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Orthotics and Prosthetics

Journal of the American Orthotic and Prosthetic Association

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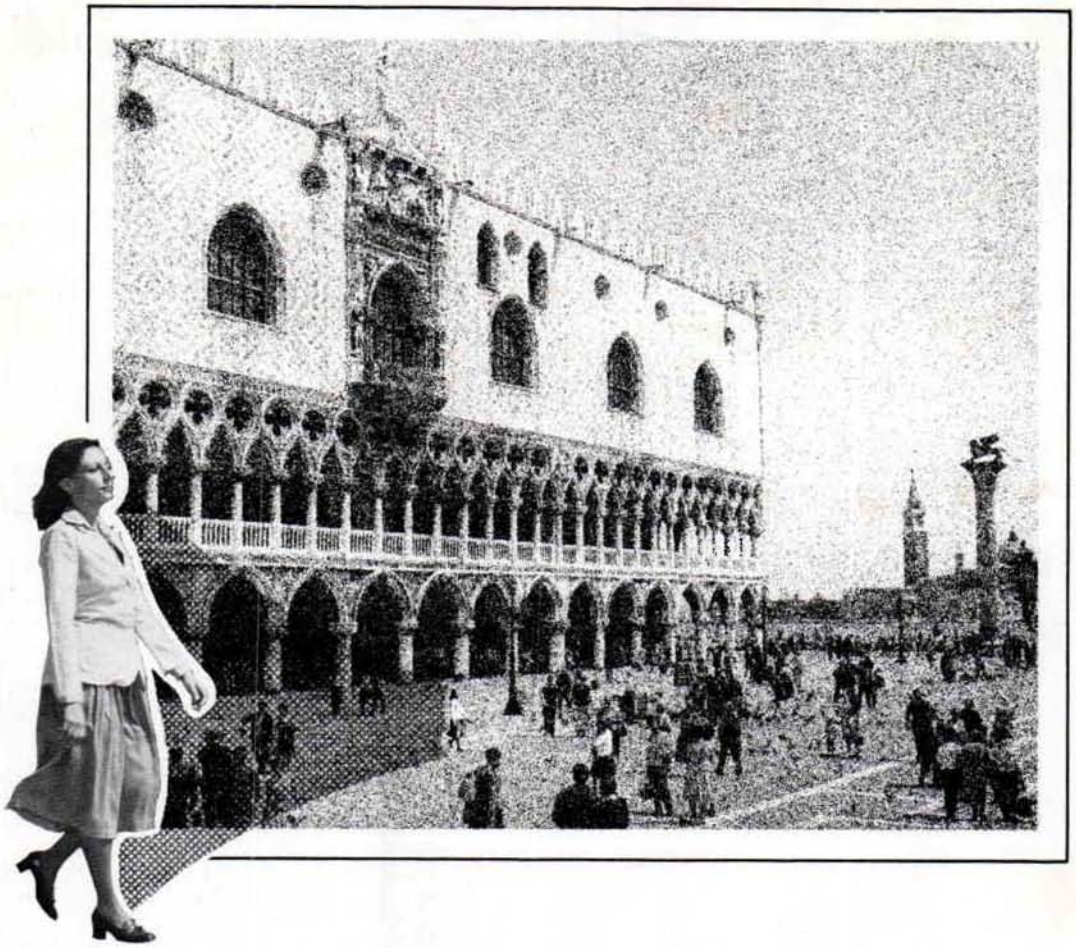

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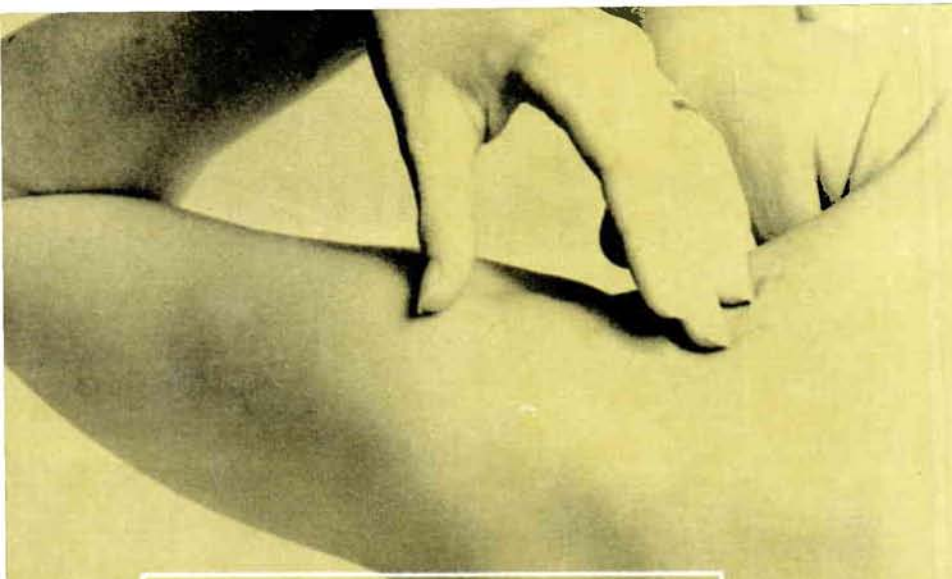

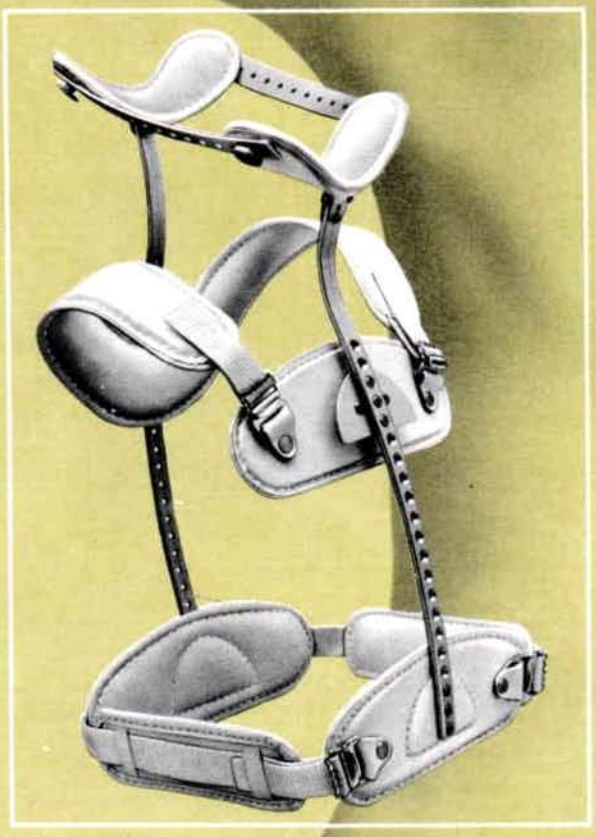

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1980, June 22-27, World Congress of Rehabilitation, International Winnipeg Convention Center, Winnipeg, Canada.

1980, June 27-29, AOPA Region XI Meeting, Sands Hotel & Casino, Reno, Nevada.

1980, July 17-19, AAOP—Didactic P & O Seminar, Charles Dankmeyer, Program Chairman, Sheraton Boston Hotel, Prudential Center.

1980, September 15-20, AOPA National Assembly, New Orleans Marriott, New Orleans, Louisiana.

1980, September 17-19, Scoliosis Research Society, Annual Meeting, Chicago, Illinois.

1980, September 28-October 4, Third World Congress (ISPO), Bologna, Italy.

1981, January 27-February 1, AAOP Round Up Seminar, Fountainebleau Hilton, Miami, Florida.

1981, June 12-14, AOPA Region II and III Meeting, Host Farms, Pennsylvania.

1981, June 16-21, AOPA Regions VII, VIII, X, XI Combined Meeting, Four Seasons Motor Inn, Colorado Springs, Colorado.

1981, October 30-November 1, AOPA Assembly, Sahara Hotel, Las Vegas, Nevada.

1982, February 14-20, AAOP Round Up Seminar, Royal Sonesta Hotel, New Orleans, Louisiana.

1982, May 6-9, Region IV Meeting, Nashville, Tennessee.

1982, May 13-16, Region II and III Meeting, Ceasar's World, Atlantic City, N.J.

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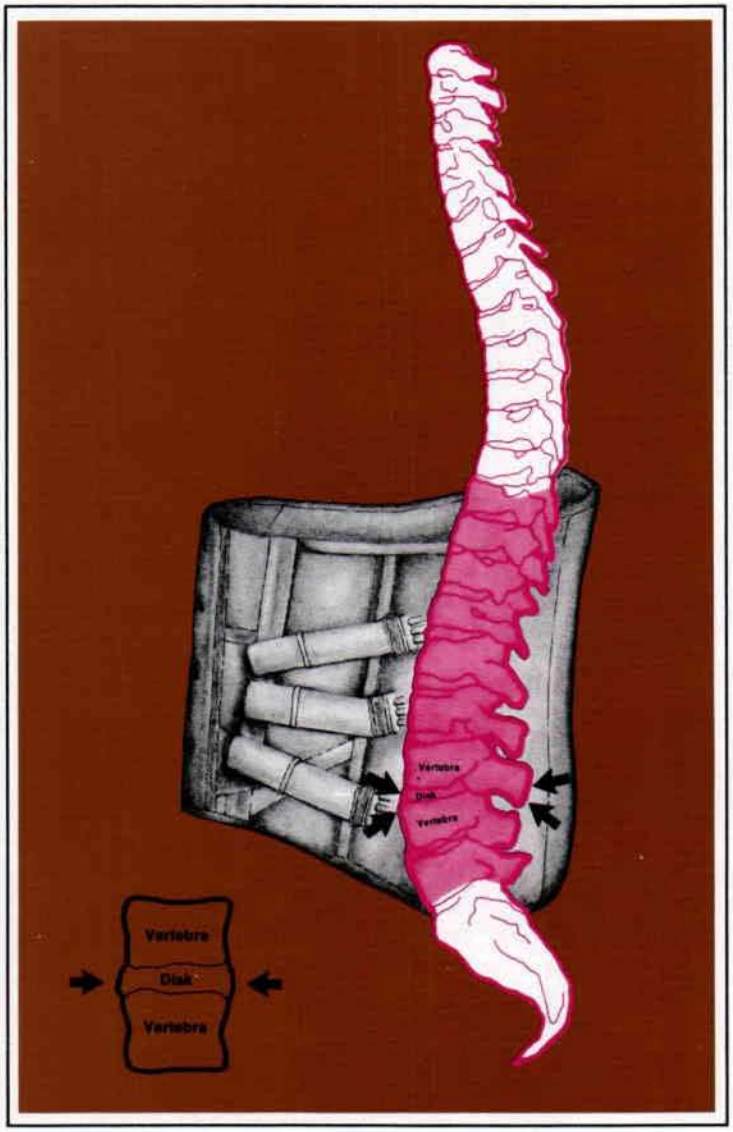

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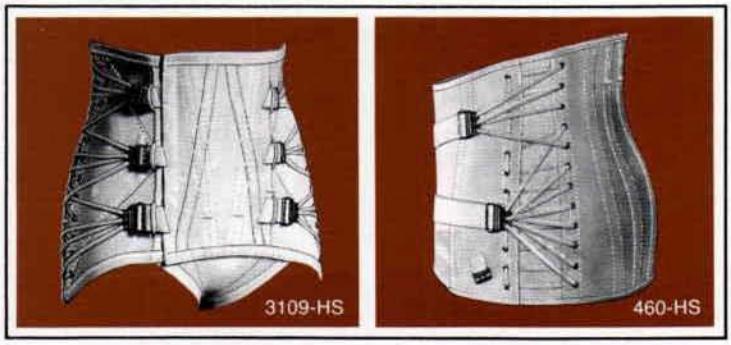

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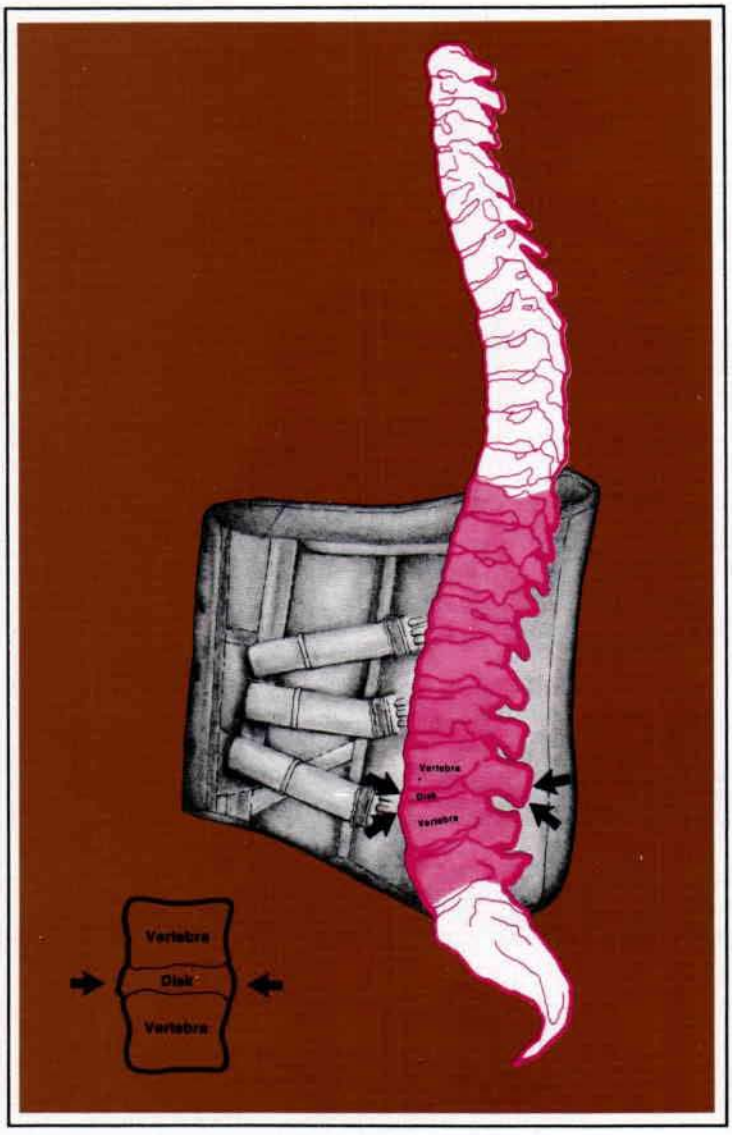

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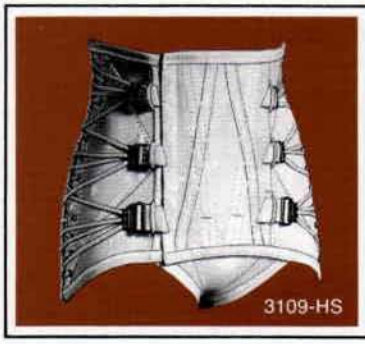

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Commentary

I am taping this commentary to you from my position 35,000 feet over the desert of Arizona while returning from a fracture cast bracing seminar by Dr. Sarmiento in Los Angeles. This seems to be the first opportunity I have had to gather my thoughts on the Commentary for O & P. The cast brace course that I just attended was well presented and quite informative. However, this brings me to a point that I would like to relate to you pertaining to the vast saturation of various medical specialties that I find now functioning in the field of Orthotics and Prosthetics.

