MEDIAL OPENING ABOVE ELBOW SOCKET

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Introduction

A medial opening above elbow socket was recently fabricated at Northwestern University Prosthetic Research Center to solve specific problems in a special case. The principles involved are of particular interest because they may be advantageous in standard cases.

Case History

On November 6, 1959, a 22 year old female incurred an amputation above the right elbow following injuries received in an automobile accident. A brachial plexus injury sustained at the time of the accident caused the stump to be considerably limited in range of motion and strength. In addition there was considerable redundant soft tissue at the end of the stump and loss of sensation over the lateral and distal portions. Following pre-prosthetic therapy a standard above elbow arm with figure 8 harness was fitted. The patient experienced discomfort in the axilla of the opposite arm with considerable impairment to circulation. She was unable to don and remove the prosthesis unaided, was limited in her ability to open the hook because of her restricted range of motion, and experienced difficulty in operating the elbow lock.

Fig. 1—Lateral view of amputee showing limitation of humeral flexion and redundant tissue at the distal end.

Fig. 2—Anterior view of the amputee showing limitation of abduction.

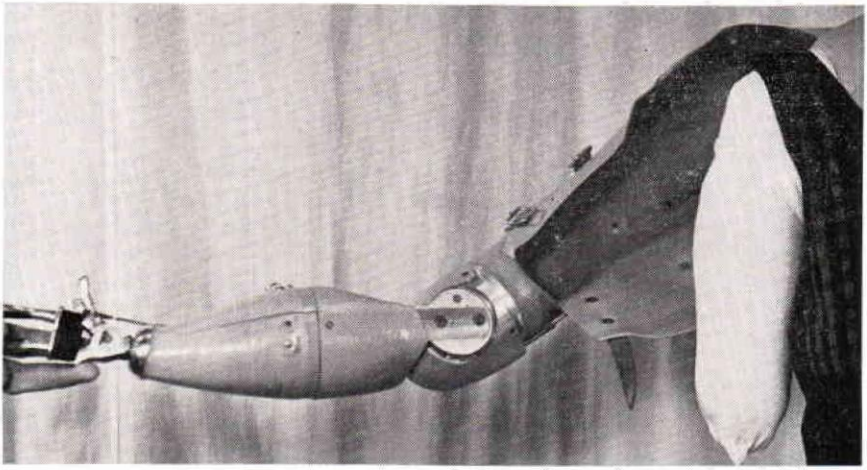

Fig. 3—View showing the medial flap open for donning and removing the socket.

Special Prosthesis

The problem of axillary discomfort was overcome by fabricating a socket which was fitted well up over the shoulder. The arm was thus suspended from the shoulder rather than the harness. To provide facility in donning and removing the socket the entire medial section of the socket was removed (with the exception of the distal end) and replaced by overlapping Naugahyde flaps with straps and buckles for adjustment.

The socket provided good suspension, adequate stability and ease of adjustment. The thin, flexible medial wall renders this part of the socket more comfortable.

The cast of the stump was made in two pieces—humeral section and shoulder cap—both using alginate. In the case of the shoulder cap a stockinette bag of alginate was placed over the shoulder and external pressure was applied. A check socket was then made in two corresponding pieces from which the cast for the final socket was obtained.

Difficulties in operation of the conventional elbow lock were overcome by tightening the elbow control strap so that it was in tension in the relaxed position. The lock was alternated by raising and lowering the shoulder which momentarily released tension on the cable. This simple and effective hook-up can only be used when the socket is suspended by an integral shoulder cap instead of by the harness. However, because of the limitation in range of motion, the conventional elbow was abandoned in favor of the experimental single control elbow unit (as illustrated).

Remarks

This medial socket and elbow lock control system appears to be simple and advantageous for special cases. It remains to be proved whether or not it has any advantages for standard above elbow amputees. It does suggest that the advantages of the German system of fitting well over the shoulder for suspension can be realized without difficulties in getting in and out of the socket. The adjustment should also be valuable in primary cases where considerable shrinkage is expected.

Fig. 4—Posterior view of arm and harnessing. *

Fig. 5—Lateral view of arm and harnessing. *

Fig. 6—Anterior view of arm and harnessing. *

*The elbow and forearm in these photographs are non-standard requiring no elbow lock control. With a standard arm the elbow lock control set-up would be attached at or near the center point of the figure 8 and draped medially to the socket, so that when the shoulder is elevated the socket rises releasing tension on the elbow lock.