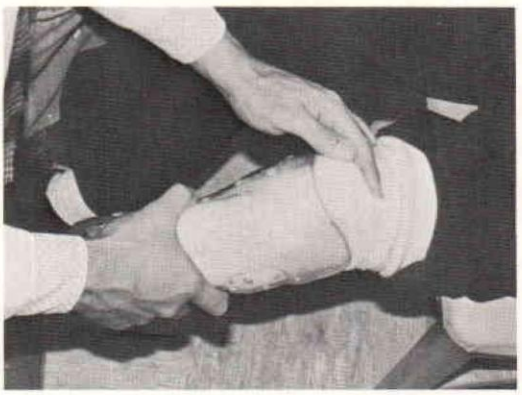

Fig. 2. Application of the transparent check socket by the prosthetist.

condyles, head of the fibula, the flare of the tibia on the medial side, but other areas may be just as critical on any given patient. A prosthetic, "stump," sock of the same type normally used by the individual prosthetist at "initial fitting" should be used in the check socket fitting.

As the amputation stump, with the sock, is introduced into the check socket (Fig. 2), the prosthetist brings his fitting experience into play and coordinates this with visual evaluation, looking for areas of restriction, tightness, or pressure in a given area prior to complete settling of the stump into the socket. We are looking for the "experience feel" in the prosthetist's hands of just how the stump is adjusting itself to the socket.

Torque, rotation, and pressure are applied through the socket by the prosthetist's hands, and, following this, the patient bears full weight on the socket as it is supported by a fitting stand (Fig. 3). After the socket is well set on the stump, further evaluation is accomplished by using a pencil eraser or other blunt object to test the pressure or lack of pressure through the holes. During all of these steps evaluations are made by correlating what is seen through the socket with what is felt by the probe on the soft tissues.

During this procedure notations and markings are made on the check socket to assist the prosthetist in making further modifications to the positive plaster model (Figs. 4 and 5). It should be emphasized that vision alone does not provide adequate evidence for the decisions that may be necessary. Only after considerable experience in relating visual information to the pressures found by palpation through holes directly to the skin surface can adequate evidence be gained for making "fitting" decisions. *In other words what you see with your eye may very well not be what is causing a problem or does not necessarily indicate that a problem does not or will not exist.* ONLY by coupling his previous experience with experience in the use of transparent check sockets will the prosthetist obtain the greatest value from transparent check sockets.

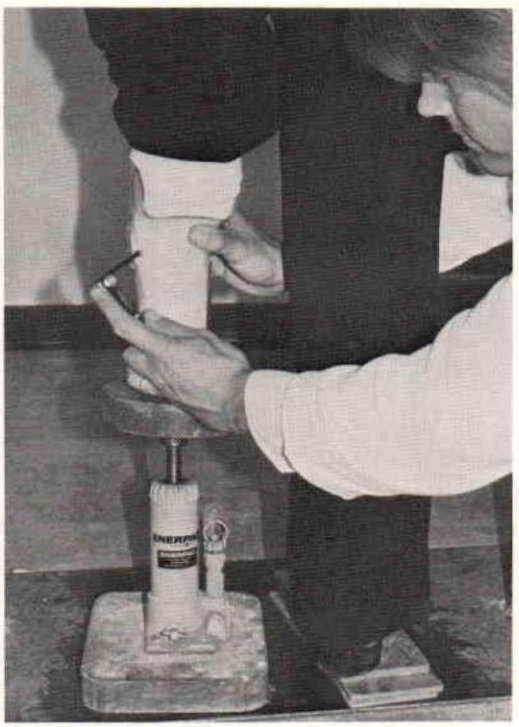

Fig. 3. Use of probe to determine degree of fit of socket during weight-bearing.

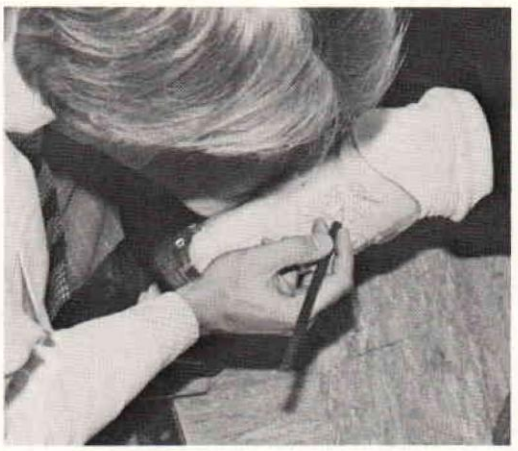

Fig. 4. Prosthetist indicates with a marking pencil areas on the cast that will require modification.