Twelve years ago when I received my certification in Orthotics, I felt that I had achieved a very high professional goal and, in fact, I had. I feel that the goals established by The American Board for Certification are quite high, and I was quite pleased with myself having been able to achieve them. Almost eleven years ago, I started my own private practice and was well pleased with my position as a Board Certified Orthotist. I was received warmly in my new community and accepted on the Allied Staff of the hospitals as a certified practitioner of Orthotics. For many of these years I have been lulled into the mental satisfaction that being a Certified Orthotist was the epitome, or the pinnacle, of the profession, realizing, of course, that there is also a Certified Prosthetist Orthotist position which many of my colleagues have fortunately been able to achieve, and they certainly have my respect in their achievement. Like most certified practitioners, I have been selling the fact of my Board Certified position to my colleagues of physicians and medical specialties in my community. I have been quite successful in acquainting these people with the fact that we are Board Certified. While I have been accepted in my own community as a certified practitioner, I have always felt a bit uneasy about the fact that I am not a licensed practitioner, especially when I stop to consider that my barber is licensed and so is the man who trims my dog. Yet, at this point, there is not a licensure law for practitioners involved in the design, fabrication, and application of orthotic and prosthetic appliances for the physically handicapped. I have long been an advocate of licensure for individual practitioners from a professional standpoint of being recognized in our own State as professionals. But far more important is the fact that there is no legislation which has any control over the individual acts of people involved in delivering services for the physically impaired. I am now involved in working with the Legislature in the State of Illinois to get a House Bill through for the practitioners in this State. At this point, the Bill has passed the Legislature and is ready to go to the Senate. I was amazed to find that we have such strong opposition with some of our para-med-

ical colleagues, primarily N.A.R.D. (National Association of Retail Druggists). We are being opposed by A.S.T.A. (American Surgical Trade Association), the Podiatrists, the Ped-Orthotists, and many others too numerous to mention at this time. However, we intend to continue to fight for our Bill, and hopefully, we will be successful in getting it through the Senate. All of this opposition brings me back to the point I would like to make, referring again to my trip to the fracture cast bracing course. I was amazed to find that, although there were over seventy-five people involved in the course, a very small number of them were practicing Orthotists and/or Prosthetists. I found myself surrounded by Physicians Assistants, Orthopedic Technicians (who are hospital based and paid employees), as well as some Pharmacists and Orthopedic Surgeons. There are many other organizations that are chipping away at our pinnacle of certified practitioner. Not only is this true in the field of fracture cast bracing, but also in spinal orthotics and prosthetics. Pharmacists, cast technicians, physician assistants, and many other paramedical personnel are now "Certified Practitioners" of Orthotics and Prosthetics due to the availability of prefabricated off-the-shelf components. One certifying body is N.A.R.D. It is possible to become certified by taking a one week course sponsored by N.A.R.D. In a recent trip to the national meeting of the American Academy of Orthopedic Surgeons, I was interested to see a large sign on the front of a booth that said "N.A.R.D.—Certified Orthotists and Prosthetists".

It seems that we as A.B.C. certified practitioners have done such a good selling job on certification that it is now being used by every group imaginable, thereby diluting our own certification by The American Board. I have talked to many practitioners across the country, and asked what they thought of licensure. I have received many different comments. Most of the practitioners have come to the realization that our standards are being diluted, and our position is being challenged on many fronts. It is, therefore, my feeling that in order to maintain our high professional standards, we must seek individual State licensure. I encourage all of you to initiate action in this direction, and I will be happy to assist any organized movement. Licensure is not the total answer, but it is a move in the right direction toward professional achievement and recognition on a national basis.

I feel that this is a very important subject and needs to be better understood and fully supported.

Sincerely,
Jack R. Milbourn, C.O.
President
Region VI A.O.P.A.

Orthotics and Prosthetics, Vol. 34, No. 2, pp. 3-9, June 1980

Variable Abduction HKAFO in Spina Bifida Patients

KENNETH V. JACKMAN, M.D.[1]
ROBERT O. NITSCHKE, C.P.O.[2]
P. WILLIAM HAAKE, M.D.[1]
JAMES A. BROWN, C.O.A.[2]

The spina bifida child who has an intact lumbar neurosegment at the L3-4 level without distal motor function has a high risk of hip dislocation during the first year of life because the hip flexors and adductors are not balanced by hip extensors and abductors. These children have functioning quadriceps, and when this set of muscles develops sufficient strength, the patient has potential for ambulation. Therefore every effort should be made to maintain hip reduction for better mechanical support and gait efficiency.

Neurosegmental lesions below L4 may also result in hip subluxation that progresses to dislocation, and should thus be reduced. Lesions above L2 with only hip flexors and hip adductors and without a functioning quadriceps, and those who have little or no hip muscle activity do not require operative hip reductions, especially when the condition is bilateral. The degree of ambulation is necessarily limited, and whether the hips are reduced or dislocated has not been demonstrated to influence eventual gait performance.

At the Birth Defects Center at the University of Rochester, we are following 95 children with spina bifida, as a multidisciplinary team effort. Orthopaedics is involved, often prior to back closure, in the initial comprehensive evaluation. A complete examination is performed with special emphasis on the musculoskeletal system. Functioning muscle groups in the lower limbs and any significant spinal, hip, knee or foot deformities are documented.

Serial cast correction of foot deformities is begun when the patient is first seen. Physical therapy is initiated and parents are given specific instruction for exercise of the hips, knees, and feet. Faradic muscle stimulation is performed early in determination of baseline data, and is repeated at periodic intervals.

This article is a preliminary report on the use of a new variable abduction hip, knee, ankle, foot orthosis (HKAFO) in six spina bifida patients.

The orthosis was designed originally because there was no adequate program for maintaining hip reduction without producing resistant hip flexion-abduc-

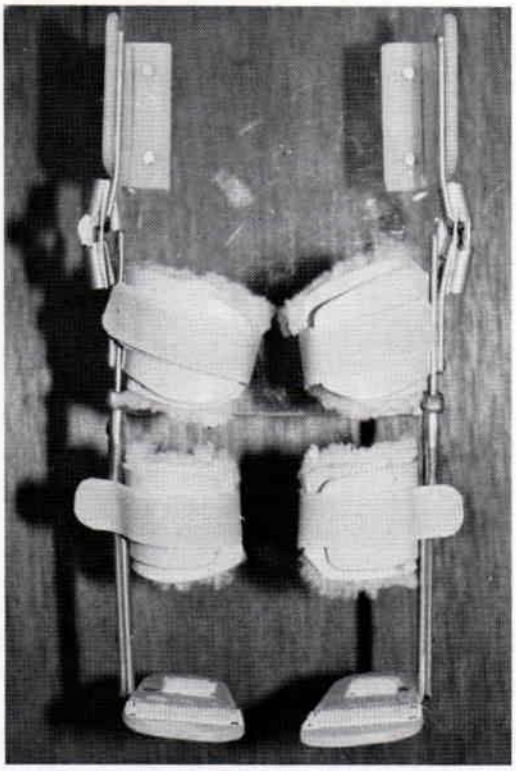

Fig. 1. Variable abduction HKAFO in neutral position showing Velcro foot plates.

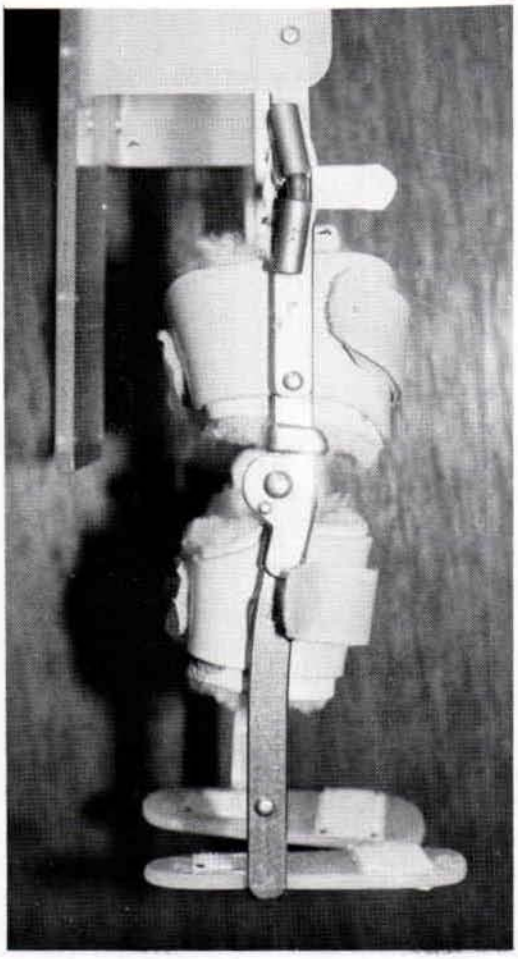

Fig. 2. Side view of variable abduction HKAFO in neutral position. Note variable hip position joint, drop lock knee, and 45-deg. knee flexion stop.

tion contractures. Our hypothesis is that hip alignment can alternate between the reduced and adducted-extended position to accomplish reduction and prevent flexion-abduction contractures.

The orthosis (Figs. 1 & 2) has bilateral uprights which are attached to a Plexiglass or polypropylene back support. The hip position is controlled by a bi-directional stainless steel hinge with pre-set angles (Figs. 3 & 4). Thigh and calf supports are made from either sheepskin or Kydex lined with Pelite foam. Velcro straps are used to restrain the legs. No permanent padding is used on the back support in order to avoid soilage problems. The knee joints are the single axis type with drop locks that allow flexion from 0 to 45 deg. The lateral bars are attached to a polypropylene foot piece. Ankle joints are not provided. The shoes are attached to the footplate with Velcro tape.

The entire orthosis can be converted into a standing brace by attaching it to a plywood frame with metal uprights that hold the back portion rigid. This frame may be used prior to the age that they can satisfactorily use a more conventional standing brace or Parapodium.

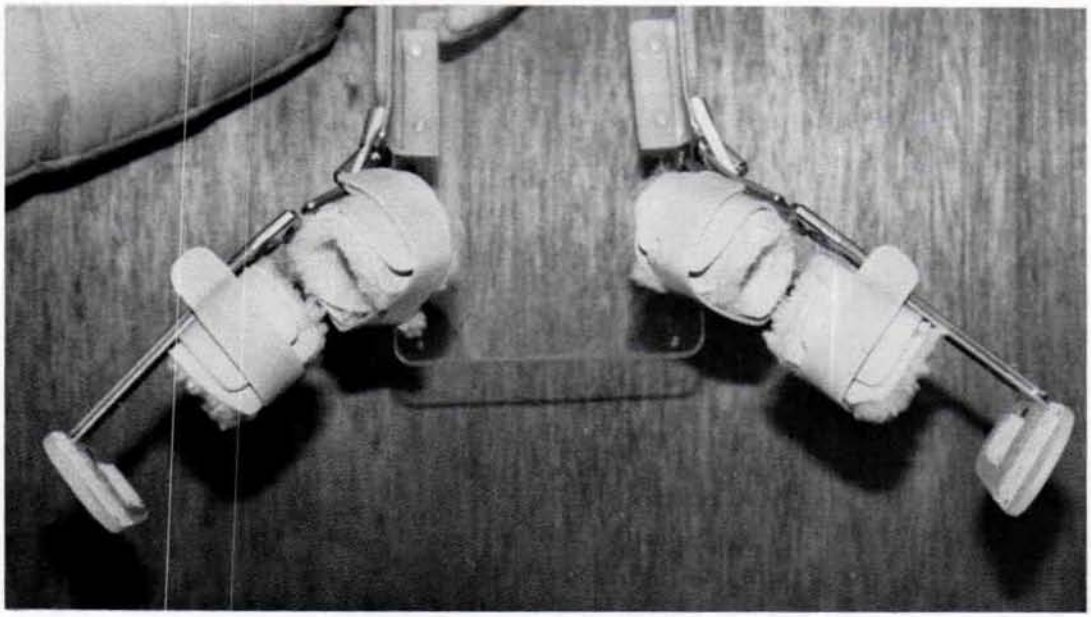

Fig. 3. Anterior view of the variable abduction HKAFO showing flexion, abduction, and internal rotation features. The exact position is determined by the clinical examination.

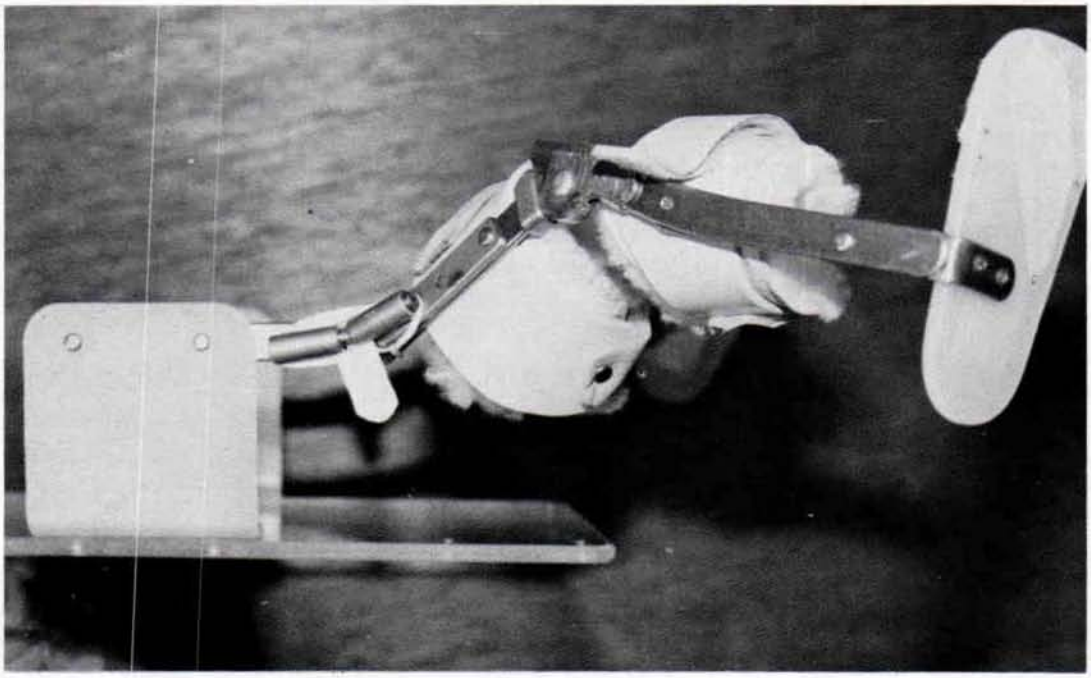

Fig. 4. Lateral view of flexion, abduction, and internal rotation of the variable abduction HKAFO. Note hip lock tab is now down.

Patient Material

1. K.P. (97-39-49), is a 13-month-old white female with a lumbar meningomyelocele and an L4-5 neurosegment level who underwent back closure on the third day of life. At three months of age, right hip subluxation was noted and the variable abduction HKAFO was fitted. Initially, she was in the orthosis for 16 hours in the flexed abducted and internally rotated position and then four hours in the neutral position and four hours out of the orthosis. She began Parapodium ambulations at 13 months of age, but has continued to use the variable abduction HKAFO for 15 hours per day in the flexed position. She will require hip stabilization surgery to maintain reduction.

Comment: The hips have been maintained in a reduced concentric position during the time the variable abduction HKAFO was ued. However, she will require hip muscle stabilization for maintenance of reduction. Use of the orthosis has delayed the immediate need for hip surgery and has allowed her to grow.

2. B.I. (98-01-32), is a five-month-old white male with a lumbar meningomyelocele and a partially intact L3-4 neurosegment level. He underwent back closure on the third day of life. At birth he had bilateral 30-deg. hip flexion contractures. Hip abduction was 30 deg. bilaterally. At three weeks of age, subluxation of the left hip was noted radiographically, and at five weeks the variable abduction HKAFO was ordered but was not used due to religious conflict. At five months of age passive abduction had increased to 80 deg. and there was no hip subluxability. He was fitted with the variable abduction HKAFO and a flexed position was maintained for 15 hours per day.

Comment: The hips remained reduced in spite of his not using the orthosis initially. Abduction will be continued at night, and he has been fitted for a Parapodium.

3. J.D. (93-72-57), is a two-year-old white female with a lumbar meningomyelocele and an intact L3-4 neurosegment level whose back was closed at two days of age. The variable abduction HKAFO was started initially when she was seen and the flexed position was maintained for 16 hours, the neutral for four hours, and for four hours no orthosis was used. At 13 months of age she sustained a right femoral fracture, and the variable abduction HKAFO was used as an external splint in the extended position until healing was noted. At 15 months of age the right hip, and at 20 months of age the left hip noted to be subluxed radiographically. The variable abduction HKAFO was used at night in the flexed position and was attached to a standing brace during the daytime. At two years of age she underwent bilateral hip stabilization procedures consisting of adductor transfer, external oblique transfers, and varus derotational femoral osteotomies.

Comment: She is using the Paradoium now and has active hip abduction. The hips are reduced and are well maintained.

