

Individual Silicon Interface for Myoelectric upper limbs

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Introduction

Silicon as an interface is a very good material, one that gives us the ability to solve problems not easily solved before. The long Trans-radial has never been easy to fit. When we first started to manufacture bespoke Silicon interfaces we used silicon gel that was painted onto the cast until we achieved the thickness required. This system has worked well but it was not able to cope with a myoelectric arm easily. We needed to develop a system that allowed the patient to don and doff the silicon interface when fitted with electrodes and cables and did not cause the patient to sweat.

Methods

We originally looked at a technique developed at Strathclyde University – the roll on and off individually made silicon sleeve with a lanyard fitted at the distal end. A polyester resin frame was made to hold the sleeve in place. The lanyard, which is attached to the distal end of the silicon sleeve, is threaded through the frame so the patient can pull the sleeve and residual arm into the frame. The system worked well but it was not able to cope with a myoelectric arm. We needed to develop a system that would allow the patient to don and doff easily a silicon interface that had been fitted with cables and electrodes.

Result

We have developed a new technique using the Otto Bock Chlorosil Silicon, with a zip, electrodes and cables built into the silicon. The Silicon is put through the mixing rollers to a thickness of 2 cm. It can be thicker dependent on the strength required. Different areas can be fitted with hard or soft Silicon if you have a bony area. (shore rating 20, 35 and 60). Because you put the silicon through rollers it is very easy to control the thickness prior to laying it on the cast. A first layer of silicon is put onto the cast over the electrode blanks. A polythene strip is then laid where the electrode

Cables are to be run. A second layer of silicon is then placed over the polythene strips. (When the silicon has cured the polythene strips are pulled out leaving a channel for the cables to be inserted) The zip is laid into place at the same time ready to be covered up to the teeth with a second layer of silicon. It is very important to put a series of holes in the zip so the Silicon can get a firm grip of the zip.

Part of this development is a new way of attaching the silicon to the Polyester or Acrylic frame that secures the hand or wrist mechanism in place. A shaped resin distal cap is made to fit the distal end of residual limb, the cast is then drilled with a series of holes, this to allow the silicon to get a good hold of the resin end cap. Finally we have added a lattice system which is a series of slots in a lattice formation that allows the silicon to breathe. It will also allow the silicon to stretch if required.

Conclusion.

We are now able to fit individual Silicon sockets to elbow disarticulation, Trans-carpal and Trans-radial residual limbs. Patients with Trans-carpal gain the greatest improvement flexion/extension and pronation/supination of the wrist, which could not be achieved with a conventional socket technique. The new lattice system allows the silicon to breath and stretch; this gives patients better comfort and movement of the prosthesis.

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