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Technical Note: Improved Techniques in Alginated Check Sockets

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INTRODUCTION

One recent prosthetic advancement, the total surface bearing socket design, has been shown to enhance the function and comfort of the amputee. Alginate is one material used by our profession to accomplish this improvement.

Alginate as a prosthetic fitting tool was introduced to the prosthetic profession by Bob Hayes, C.P., in 1975[1] and its use was updated in 1985.[2] Alginate's continued benefit in practice is undeniable. No matter how accurate your negative impression, or detailed your modification, there's always room for improvement. At Beverly Hills Prosthetics Orthotics, as well as in many other facilities across the country, alginated check sockets have become a standard fitting procedure. The alginate procedure is a valuable tool for obtaining optimum prosthetic fittings. Not only does this procedure give the practitioner the opportunity of achieving a true total surface bearing type fit, but also serves as an excellent education and evaluation tool. Each time you complete the alginate procedure, your impression taking and modification deficiencies become apparent. With this information, prosthetists are better able to advance their own skills.

Practitioners who employ this technique have all experienced the frustration of having the alginate come loose from the wall of the socket as the patient removes his/her residual limb. Sanding the inside of the check socket and cleaning it with solvent has in the past been the method of choice, but this is too time-consuming and does not always yield the desired results. A search was therefore initiated for a product or methodology which would keep the alginate adhered to the wall of the socket. A product called HOLD Spray-On Tray Adhesive®* (Figure 1) was located. This was developed for use in dental practices to assist in taking alginate, or hydrocolloid mouth impressions. It has completely re-

Figure 1. HOLD Spray-on Tray Adhesive.®

*Catalogue No. 11461. Teledyne Dental Products, Elk Grove Village, Illinois 60007.

solved the socket/alginate interface problem.

PROCEDURE

It should be emphasized that the alginate procedure is not a cure-all for a poorly fitting test socket. Any deficiencies in the socket weight-bearing characteristics must be rectified before advancing to the alginate step.

The procedure we use for alginating check sockets is an adaptation of that used by Jan Stakosa, C.P. of the Institute for Advanced Prosthetics in Lansing, Michigan. The patient is fit with a clear Uvex® check socket.[3] All check socket fittings are done on bare skin coated with Otto Bock Insulating Cream®** (this is preferred over Vaseline® because of its improved feel and ease of removal from the patient's skin). The check socket is then statically aligned. Because the residual limb is now more closely positioned in its proper orientation in the socket for weight bearing, this ensures a more accurate alginating process. When these steps are completed, the check socket is ready for close visual inspection. Skin coloration is used as a visual cue for accuracy of fit. Probing with thin corset stays may be done to obtain further evaluative information. A china marker is then used to map out intended alterations. Excessively tight areas should be relieved; loose areas are marked.

Once the evaluation has been completed, the check socket is removed and the insulating cream cleaned out completely with a solvent. Injection holes are now drilled in the check socket (prior to our use of alginate adhesive, we devised a special tool for this purpose). This drill bit*** (Figure 2), makes a 5/32" hole in the socket and simultaneously drills a 3/8" diameter countersink in the outer half of the socket wall (Figure 3).

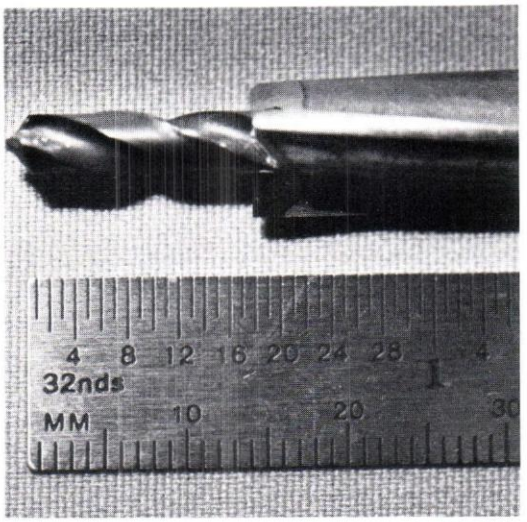

Figure 2. The Otto Bock drill bit makes a 5/32" hole in the socket and simultaneously drills a 3/8" diameter counter sink in the outer half of the socket wall.

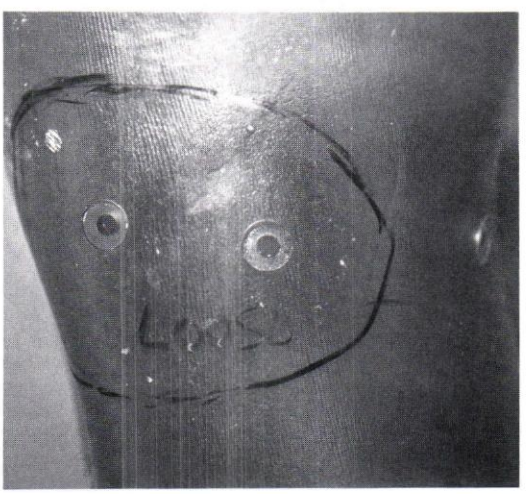

Figure 3.