4. S.J. (91-73-74), is a three and a half-year-old white male with a lumbar meningomyelocele and an intact L3-4 neurosegment level. He had a left hip dislocation at birth. An abduction splint was used initially, which maintained the reduction, but an abduction contracture developed prior to the development of the variable HKAFO. At six months of age the variable abduction HKAFO was fitted and used in the flexed position for 16 hours, neutral for four hours, and out of the orthosis for four hours per day. The abduction contracture gradually regressed. He began ambulation with a

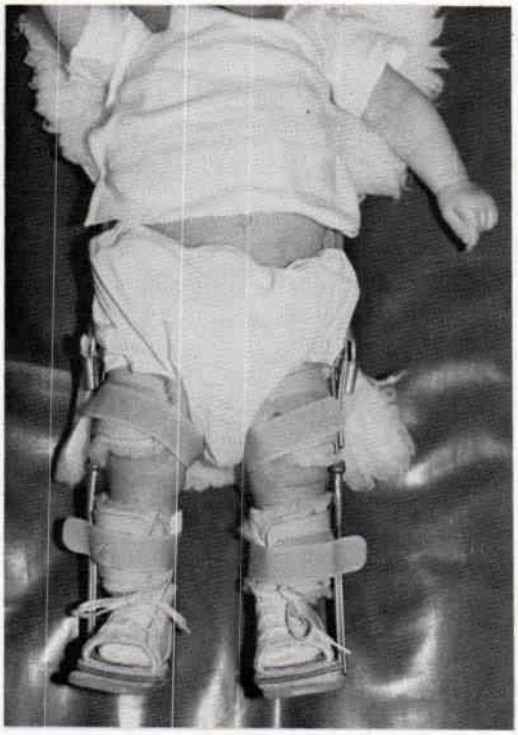

Fig. 5. Four-week-old patient in the variable abduction HKAFO.

Parapodium at 15 months of age, and right hip subluxation was noted at 20 months of age. The variable abduction HKAFO was used only at night. He underwent bilateral varus derotational femoral osteotomies at 27 months of age. Post-operatively the variable abduction HKAFO was used in the flexed position for 12 hours, seven hours in the neutral, and five hours out of the orthosis per day. At three years of age the internal fixation devices were removed and the variable abduction HKAFO was used at night with Parapodium use during the daytime. His latest X-rays demonstrate left hip subluxation.

Comment: The orthosis held his hips in the reduced position. However, left hip reduction could not be maintained. He will require hip stabilization surgery.

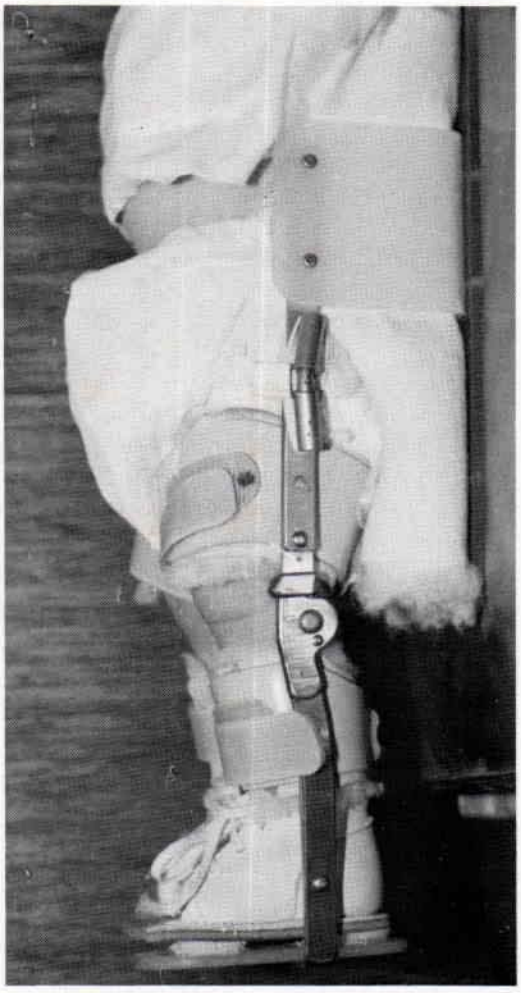

Fig. 6. Lateral view of the patient shown in Figure 5. The sheepskin padding protects the skin from excessive pressure.

5. B.M. (95-50-77), is a two-year-old white male with a lumbar meningomyelocele and an intact L4 neurosegment level who had early back closure and required a VP shunt at four weeks of age. He underwent bilateral posterior foot releases at three months of age. He began using the variable abduction HKAFO at seven months of age for 14 hours in the flexed position, three hours in the neutral position, and seven hours out of the orthosis per day at which time he was using his Parapodium. At 20 months of age

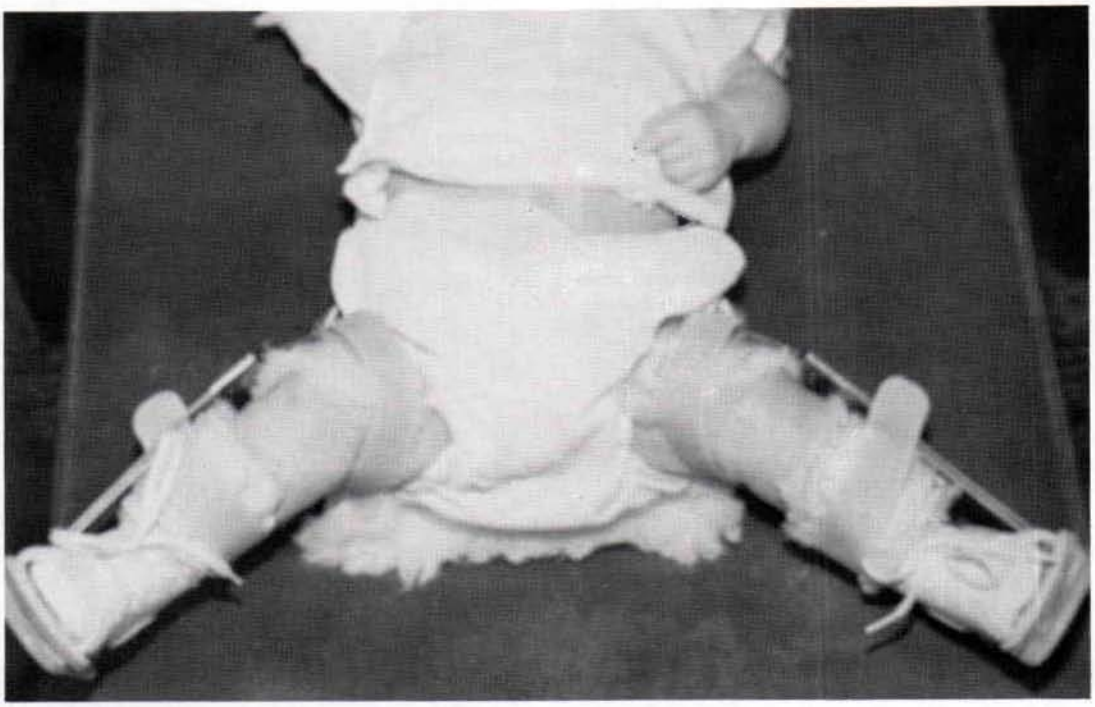

Fig. 7. Anterior view of the patient shown in Figure 5 with flexion at 30 deg., abduction at 45 deg., and internal rotation at 15 deg. Sheepskin posteriorly can be removed for cleaning.

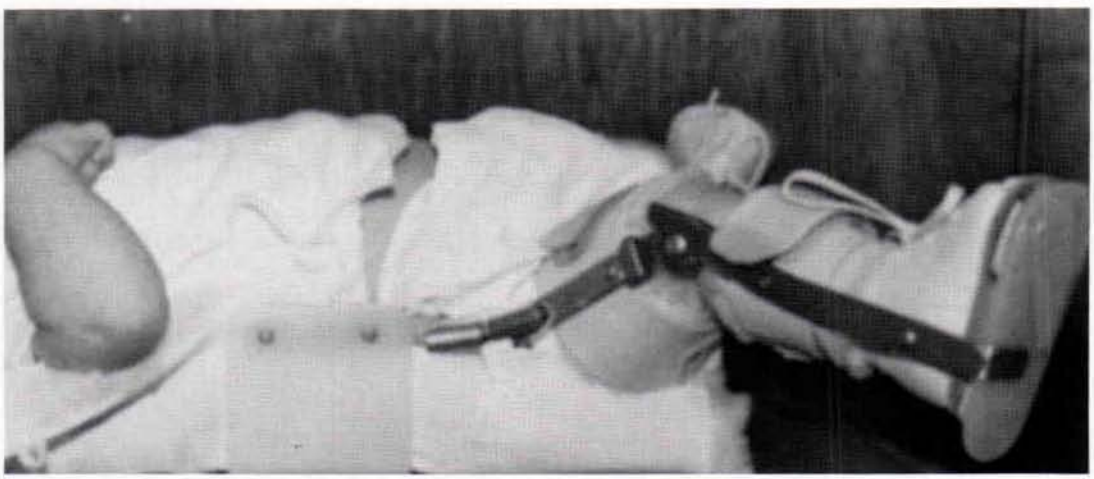

Fig. 8. Lateral view of patient shown in Figure 5. The 45-deg. knee flexion stop allows a natural position.

he had reciprocal gait. Hip abduction was to 25 deg. passively, and he is presently using the variable abduction HKAFO in the flexed position for nighttime and nap use. The remainder of the time he is either using his Parapodium or has no restraints.

Comment: No hip surgery is planned. Hip reduction has been maintained.

6. J.S. (101-64-19), is a 10-week-old white female with a lumbar meningomyelecele and an intact L3-4 neurosegment level who underwent back closure within 24 hours of birth. The left hip could be subluxed. She had bilateral calcaneal foot deformities due to unopposed anterior tibial activity. Splinting of the foot deformities was started. The variable abduction HKAFO was applied at four weeks of age (45 deg. abduction, 15 deg. internal rotation, and 30 deg. flexion). (Figs. 5, 6, 7, 8). The flexed position was used for 16 hours, neutral for four hours, and the orthosis was left off for four hours.

Comment: She has a subluxable left hip and will probably sublux her right hip. It is too early to evaluate the results of the orthosis. Her hips should be reduced and maintained as she is potentially a community ambulator.

Discussion

This is a report of our first attempts at early external hip stabilization by using a variable abduction hip, knee, ankle, foot orthosis. The neurological level can be well documented soon after birth, and the prediction of hip instability anticipated, especially in those cases where the L3-4 neurosegment level is intact. If the position of hip reduction can be maintained early in life, the need for surgery may be prevented or delayed until the child is older and the anatomical structures are of more substantial size.

The reason for varying the hip position is to avoid fixed hip flexion-abduction contractures, which would make Parapodium standing impossible without further surgical releases. Hip spica casts, harnesses, and static abduction splints are used effectively for the child with hip dysplasia in the absence of muscle imbalance. Children with hip muscle imbalance secondary to spina bifida do not tolerate long periods of time in one position.

The exact degree of hip position is determined by the clinical and radiographic examination of maximum hip stability. This is usally 30 to 45 deg. flexion, 30 deg. abduction, and 10-15 deg. internal rotation. We have used an initial program of 16 hours flexed and abducted, 4 hours in neutral and 4 hours out of the orthosis. The timing has been empirical, the flexed and abducted positions being maintained to the point where they can just be reversed by the neutral position. The orthosis may be used effectively even when casts or splints are applied for foot correction. We strive to position these children upright in the Parapodium at approximately 12 to 15 months of age, which is the time the normal child is beginning to stand and walk. We would like to have the major surgical procedures, especially to the hips and feet, completed as soon as possible to avoid repeated hospitalizations.

Summary

This is an initial report of six patients with lumbar meningomyelocele who have been treated with a variable abduction HKAFO as part of their early comprehensive therapy. It is too early to tell whether this will have a significant effect on preventing or delaying hip surgery, and further follow-up is currently being carried out. Our main objective is to maintain hip reduction in those patients who will be functional community ambulators (intact L3-4 neurosegment level), without introducing further complications (hip flexion-abduction contractures).

Footnotes

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A Prosthesis for the Short Above-Knee Amputee

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Fitting a very short above-knee stump with a stump-controlled prosthesis has always presented difficulties related to functional effectiveness and prosthesis suspension (1, 2). One of the existing problems is the tendency of the short stump to slide out of the socket, when amputees sit on relatively low seats, especially tall individuals on automobile seats, where space is also very limited.

Two factors contribute to this problem. One is the use of a high anterior brim, fitted well above the level of the ischial seat to provide an efficient voluntary knee control (3). When sitting, the anterior brim pushes against the inguinal crease, resulting in a tendency of the socket to be pulled away from the stump. The other factor is the alignment of the socket in a position of initial flexion with respect to the hip-ankle line, the benefits of which have been listed elsewhere (3).

Sitting on low seats requires a large amount of flexion of the socket, forcing the stump to flex even more, a condition that may bring the flexion and extension musculature into an unfavorable position with respect to maintainence of hip flexion for a long period of time. A simple solution is to provide the prosthesis with a normally locked joint in the mediolateral plane just distal to the socket. When sitting, the joint is normally unlocked and the prosthesis is free to flex, and thus reduces the amount of flexion required of the stump and socket. Fitting such a joint from existing components of modular prosthesis is clearly desirable, and the Otto Bock[4] modular hip joint, normally used in hip disarticulation prostheses, provides a satisfactory solution when the distance between the stump end and the knee joint is sufficient to accommodate this rather large component.

This paper describes an alternative solution, suitable to all short above-knee stumps.

Method

We make use of a modular Otto Bock AK prosthesis, sometimes combined with a USMC[5] Dyna-Plex unit for swing control, and introduce into the prosthesis an axis just below its socket (Fig. 1). Due to its small dimensions, an Otto Bock single axis knee joint, type 3R16, is especially suitable for this purpose. It is connected to the socket in an inverted position to enable flexion forward when required. During walking, the joint is locked by means of a specially prepared trapezoidal wire bow (Fig. 1, item 4). The dimensions of

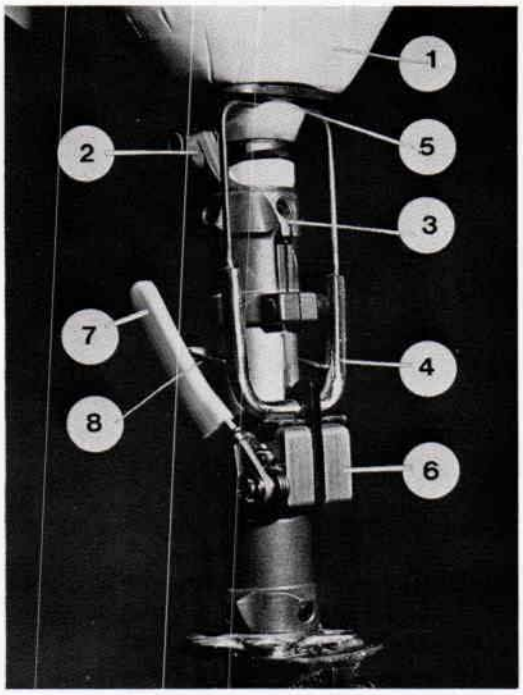

Fig. 1. View of thigh segment without cosmetic fairing showing the flexion-joint fitted between the socket and the knee joint. The standard parts are Otto Bock units. 1. Socket. 2. Single axis knee joint, type 3R16. 3. Tube clamp adaptor 4R21 with adjustment screws. 4. Specially prepared trapezoidal bow (for dimensions see text). 5. Proximal anchor 21Y73. 6. Lock assembly 7Z8 with distal anchor. 7. Lock lever 7Z10. 8. Specially prepared thin wire bow with plastic roller (hidden by lever) connected to trapezoidal bow.

the bow are: 120mm length, 52mm proximal width, 45mm distal width and the thickness of the wire used is three mm in the proximal half and seven mm in the distal half. The bow is anchored proximally to the knee joint anchor 21 Y 73 and distally to the lock hook of an Otto Bock 7 Z 8 lock assembly mounted on the tube. Disengaging the bow from the hook with the lock lever enables the prosthesis to flex forward freely about the axis with respect to the socket. A thin wire bow with plastic roller is prepared and installed to keep the main wire bow adjacent to the tube as it moves after disengagement.

Results

To date, two tall AK amputees with short stumps have been provided with prostheses equipped with a flexion-joint as described. The problem these patients have had previously, namely the tendency of the stump to slide out of the socket when sitting on low chairs or when bending forward at the waist has been solved. Sitting and bending forward are reported to be comfortable, while the socket remained adequately affixed to the stump (Figs. 2 and 3). Two additional advantages arose from this addition. One is the

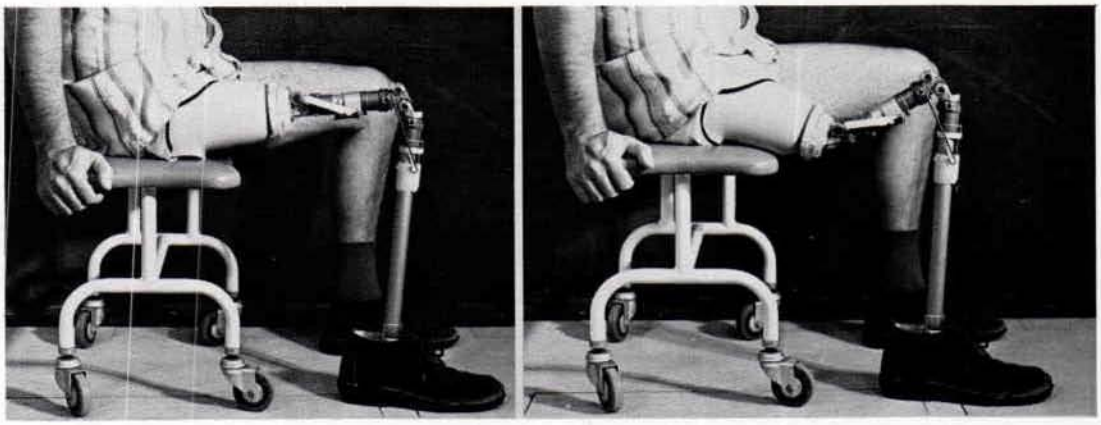

Fig. 2. Patient sitting on low chair: left, with flexion-axis locked; right, with flexion-joint unlocked. Note the difference in flexion angles of the socket.