The check socket may be removed and retried numerous times; it can be ground with a "burr" on a router; it can be cut and widened or nar-

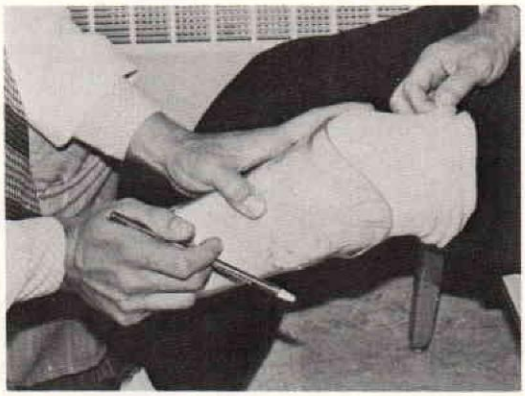

Fig. 5. View of a typical situation where a check socket is used to improve fit of the definitive socket.

rowed. There is little limit to the amount of modification that can be made to the check socket.

The check socket is then filled with plaster of Paris, and removed by splitting one side with a cast cutter after the plaster has set (Fig. 6). Appropriate modifications are then made to the new positive model in accordance with needs determined during the check socket fitting (Fig. 7). A second check socket is occasionally indicated.

We enforce one basic rule in the check socket procedure: "THE CHECK SOCKET CAN NEVER BE ISSUED AS THE DEFINITIVE SOCKET." The reason for this is that a check socket may be considered to be "good enough" and the true purpose of a check socket thus would be defeated, in that needed modifications, though small, will not be made with the idea that time is being saved.

Another major benefit accrued by use of the check socket is in psychological management of the patient. We have noted time and again a better attitude or feeling on the part of the patient when the check socket is used. This intermediate step between the patient's visit for casting and his experience with the entire apparatus set up on an adjustable alignment device seems to relieve him of the shock most patients experience at this time. By having the patient return for a check socket fitting much of the "shock" is relieved. The patient feels that the prosthetist is more interested in him as an individual and the procedure demonstrates to the patient that the best possible fit is the goal of the prosthetist. While the "shock" effect is more pronounced in new patients, it is interesting to note that the most favorable comments come from the experienced patients who are having a check socket used in their fitting procedure for the first time.

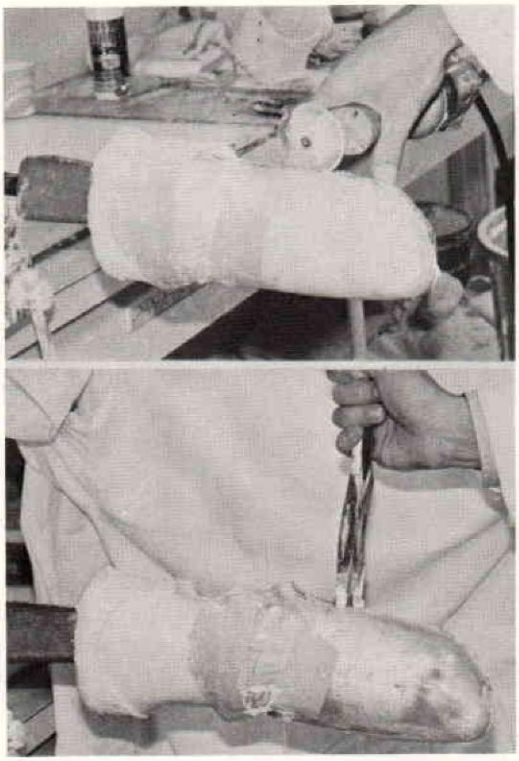

Fig. 6. Removal of check socket from newly poured model.

Fig. 7. Modification of second model.

CONCLUSION

In conclusion, we readily realize that our ideas on the use of a check socket in fitting lower-limb prostheses are subjective. However, we feel that the number of prosthetists who are turning to check sockets is increasing, and from the experience of all of these as well as that of the

authors there is a definite feeling that the number of return visits by patients in the one-year post-fitting period is reduced drastically, and that the procedure is of tremendous psychological benefit to the patient.

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