During the procedure, the alginate collects in the countersink and forms a lock which helps to hold the alginate in place (we continue to use this tool for added insurance). At least three holes are drilled 1" proximal to the most distal point of the socket. These holes act as pressure relief valves and ensure that the patient is completely down in the socket. This also pre-

**Catalogue No. 640Z5. Otto Bock Orthopedic Industry Inc., 4130 Highway 55, Minneapolis, Minnesota 55422.

***This tool is a custom made combination of a 3/8" spot facer with the pilot removed and 5/32" drill put in its place.

vents the patient from getting excessive distal end pressure that results from too much alginate. Additional holes are drilled in the socket over previously marked loose fitting areas (Figure 3). Alginate will be injected into these loose areas with a 60 c.c. syringe while the patient is weight-bearing in the test socket. Relief holes are also drilled over any bony prominences or sensitive areas. All holes should be deburred on the inside of the socket.

The socket is now sprayed with a thin coat of HOLD® tray adhesive. The socket will be ready for application in approximately two minutes and will remain sufficiently tacky for 10-15 minutes thereafter. At this point, a parting agent such as insulating cream may be applied to the residual limb if it is unusually hairy.

The alginate is now mixed according to manufacturer's specifications, and a thin coat poured over the entire surface of the inner socket (Figure 4). This ensures that nothing will come into contact with the HOLD® adhesive and inhibit bonding with the alginate. The residual limb is now placed into the check socket, with the patient bearing approximately 70 percent of his body weight on the prosthesis, maintaining a vertical load, as evidenced by a perpendicular pylon. This will ensure that the patient is properly seated in the socket. If this precaution is not taken, the alginate could hold the patient out through hydraulic pressure and thereby void the fitting. Once the patient is down in the socket, additional alginate is injected through the previously drilled portholes in the socket (Figure 5). Patient feedback is important in order to pinpoint areas that feel loose or tight. All patients report improved comfort once the alginate is injected and has jelled.

At this point, the patient is asked to sit, while keeping the knee extended. A small amount of water, poured into the socket about the knee will help break the suction, thereby allowing the socket to be slowly and gently removed from the patient. Once the socket has been removed, it should be locked in the correct alignment and filled with plaster as soon as possible. The purpose of this is to circumvent the tendency

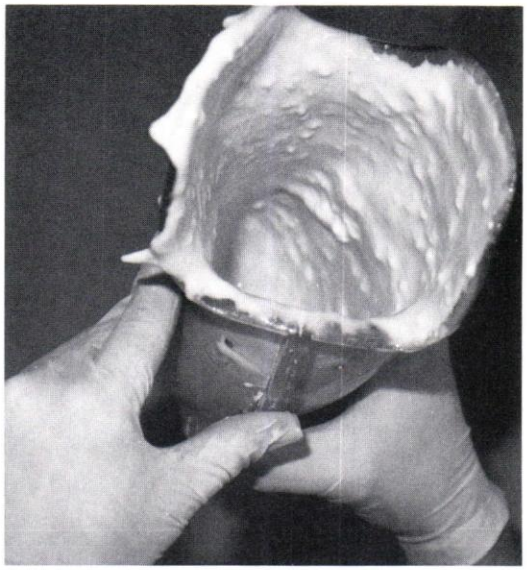

Figure 4. A thin coat of alginate is poured over the entire surface of the inner socket.

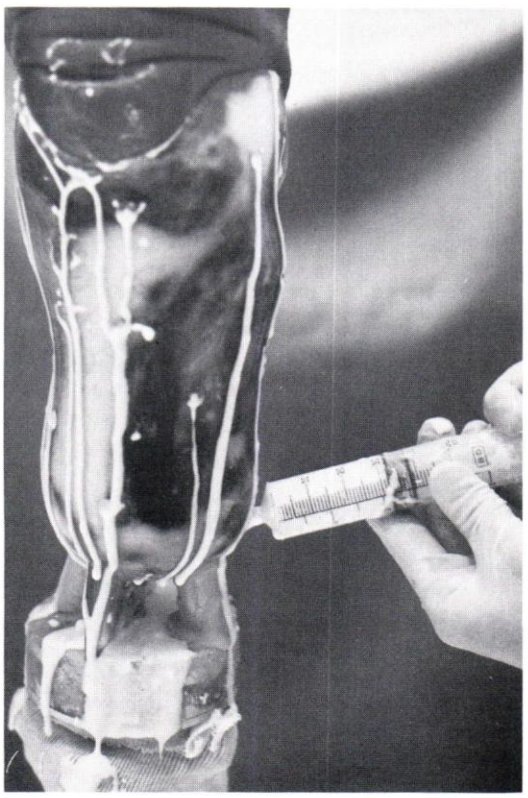

Figure 5. Once the patient is down in the socket, additional alginate is injected through the portholes.

of alginate to shrink and dry out, thereby altering the fit.

After the plaster has hardened, the check socket and alginate are removed from the positive model. The resultant positive model will require minor smoothing before another test socket is fabricated in order to verify the fit resulting from the alginate procedure.

CONCLUSION

Since its introduction to the field, the alginate procedure has proven to be a valuable aid in prosthetic fittings. Unfortunately, the alginate's poor adhesion to test socket surfaces has no doubt discouraged many prosthetists from using this technique on a regular basis.

It is hoped that the solution presented in this paper will encourage more practitioners to discover or rediscover this technique. Once the benefits are seen, it is difficult to avoid using this procedure. This technique will create a prosthesis that provides increased comfort, minimizes tissue atrophy, and improves ambulatory endurance. In so doing, the definitive limb will require fewer post-delivery adjustments and ultimately reduce the necessity for replacement.

AUTHORS

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