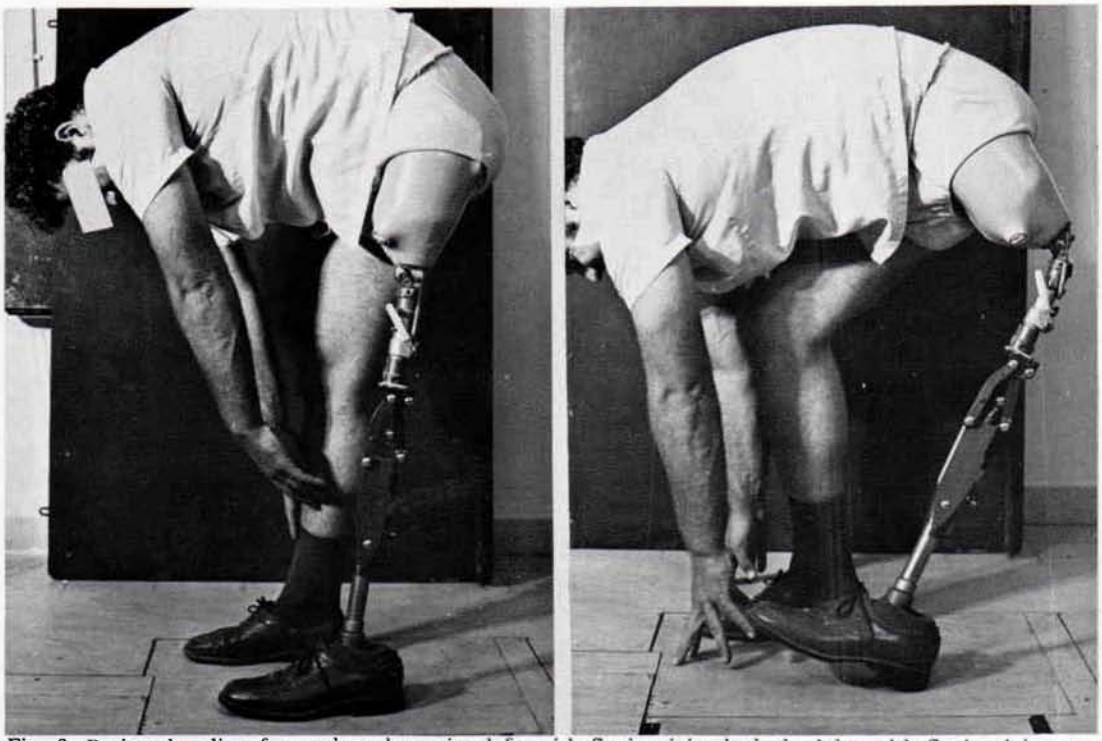

Fig. 3. Patient bending forward at the waist: left, with flexion-joint locked; right, with flexion-joint unlocked.

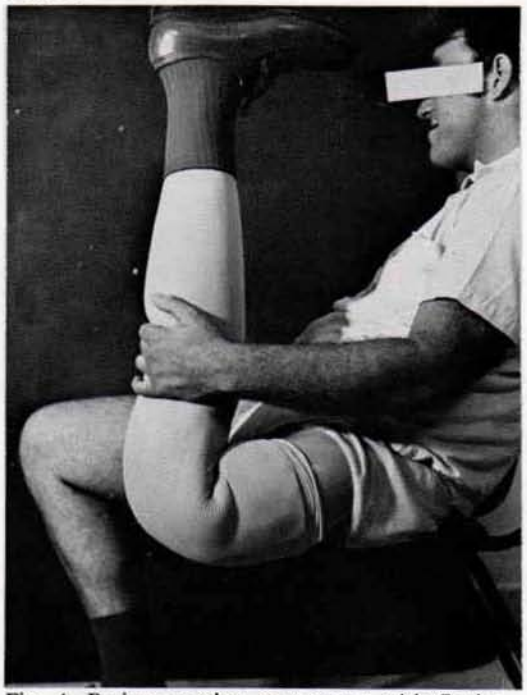

Fig. 4. Patient putting on trousers with flexion-joint unlocked.

improved manoeuverability of the amputee as may be required, for example, when donning trousers (Fig. 4). A second advantage is the increased possibility of alignment of the prosthesis through the tube clamp adaptor with adjustment screws to which the joint is connected.

Gait was also evaluated with the joint locked to ascertain that the added flexion-axis did not affect the normal functions of the prosthesis. Using force platforms and a VTR system, no deviation from the "normal" gait pattern of these patients was observed.

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2. *McKenzie, B.S.*, The fitting of short stumps, J. Bone Joint Surg. 31 (B), *484, 1949.*

3. Radcliffe, C.W., Biomechanics of above-knee prostheses, *in* Prosthetic and Orthotic Practice, *G. Murdoch, ed., Edward Arnold Ltd., London 191-198, 1970.*

Footnotes

1. "Gapim" Ltd., Israel Orthopaedic Industry Workshop in Loewenstein Rehabilitation Hospital, Raanana, Israel.

2. Biomechanics Department, Loewenstein Rehabilitation Hospital, Raanana, Israel.

3. Department of Orthopaedic Rehabilitation and Biomechanics Department, Loewenstein Rehabilitation Hospital, Raanana, Israel.

4. Otto Bock Orthopadische Industrie KG, Postfach 107, D-3428 Duderstadt, West Germany.

5. U.S. Manufacturing Co., 180 North San Gabriel Blvd., Pasadena, Calif. 91107.

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Parapodium Design With Knee and Hip Locks

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EDWIN KINNEN[3]

The parapodium developed by W.M. Motlock at the Ontario Crippled Children's Center, Toronto, Canada, has proven to be a useful orthosis for children with paralysis from the waist down (1). The hip and knee lock design, however, has been difficult to manage, particularly in the case of young children.

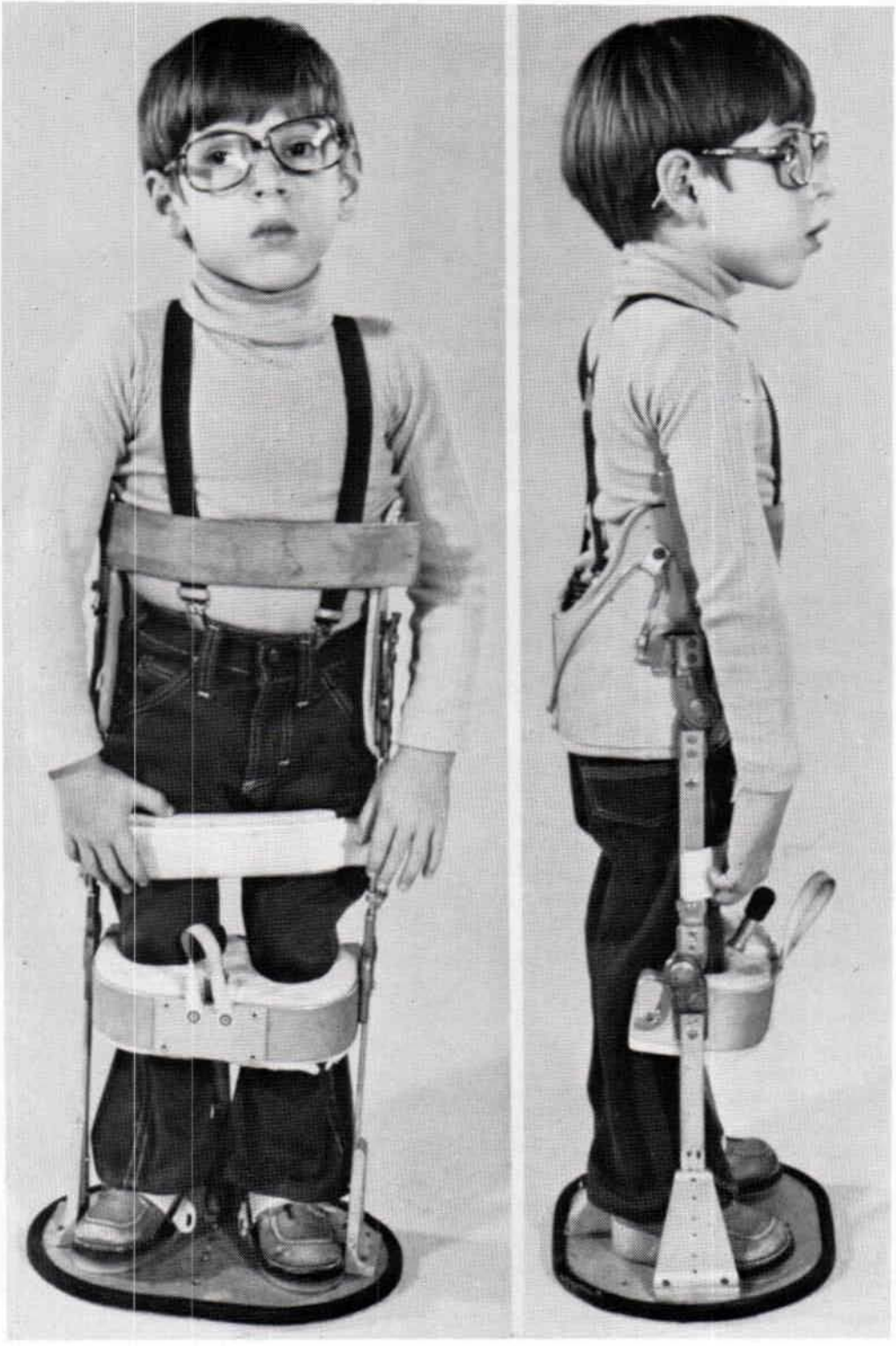
Because the hip and knee controls require use of both hands, the disabled child often finds the maneuvers necessary to get in and out of a chair much too difficult as well as frightening.

To sit, the child must lean back in an inclined position against the chair, and the knee and hip locks are rotated so that both joints flex simultaneously and he can collapse into a partially sitting position. The simultaneous release of both hip and knee locks is frightening to most children under 10 years of age. The hip and knee lock design also complicates the stand-from-sit motion, since the body of the child must become fully extended before any locking is possible. Again, this locking requires the use of both hands. For some chairs, particularly wheelchairs, there may be insufficient room on the side to permit rotation of the locking levers.

It seemed reasonable to attempt to design a system that would separate the hip and knee lock controls, in order to permit the child to unlock and flex his hips when sitting while the lower portion of the brace remains rigid and supportive. The knees could be unlocked by a subsequent action. At the same time the new design would also allow both hip locks and both knee locks to be released by a single lever action with the control possibly located on the child's dominant side, thus freeing one arm for control of balance. Locking could be made automatic upon extension. It was felt that these features would simplify the sitting and standing maneuvers by allowing the child to concentrate on one locking or unlocking action at a time, while maintaining support with one hand. It was felt that such a feature would eliminate much of the fear observed when the young disabled child attempts to sit or to stand in the Toronto Parapodium.

Design

The objective was to redesign the parapodium with independent knee and hip locks, single lever action for knee and hip lock release, and automatic lock on extension. It was intended that the lateral upright supports be modified from the Toronto design for connection to commercially available hinges. Other components of the orthosis were to be designed



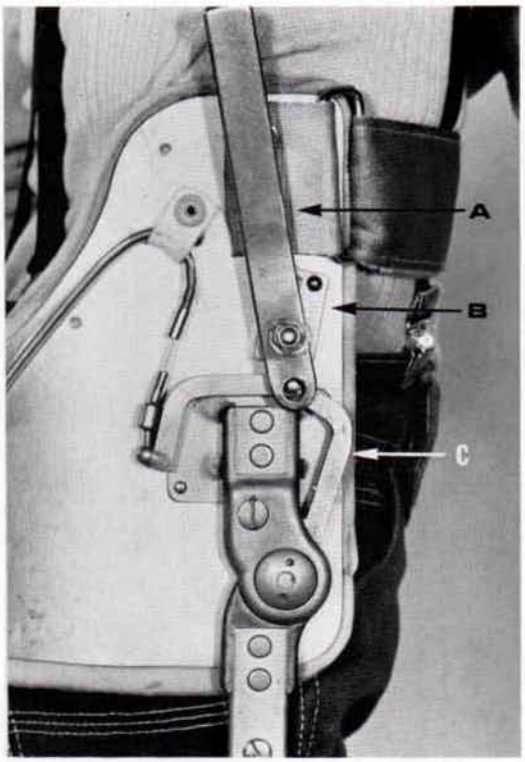


Fig. 2. Close-up view of the hip lock, right side.

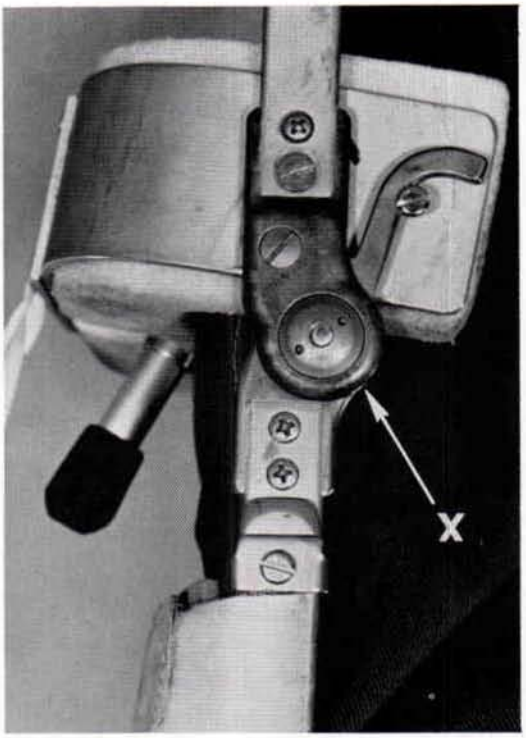


Fig. 3. Close-up view of the knee lock, right side. Part of the flexible pull strap attached to the superior anterior edge of the pretibial band can be seen at the extreme right.

for fabrication in a well-equipped orthopaedic shop.

Three models were constructed. The following description and figures are limited to the third model.

The redesigned parapodium is shown in Figure 1; the patient is 10 years old and 101 cm tall.

Details of the hip and knee locks are shown in Figures 2 and 3.

The hip joint assembly (Fig. 2) is based on stainless steel 17B23 Otto Bock knee joints, right and left outside. These joints flex anteriorly when released by anterior motion of manual lever "A". The release lever, "C" can engage detents at 105 deg, 145 deg, and 185 deg angles of flexion. A standard triple-swivel connection, projecting superiorly, is silver-soldered to the release lever. A standard cable with cable housing assembly as used in arm prostheses connects to the opposite hip release lever through a second triple swivel, so as to allow both joints to be locked and unlocked in unison. The manual lever can be mounted on either the right or left side.

A base block with bullet catch, "B", attached to the manual lever, maintains the hip joints in the unlocked condition until the manual lever is returned to the upright position. This permits the child to move around into a full sitting position without the hip becoming relocked. Locking is automatic upon extension to the standing position when the manual lever is upright.

The knee joint assembly (Fig. 3) is

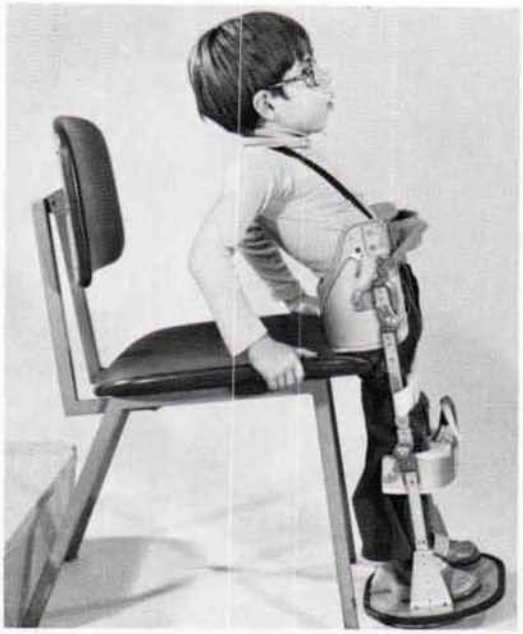


Fig. 4. Initiating the sitting maneuver. The hip locks are released while weight remains supported by the orthosis.

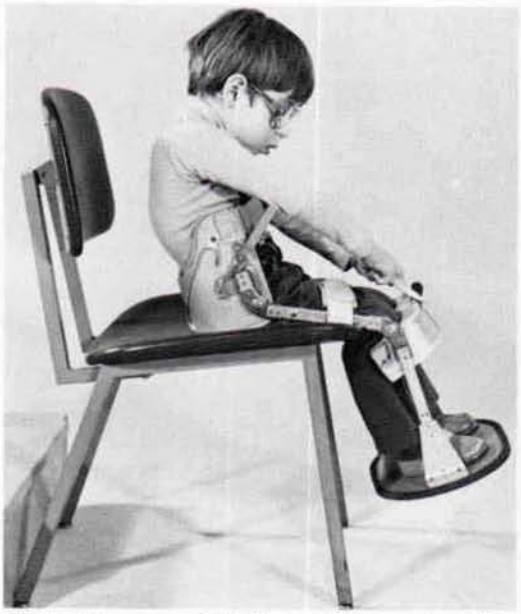


Fig. 5. When seated, the knee locks are released by a slight rotation of the pretibial band provided by a pull on the strap on the anterior surface.

based on stainless steel 17B23 Otto Bock knee joints, right and left outside, inverted to flex posteriorly. A pretibial band of aluminum 3.175 cm wide lined with Plastizote knee blocks, pivots on 10/32 stainless steel screws and bearing sleeve, "X". The J-shaped locking lever rides on a trip screw to release the knee lock when the strap located on the anterior aspect of the pretibial band is pulled upward (Fig. 1). Spring loading relocks the system upon full extension.

The pelvic band is T32023 aluminum 1.6 mm thick, with a 6.35 mm Plastizote lining. Velcro is used for the chest strap closure.

Lateral uprights are 16 or 20 mm x 4 mm stainless steel or aluminum, depending on patient strength and size. Growth adjustment is in 1.5 cm increments for a 7 cm range, with 8/32 screws for fixation. The base supports for the lateral uprights are shaped from T32024 angle aluminum 76.2 x 101.6 x 9.5 mm stock.

The knee extension assist bar is made from telescoping 11.9 and 12.7 mm aluminum tubing, and using 6 mm diameter cords to maintain tensions for returning the assembly to its original position. The attachment block is shaped from 25 x 90 mm aluminum bar stock.

The foot plate is T32024 aluminum plate, 2.2 mm thick. The plantar surface is covered with linoleum to reduce friction over carpets.

Operation

Figures 4 through 7 are views of the critical stages in the maneuvers from standing to sitting and from sitting to standing. In Figure 4 the child has approached the chair, turned, and using one hand, has removed the manual hip

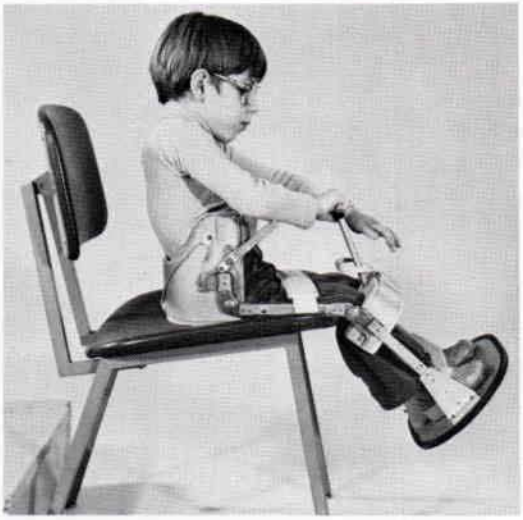


Fig. 6. Beginning the standing maneuver. The knee extension assist bar is used to secure the knee locks.

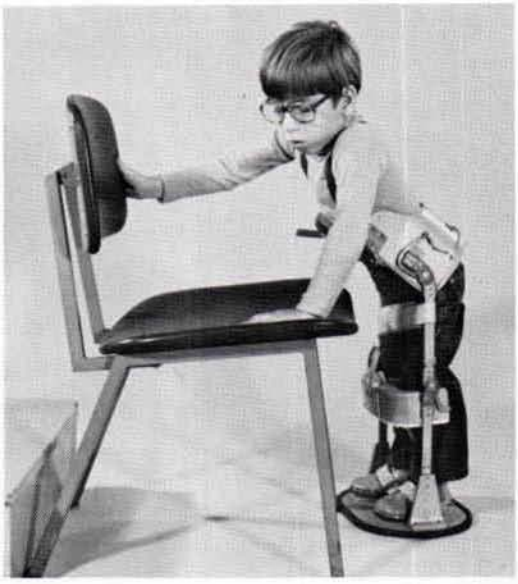


Fig. 7. The standing maneuver is completed by extending the hip to the point where the lock engages automatically.

release lever forward (Fig. 2). In this position, the hip locks are released while the knee locks remain secured. The child's weight is supported by the orthosis as long as his center of gravity is not moved forward. Both arms are positioned in this figure for lifting his weight onto the seat. When the patient is stable on the seat (Fig. 5), a pull on a flexible strap loop connected to the pretibial band (Fig. 3) releases the knee lock, and the sitting motion is completed.

To regain the standing position, the child initially extends his knees by pulling back on the knee extension assist bar (Fig. 6) until the knee lock clicks into position. The child can then roll over and off the seat, again with the lower portion of the orthosis providing full support for body weight. If the hip release lever is now returned to its original position, the child can push upright with both arms (Fig. 7) to secure the hip locks automatically.

The tension adjustments for the hip and knee locks were found to be critical for the youngest patients, and required individual fitting. This was not a problem for the older children. Some special training in the use of the redesigned parapodium is indicated, or a self-taught skill may have to be relearned.

The lateral uprights in this design permit some lateral motion during swivel gait. This flexibility appears to aid forward motion.

The weight of the new design is estimated to be about 10 percent greater than the Toronto Parapodium.

Results

CASE STUDY I

The first child to wear the redesigned parapodium, J.N., was a girl of three with a diagnosis of approximately T-12 level meningomyelocele. She had worn a Toronto parapodium since the age of 10 months. Following fitting in the redesigned parapodium, J.N. received some

special instruction on the use of the locks but then resumed a normal therapy schedule, which consisted of a reevaluation once a month and a task assignment to be carried out at home. After one month, J.N. could get to a sitting position in a chair and back to standing with minimal assistance. Some adjustment of the tension on the hip and knee locks was needed. Following these adjustments and another month of practice, J.N. was able to sit and stand independently. Her mother, in fact, reported that she often would get in and out of her "TV" chair at home without help. With the original design she had been unable to even begin this task of sitting unaided.

CASE STUDY II

The second child fitted with the new lock design was K.Z., a 10-year-old boy, diagnosed meningomyelocele approximately at the T-12 level. He had worn a Toronto Parapodium since the age of four. After working with his mother without any special instruction over a period of several weeks, K.Z. had learned both to sit and move to a standing position from a chair independently, using only a desk for added support. This new freedom of getting up and down from a chair triggered the learning of several other activities of which K.Z. had previously been frightened. He began an independent swivel gait without an assistive device and developed a much more confident swing gait. K.Z. received further training from his physical therapist at school, and is learning to sit and stand without a desk. He does this with minimal assistance. He can also move in and out of his wheelchair unassisted.

CASE STUDY III

The third child to receive the new design was A.C., eight years of age. She had worn the Toronto Parapodium since the age of three or four. She had a diagnosis of meningomyelocele of fairly high level. A.C. had previously been unable to manage the locks on her Toronto Parapodium for the sitting or standing maneuvers. After fitting with the redesigned orthosis and some special instruction in the use of these new locks, A.C. continued her regular physical therapy schedule of one-hour sessions twice a week in the special school she attended. Of the three children placed in the brace up to this point, A.C. had the weakest upper limbs. She had some success in unlocking to sit, but had a great deal of difficulty using the extension assist in preparation for standing. A.C. wore the new Parapodium for several months before entering the hospital for surgery. At this point she died unexpectedly.

CASE STUDY IV

J.D., the fourth child to be fitted with the new lock design, was three-years old with meningomyelocele at approximately the L-3 level, and had worn her Toronto Parapodium since approximately one year of age. She had done well in all brace activities but had found sitting and standing difficult. After some specific training, J.D. also resumed her regular physical therepy training schedule of once-a-month sessions. She has worn the redesigned parapodium for approximately three months, and can now sit and stand with minimal assistance. She still has some difficulty with the tensions on the knee lock and handling of the extension assist, but is improving.

Conclusions

The objectives of the alternate Parapodium design were accomplished in the construction of three prototype units. These have been fitted successfully to young patients for evaluation. Preliminary observations indicate that in all cases, the patients were able to perform sitting and standing maneuvers when previously they had been unable or fearful to do so. Depending on age and degree of disability, the three surviving children developed the skill for sitting and standing that was superior to that previously accomplished. In some cases this new "freedom" led to increased confidence and skill in other areas.

It appears, therefore, that additional study and use of the redesigned Parapodium is justified.

Acknowledgment

This report describes the work and contributions of the members of the Biomechanics Group of the Birth Defects Clinic, Department of Pediatrics, School of Medicine and Dentistry, University of Rochester, Rochester, New York 14642.

Partial support for this work is from a grant by the J.M. McDonald Foundation, Cortland, New York.

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Footnotes

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Orthotics and Prosthetics, Vol. 34, No. 2, pp. 21-24, June 1980

The Selectively Placed Silicone Gel Liner System for PTB Prostheses[1]

JACK M. GRAVES, C.P.[2]

The Silicone gel soft insert has been developed and is available as a component for below-knee prostheses. The principal indication for use of a gel liner has been for amputees with badly scarred residual limbs where it has proven to be an effective system for protection of the residual limb. However, delamination of the bond between the gel and leather and migration of the gel have discouraged somewhat widespread use of the liner.

For walking and most other routine activities, a PTB with either a hard socket or a conventional liner is adequate and is usually preferred by the below-knee amputee. However, for activities more demanding than walking, such as skiing, mountain climbing, and participation in physically demanding sports, the below-knee amputee needs more protection than is generally provided.

A new interface system is described in this report. The Selectively Placed Silicone Gel Insert (SPSGI) is essentially a conventional soft insert design that uses a combination of Pelite and leather (Kemblo can also be used) with a "window" in the Pelite over the anterolateral surface and crest of the tibia. Where the Pelite is deleted Silicone gel is applied (Figs. 1 and 2). Because of its inherent properties, the Silicone gel provides constant volume

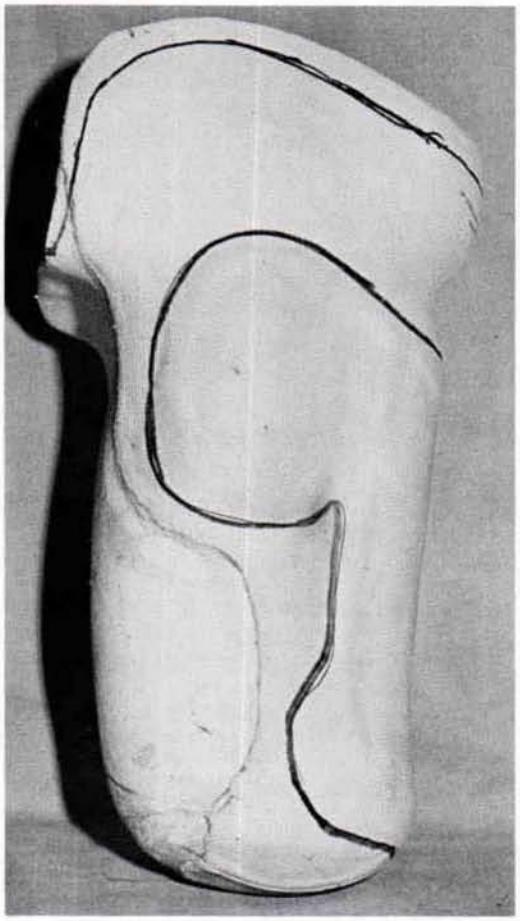

Fig. 1. Lateral view of positive model for PTB using the selectively placed Silicone gel liner system showing area of conventional liner where Silicone gel is used to replace the original liner material. See also Figure 2.

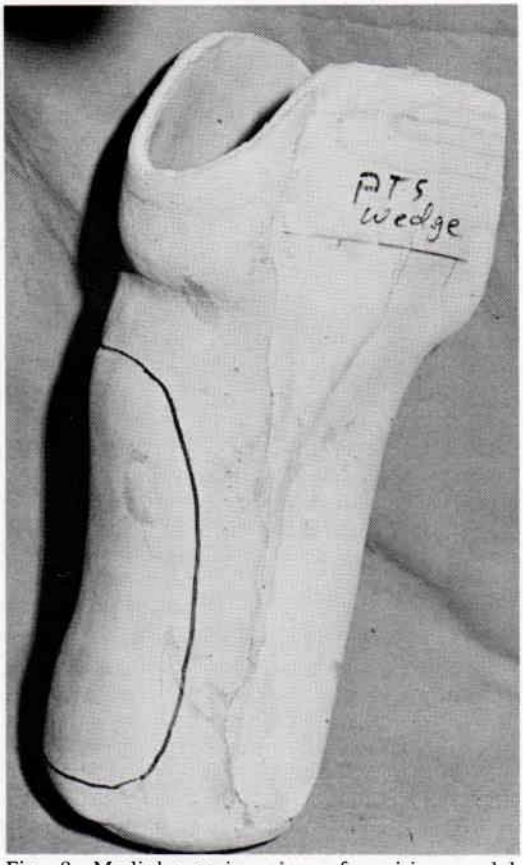

Fig. 2. Medial-anterior view of positive model shown in Figure 1.

Fig. 3. A cloth material is glued to the border of the window to provide a surface for adherence of the RTV Silicone.

with a displaceable, semi-fluid characteristic. The gel is unique in several respects. It possesses a "soft" kind of "hard", due to its volume constancy. It does not pack to a hard, unyielding interface as do most other materials used for interfaces. Although gel does have a tendency to pack, it retains its flow-like quality. There are several other advantages for its use. It provides excellent weightbearing support, and due to its containment, or, in a sense, being locked within the liner, is not subject to delamination or other problems associated with the all-gel liner.

Method of Fabrication

To bond gel in a given area and to the periphery of the window in the liner requires glueing a cloth material to the window's border so as not to saturate completely the cloth, but still bond it to the Pelite in order to provide an effective surface for adherence of the RTV Silicone (Fig. 3). This is used to glue the gel to leather but is not satisfactory for Pelite. An outer laminate of leather is used with RTV adhesive sealant in areas of gel. Conventional glues are used where the leather overlaps the Pelite surrounding the window.

The insert is fabricated over a PTB mold modification with a buildup over

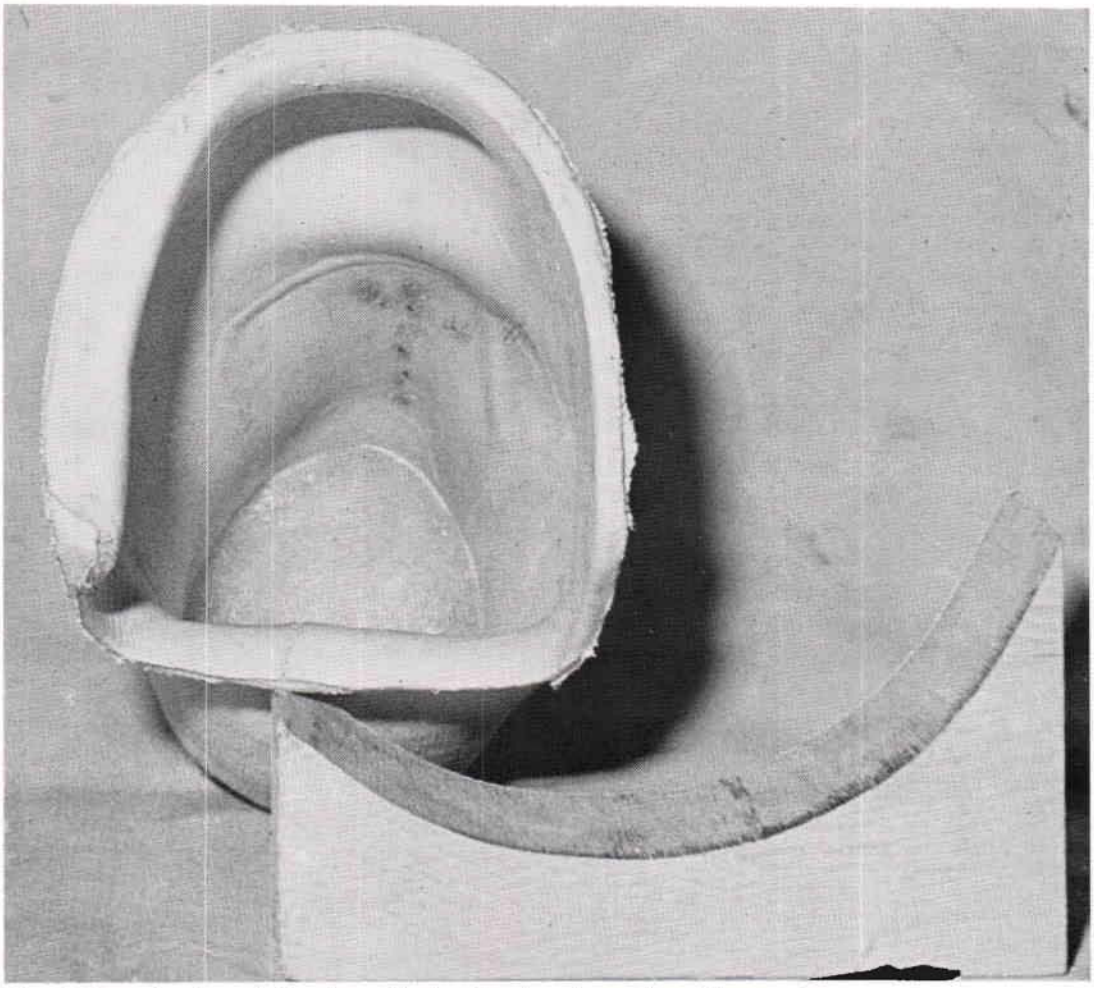

Fig. 4. The socket is molded so that a distal-end pad can be used to achieve total contact.

the distal end so that, within the SPSGI liner, a custom fit total-contact distal-end pad can be used (Fig. 4).

Leather is the most suitable material to use in conjunction with gel. It has an inherent elastic quality so the gel adhesive seals well to it. Care should be used by the prosthetist to seal the leather in all areas of the liner. When the leather interior eventually does deteriorate, it can be relined.

The prototype of the SPSGI liner has been worn daily by the author for several months. Virtually no problems were encountered using conventional alignment techniques and a SACH foot. The prosthesis had side joints, thighlacer, and included a waist belt since the lacer was not used on a daily basis. The belt was necessary since the lower joint halves remained on the prosthesis and a cuff suspension could not be made effective. This prosthesis was built for heavy duty. The SPSGI liner was especially effective when downhill walking was required during climbing expeditions. The author was

able to climb the summit of Mount Rainier twice in a ten-day period, a trek involving 9000 vertical feet of climbing. Extension force of the residual limb against the anterior socket and interface was necessary with virtually every step to prevent knee buckling and thus to maintain stability.

Whether the SPSGI liner is superior to the all-gel system for snow skiing is yet to be determined.

The experience of another below-knee amputee should be mentioned. The residual limb is approximately four and a half inches long with no muscle stabilization and thin skin covering so that the shape is essentially skeletal in appearance. He has bicycled literally thousands of miles using a conventional prosthesis with a Pelite liner. Bicycling was the only sport in which this individual could participate to the extent he desired without experiencing prosthetic problems. He has tried hiking but had skin breakdown.

The interior shape of the liner he had been using was duplicated and a SPSGI liner was fabricated. His new prosthesis consisted of a Greissinger foot and an Otto Bock endoskeletal shank system, polycentric hinges (so that the PTS brim shape could be retained) and thigh lacer for rotational stability and weightbearing support. The SPGIS liner retained the same mediolateral and anteroposterior brim fit provided by the other prosthesis. In fact the mediolateral fit was the essential factor involved in the weightbearing support provided by his socket. The day after receiving the new prosthesis the subject climbed to Camp Muir on Mount Rainier, a 5000-foot vertical elevation gain.

The author has examined another interface system that used gel with an acrylic resin skin. The suppleness of the leather was missing. It was difficult to deform the resin skin in a way that the gel would displace or flow as it does with leather. Also this particular socket interface system had gel incorporated into the socket and thus removal of a liner was not allowed. Because there was no liner, effective socket modifications was impossible without reducing whatever benefits might have been available from the gel, particularly in the anterior region of the socket.

When an all-purpose athletic or extra-ambulatory prosthesis is needed by a below-knee amputee, the Selectively Placed Silicone Gel Insert system should be given strong consideration as the one of choice particularly when the residual limb is long enough and strong enough to provide the extension forces needed about the knee for strenuous athletic feats, walking, and climbing.

Footnotes

[1]This work was performed under the terms of Veterans Administration Contract V663P-1081.

[2]Research Consultant, Prosthetics Research Study, Seattle, Washington.

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Orthoses For Rheumatoid Fingers

RICHARD D. KOCH, C.O.[1]
DAVID A. BIRD, A.B., C.O.[2]

The boutonniere deformity of the finger (Fig. 1), prevalent with rheumatoid arthritis, is characterized by flexion tightness of the proximal interphalangeal (P.I.P.) joint and hypertension of the distal interphalangeal (D.I.P.) joint, and can usually be helped by application of orthoses. The figuratively opposite deformity, the swan neck (Fig. 2), also can usually be helped. This paper will limit its scope primarily to the fitting of orthoses for these two deformities, along with some considerations for a thumb orthosis.

Why do these deformities need orthotic treatment? In some cases they don't, because they simply cannot be corrected (Fig. 3). But many cases can be corrected, and skeletal re-alignment provided by an orthosis allows much relief

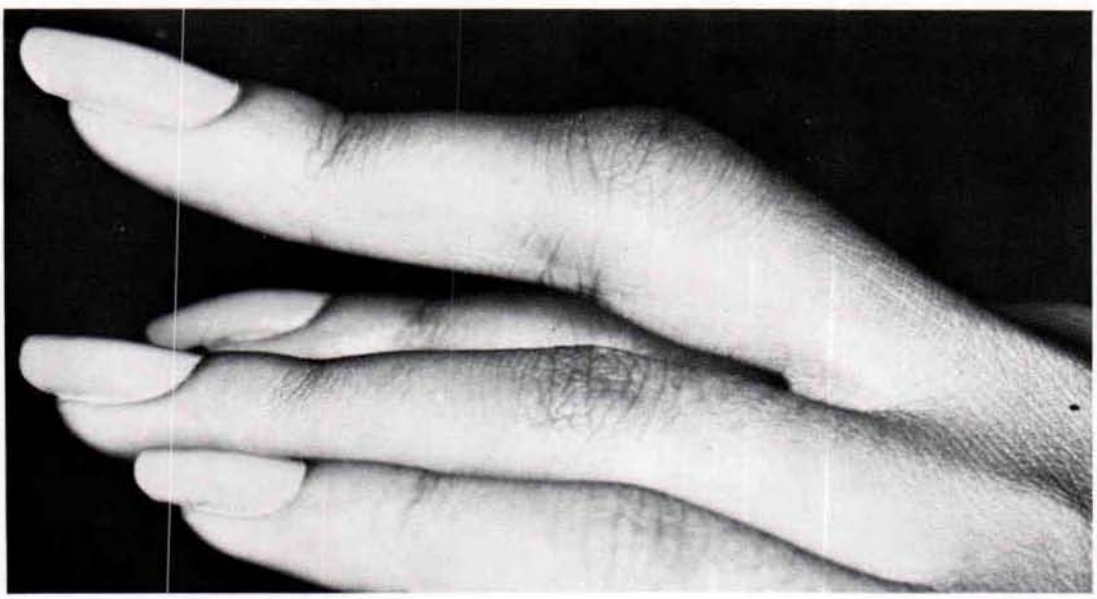

Fig. 1. an example of the boutonniere deformity.

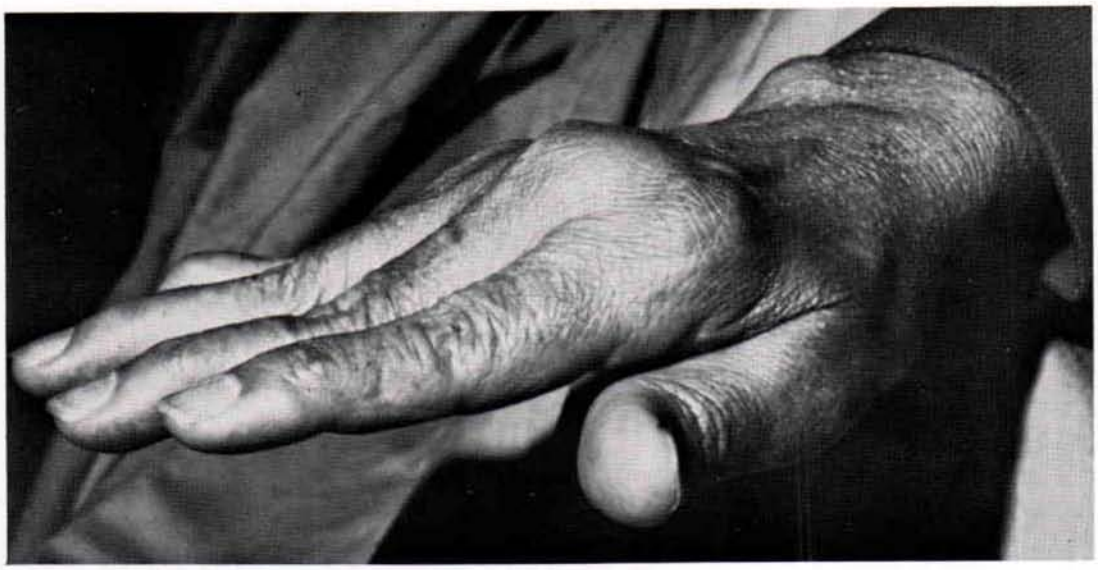

Fig. 2. An example of the swan neck deformity.

Fig. 3. A boutonniere deformity that is not amenable to correction by application of an orthosis.

from pain, reduces edema, and provides a deterrent to further deformity. another advantage for the patient is greater use of the finger through stabilization, even though P.I.P. flexion is prevented when the boutonniere orthosis (Fig. 4) is used. Many types of orthoses, from the crude to the sophisticated, have been used for the treatment of these two deformities, including off-the-shelf items, and some of

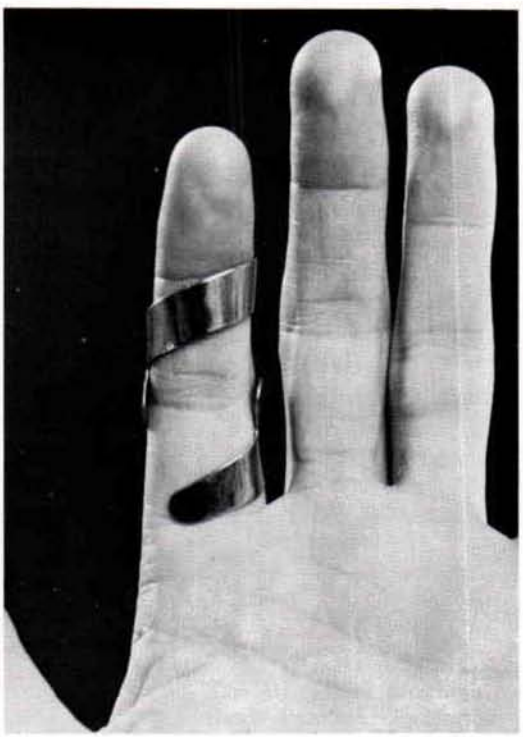

Fig. 4. Dorsal surface view of a "Boutonniere" orthosis in place.

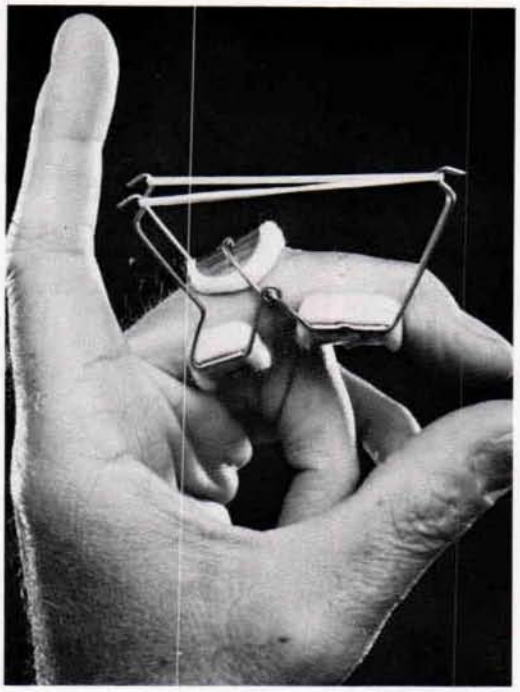

Fig. 5. A view of the dynamic reverse-finger knuckle bender.

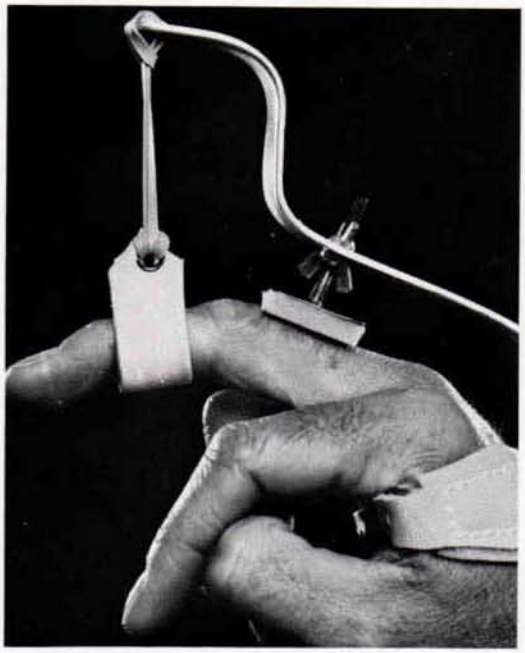

Fig. 6. An outrigger orthosis with an M.P. stop and a P.I.P. dynamic extension unit.

these have been successful. However, a truly successful orthosis must not only promote a deterrent to an increase in deformity, but must be cosmetically acceptable, nontoxic, and not bulky. Not many orthoses designed for these two deformities meet these standards (1).

Obviously, correction will not occur when the orthosis is not worn, but many patients, no matter how severe the deformity or how great the pain, will refuse to wear a finger orthosis that is bulky and "uncosmetic".

For the patient with a severe boutonniere deformity, a dynamic reverse finger knuckle bender may be used (Fig. 5). for the very severe, an outrigger involving an MP stop and a P.I.P. dynamic extension unit may be appropriate (Fig. 6). All of these devices involve the three-point-pressure system needed to achieve stabilization and correction.

The procedure for fitting boutonniere, swan neck, and thumb orthoses that achieve correction are outlined below. These orthoses are light in weight and are accepted from a cosmetic standpoint.

Fitting the Boutonniere Orthosis

The fitting of orthoses for the fingers involves the same care and procedure common to all orthoses for the trunk, cervical spine, lower and upper limbs. The three-point-pressure system is utilized, care being taken to provide the proper contours and avoid undue pressure over the fingers and hand.

To reduce a boutonniere deformity, the boutonniere reduction orthosis (Fig. 7) is fitted with the volar proximal band 1/8-in. distal to the web space. The distal volar band is placed at the D.I.P. joint and the dorsal band is located over the P.I.P. joint so as to apply pressure on the

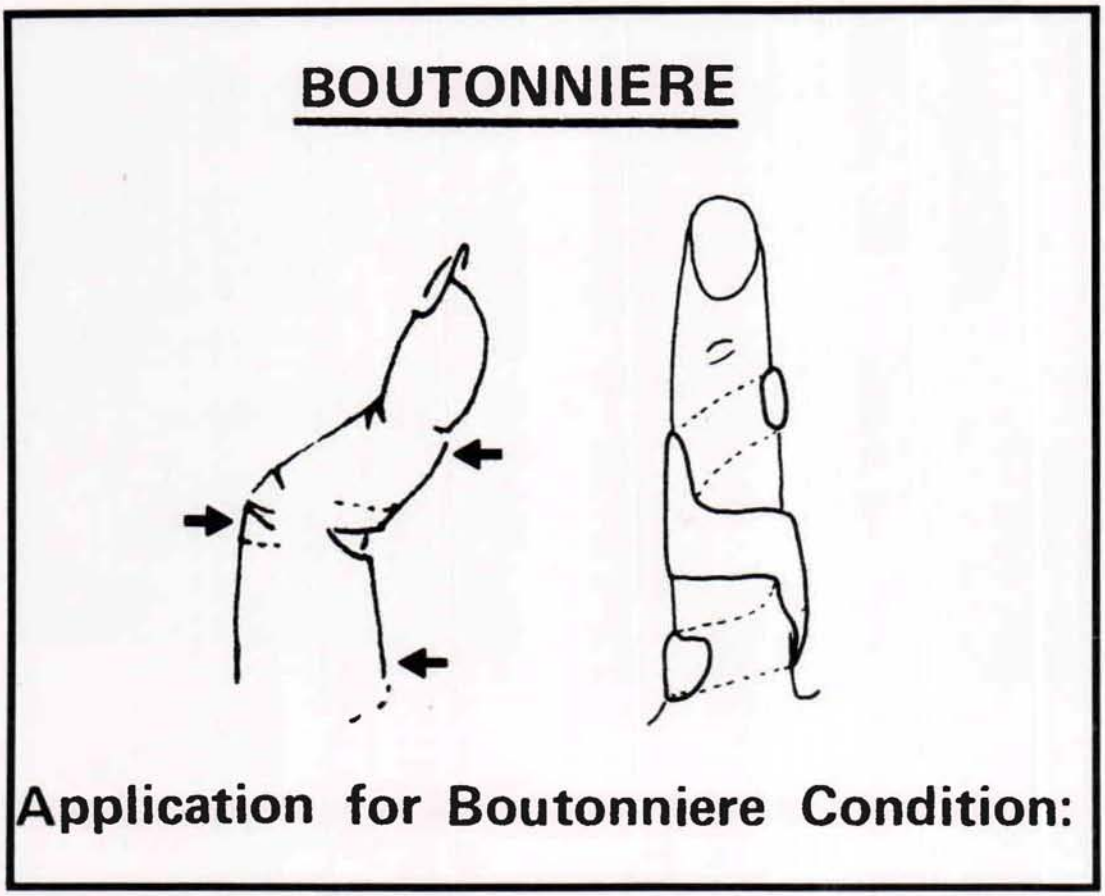

Fig. 7. A schematic showing system of forces provided by the "boutonniere" orthosis. Courtesy of Camp International, Inc.

dorsal surface. The orthosis should be contoured so that pressure from the distal band tends to flex the D.I.P. joint with the P.I.P. joint being held in the corrected position (Fig. 8).

Fitting the Swan Neck Orthosis

The swan neck orthosis is often a boutonniere orthosis rotated 180 deg, but specially designed orthoses are often used as well (Figs. 9 and 10). the proximal dorsal band should be 1/8-in distal to the MP joint and must not impinge on the P.I.P. joint. The distal edge of the distal dorsal band should be at the D.I.P. joint and the band must not impinge on the P.I.P. joint. The volar band should be just proximal to the P.I.P. joint so as to allow P.I.P. flexion with the orthosis while P.I.P. extension is restricted. The volar pressure applied by the distal band while P.I.P. extension is attempted encourages D.I.P. extension (Fig. 11 and 12).

Fitting the Thumb Orthosis

The orthosis for deformities of the IP joint in hyperextension and MP joint (Fig. 13) in flexion stabilizes and places the thumb in a functional position (Fig.

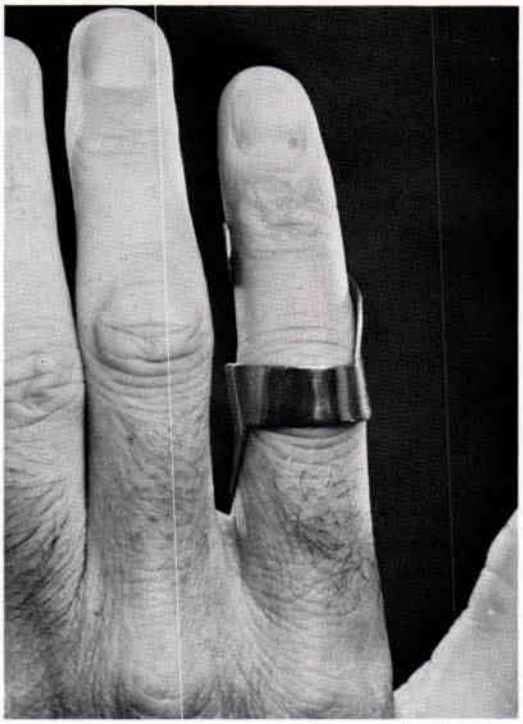

Fig. 8. A palmar view of the "boutonniere" orthosis. Flexion of the D.I.P. joint is allowed while the P.I.P. joint is held in the corrected position.

14). The orthosis is contoured to the thumb. Pressure is applied to the MP joint while the band is brought around in contour so as to apply pressure in a dorsal direction, thus causing the IP joint to flex. The band should be proximal to the IP joint but not cause impingement in the web space. The third point of pressure is the wrist strap which applies a laterally directed force.

Discussion

When treating rheumatoid arthritis with intrinsic hand deformities, it is difficult to keep it simple and at the same time provide an orthosis that is acceptable from the cosmetic standpoint.

With the boutonniere and swan neck deformities that are correctable, a reduction of pain and edema will usually follow when a well fitting, correctly designed orthosis is applied. Such an orthosis must be light, nontoxic, not bulky, and cosmetically acceptable. It must be capable of being adjusted easily without fear of

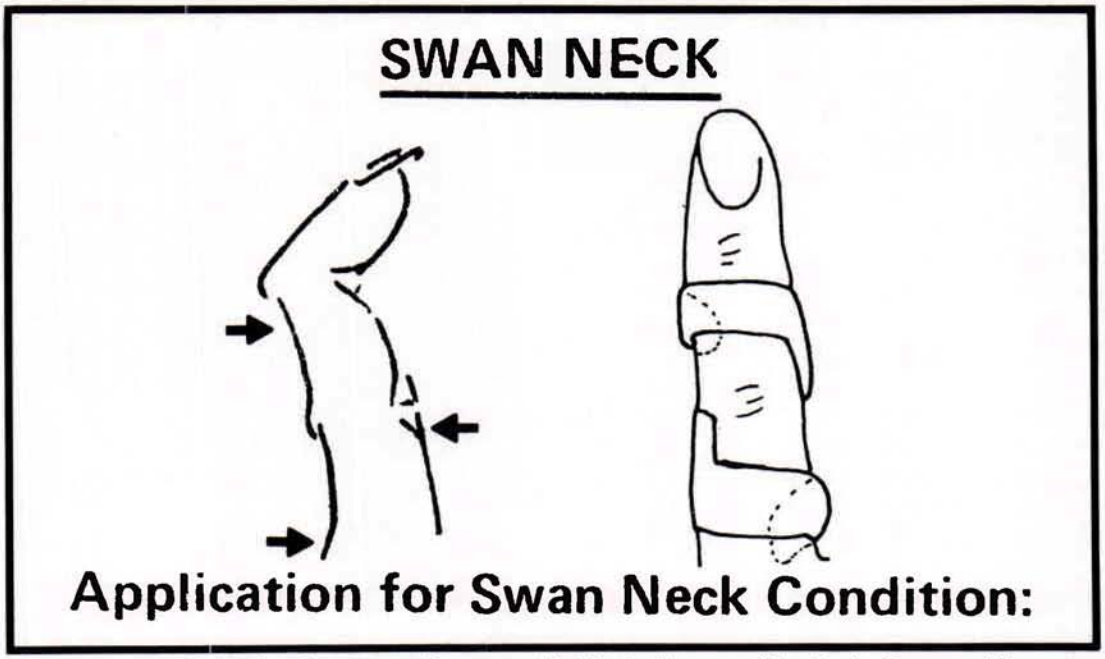

Fig. 9. A schematic showing the system of forces provided by the "swan neck" orthosis. Courtesy of Camp International, Inc.

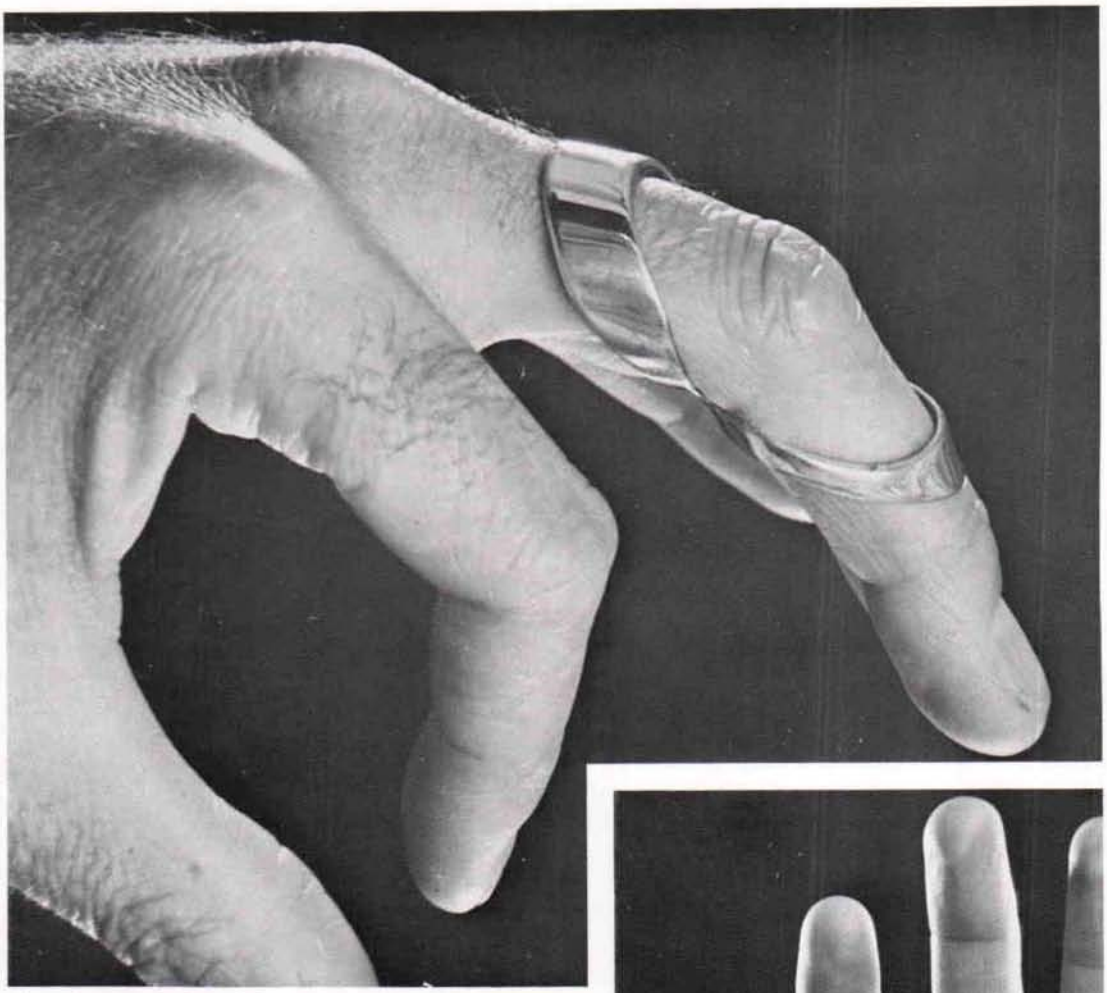

Fig. 10. Medial view of the "swan neck" orthosis. It can be fashioned from a tube of either aluminum or plastic.

breaking or deforming the orthosis. A stainless steel orthosis designed around orthotic principles not only meets these requirements but will be serviceable for many years.

A stainless steel orthosis for these two deformities is available from Camp International, Inc. The aluminum or plastic tube for swan neck correction is more difficult to adjust and with the aluminum

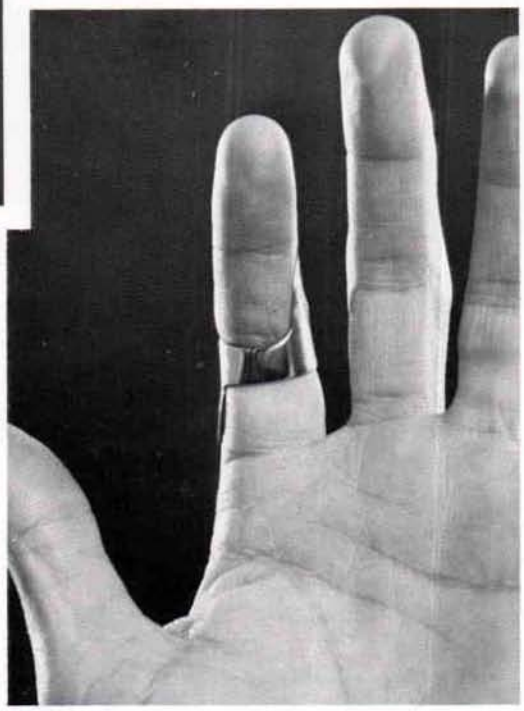

Fig. 11. A volar view of a "swan neck" orthosis. Flexion of the P.I.P. joint is allowed while extension is restricted.

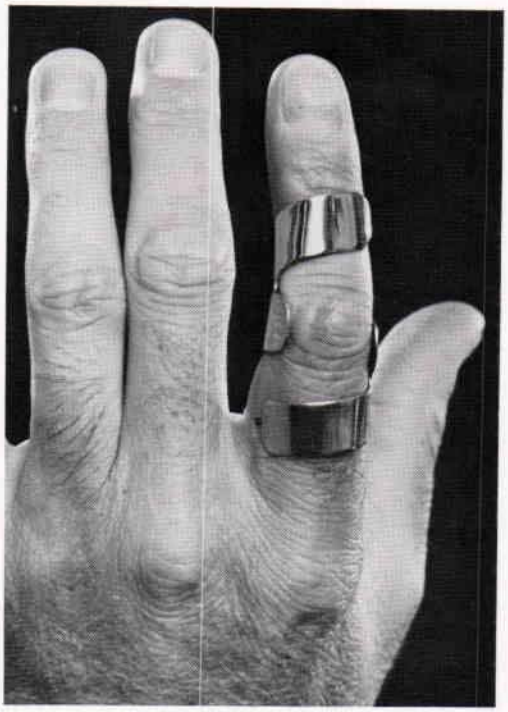

Fig. 12. A dorsal view of a "swan neck" orthosis. The distal band encourages extension of the D.I.P. joint.

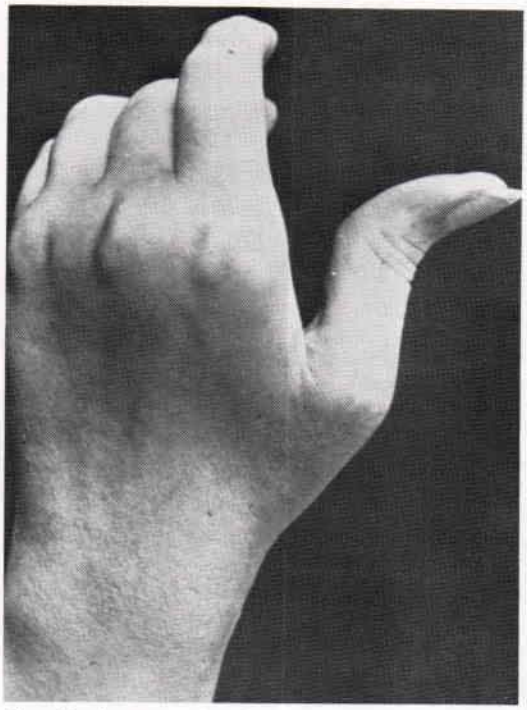

Fig. 13. An example of the boutonniere deformity in the thumb.

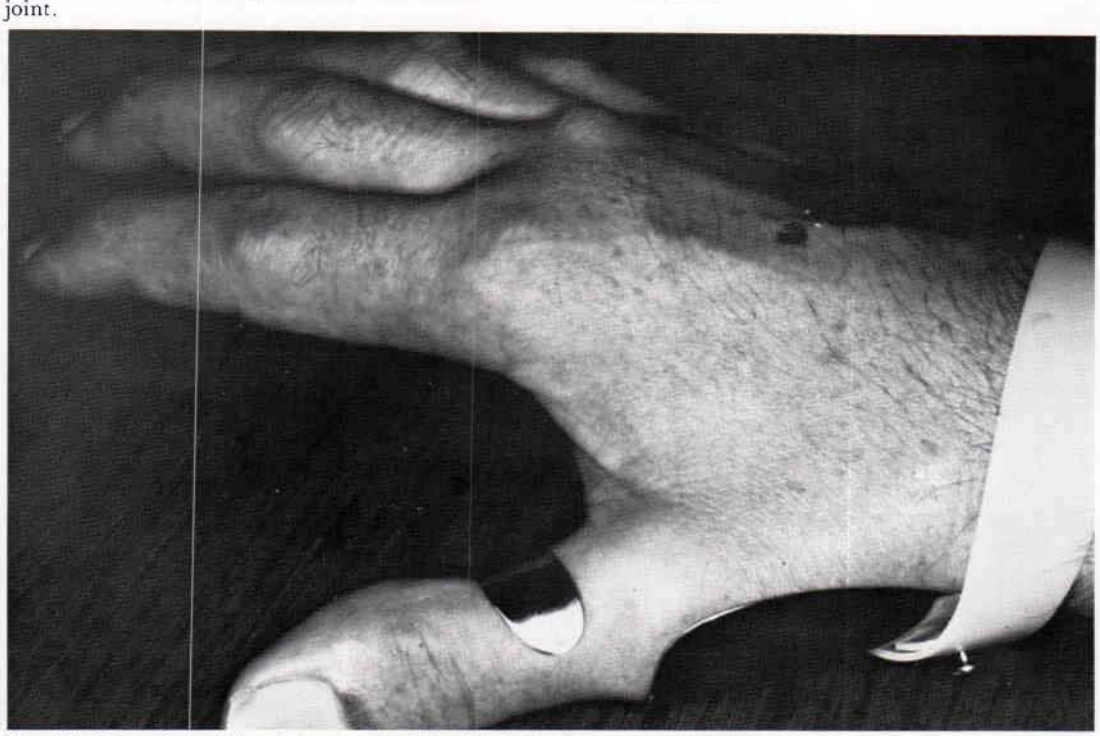

Fig. 14. View of the "thumb boutonniere" orthosis in place.

orthosis, breakage is a factor. With a plastic orthosis bulk definitely is a problem.

For the thumb orthosis stainless steel has been found to be the best material for the reasons stated above.

Credit should be given to Ben C. Fowler, C.O., for his early work in this area.

Footnotes

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Orthotics and Prosthetics, Vol. 34, No. 2, pp. 33-37, June 1980

Technical Note

An "Original" Idea

It has been said "There is no such thing as an original idea." That may be, but each of us has thought of a product, process or approach to a problem that was "original" to us. We may never produce the product, use the process, or try the new approach but that is not to say the idea was not "created" by us.

I don't know if the ideas used to fabricate the orthosis described are original or not, but having never seen it done before this way, I offer for your consideration an "Original Standing Orthosis".

After lying dormant for quite some time, interest in a standing brace has been renewed at our local Children's Medical Services Orthopedic Clinic. Because the recommendations for standing braces have been sporadic and requests for them have been divided among the various facilities serving this Clinic, no single facility has had a great deal of experience in fabrication or with supply sources. After investigating central fabrication and prefabrication kits and finding neither one suitable to our particular needs, I designed the orthosis described here (Fig. 1).

The spinal deformities of the child for which the brace illustrated was intended required use of a custom molded body jacket. Other more conventional proximal body supports can be substituted in less severe cases. A negative cast and the

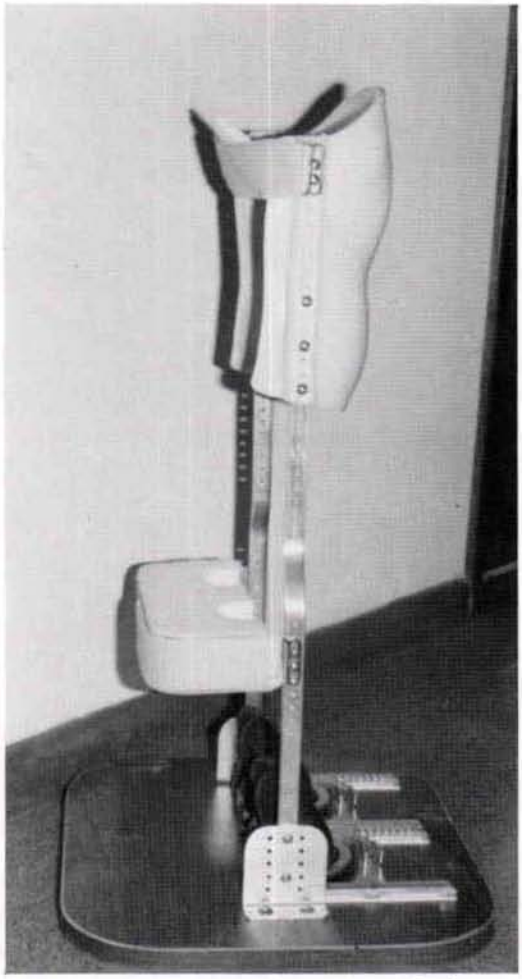

Fig. 1. The fully assembled standing orthosis.

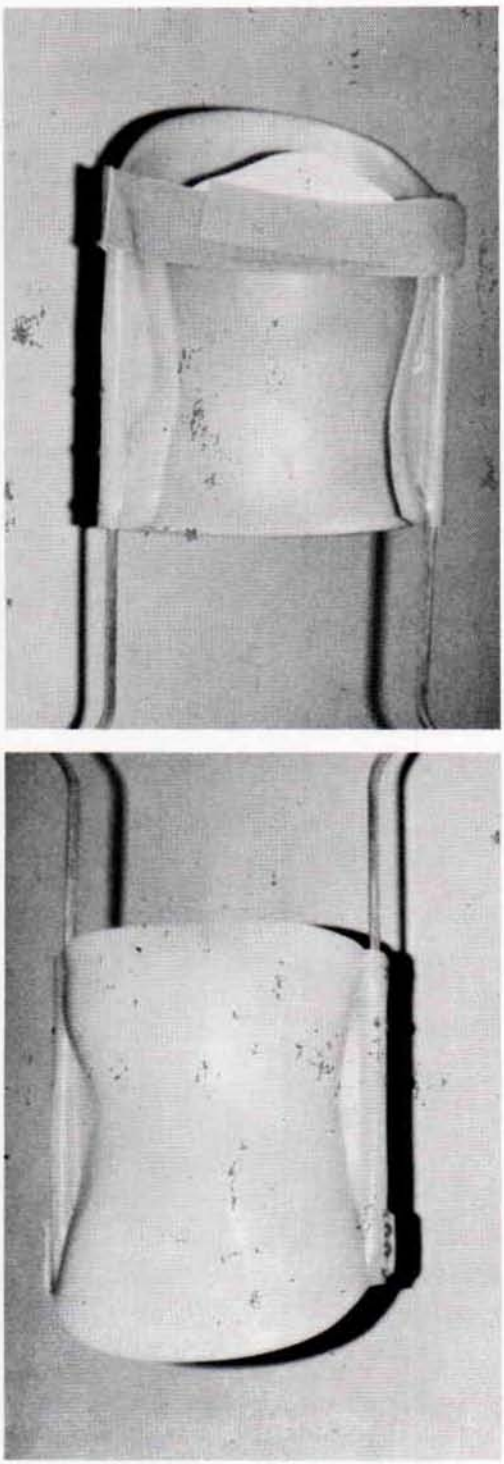

Fig. 2. Anterior and posterior views of the standing orthosis that show the channels molded to receive the aluminum uprights.

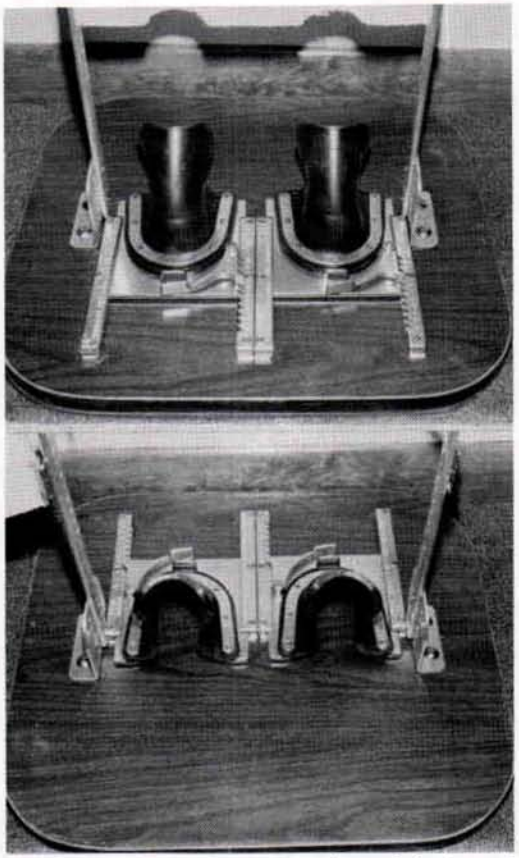

Fig. 3. Anterior and posterior views of the base of the standing orthosis that uses water-ski bindings to provide a stable attachment of the feet to the platform.

necessary measurements, along with specific instructions, were sent to Southern Prosthetics in Atlanta for fabrication. The instructions for fabrication were: material to be polypropylene lined with Plastazote; parallel, vertical channels to be molded on the outer lateral surfaces of the shell so as to accommodate 1/4-in. x 3/4-in. aluminum bars (Fig. 2).

The 18-in. x 12-in. base was fabricated from a sheet of 3/4-in. thick pressed fiberboard. The corners were rounded, and the top and sides were covered with Formica. A piece of 1/4-in.-thick crepe was cut to size for attachment to the bottom surface later (Fig. 3).

To provide a stable connection between the feet and the platform while allowing adjustment in size without interfering with ease of donning, I originally used child-sized water-ski bindings, but it was necessary to change to adult-size bindings because the heel cup on the child-size was too small to accept a shoe. Because of the bulkiness of the hardware, it was necessary to off-set the lateral supports, which proved to be no problem (Fig. 3).

The lateral uprights, which consisted of 1/4-in. x 3/4-in. aluminum bar stock that was drilled and tapped for length adjustment, were attached to the base with two pieces of 1/8-in.-thick aluminum sheet bent to form an "L" shape. Bolts, 1/4-in. in diameter, and "T" nuts were used to secure the brackets to the base. At this time the crepe rubber was glued to the bottom of the base.

The uprights were inserted in the channels provided in the body jacket and screwed to the base attachment brackets. The frame for the knee extension block was made from 1/8-in. x 1-1/2-in. aluminum band stock cut and formed to accept a foam knee block. One side was attached to the lateral uprights at approximately the level of the knees with a commercially available hinge. The other side was held in place with Velcro. The foam block was contoured later to fit the child's legs.

In order to provide anteroposterior trunk control, a 1-1/2-in. wide webbing strap with a sternal pad was positioned anteriorly at the most proximal point on the body jacket. This strap was secured on one side with a screw and Velcro through a loop on the other.

At the time of fitting the posterior body shell was checked for fit and adjusted for length. The ski bindings were positioned to hold the feet in the desired alignment. It was at this time that I realized that the toe pieces for the ski bindings would not be needed. This greatly simplified the donning of the appliance.

The foam knee block was adjusted to the proper height and cut out to accept the child's knees in the area just distal to the patella. The chest strap was secured and the child was placed in an upright position for the first time.

The orthosis received immediate and enthusiastic acceptance by the patient and his family.

It has been a pleasure to have had the opportunity to try my "new idea", and nearly as much fun writing about it.

Thomas L. Ray, CPO

Technical Note

Proportions of the Human Body Segments for Use in Design of Artificial Limbs

The following article, written long ago, which I found among other professional notes, is intended to show prosthetists a way to determine length measurements of amputated limbs for bilateral amputees. We have used this method in Germany during and after the First World War successfully in Veterans Hospitals and Shops as guidelines.

The knowledge of the symmetry and proportions of segments of the human body is essential for the prosthetist when both legs or both arms have been amputated and no measurements of the missing limb are available.

The normal human body varies in height, form, weight and posture, but, still there is a certain constancy in the proportions between lengths of segments of the legs, arms, and other parts of the body.

Painters or sculptors know this, and use the knowledge when painting pictures or forming statues. Painters, for instance, use the length of the face and the hand as a measuring unit, while the sculptor prefers the length of the foot.

Prosthetists can use both forms in their work, and it will help greatly in finding missing measurements in case of bilateral amputations. Following is a list of measurements based on these findings and used by the prosthetists in Germany:

3 times the foot length equals length from tuber ishi to floor

4 times the foot length equals length from crest of ilium to floor

5 times the foot length equals length from axilla to floor

2 times center of knee joint minus 1 times center of the ankle joint to floor equals center of hip joint to floor

3 times center of knee to floor equals center of shoulder to floor

4 times center of knee to floor minus 2 times center of ankle joint to floor equals the height of a man

1 times center of hip joint to floor equals half the height of a man

1 times center of hip joint to center of knee joint equals the length from center of knee joint to center of ankle joint

1 times center of knee joint to floor equals length from nipple to center of hip joint

1 times center of hip joint to axilla equals center of shoulder joint to wrist joint

Distance from 1st cervical to 5th lumbar vertebra equals 1/3 height of man

1½ times the length from middle finger tip to wrist joint equals foot length

1 times the foot length equals the length from center elbow to center of wrist

Distance from middle of palm to center of elbow joint equals length from center of elbow joint to top of acromium

3 times the foot length equals distance from acromium to middle finger tip

Distance from left finger tip to right finger tip (outstretched arms) reveals the height of a man

3 times the foot length equals the length from top of acromion to middle of finger tip

The width of a hand equals half the length from center of wrist joint to the middle finger tip.

Laurence Porten, C.P.O., M.O.M.
in cooperation with an old friend,
William Weiss, M.O.M.
(Master Orthopedic Mechanic)

Orthotics and Prosthetics, Vol. 34, No. 2, pp. 38-41, June 1980

New Publications

***Rehabilitation of the Hand*, Editors: J.M. Hunter, M.D., L.H. Schneider, M.D., E.J. Macklin, L.P.T., and J.A. Bell, O.T.R. The C.V. Mosby Co., Saint Louis, 1978; 720 pages plus index; $65.00.**

This book is an outgrowth of two interdisciplinary symposia held in 1976 and 1977. As such it is a far reaching exploration of a specialized topic by surgeons and therapists who are deeply committed to it. The emphasis is on neither surgery nor therapy, but rather on the interplay of the two and the management of the patient's problems by a team of which the patient is an integral member. To those involved in prosthetic clinc teams the message is familiar, but the lucid and elegant discussion by Dr. Paul Brand on the subject is most refreshing.

The book covers most disabling conditions of the hand, and includes sections on biofeedback, prosthetics, and orthotics. Of particular interest is the reprinting in full of Dr. Sterling Bunnell's classic article on partial hands and reconstruction that appeared many years ago in *Artificial Limbs,* with the notation that the principles set forth at that time are still sound. Aside from this, little is said about upper-limb prostheses, but considerable attention is given to training the upper-limb amputee in use of prostheses.

Orthostics is referred to throughout the book as splinting, and aside from a section devoted to it, is related repeatedly to specific topics elsewhere in the volume. Emphasis is on the use of low temperature thermoplastics and techniques readily employed by a therapist. This is doubtless an accurate reflection of the prevailing state of affairs and totally appropriate in the light of the stress throughout the book on continuous modification of treatment modalities in response to changing needs. Nonetheless, a discussion of the orthotist's role in meeting these needs, and, in particular, in fabricating more durable orthoses for long term use, would be useful.

The book contains 70 chapters from 72 contributors and is divided into 14 sections as follows:

I — Basic Considerations
II — Evaluation
III — Trauma, Fractures, and the Stiff Hand
IV — Tendons
V — Nerve Injuries
VI — Reflex Dystrophies and Pain
VII — Replantation
VIII — Burns and Cold Injuries
IX — Arthritis
X — Strokes
XI — Biofeedback
XII — Prosthetics
XIII — Splinting
XIV — Development of Hand Centers

This was not written to serve as an introductory text, and therefore presupposes a certain depth of knowledge and familiarity with the subject. The viewpoints put forth are those of the surgeon and therapist and the book is not addressed to the orthotist/prosthetist. Be that as it may, any orthotists interested in the hand and in the clinic team concept of managing hand rehabilitation would do well to read this book.

Charles H. Pritham

Bulletin of Prosthetics Research (BPR 10-32, Fall 1979)

The Office of Technology Transfer of the Veterans Administration announces the availability of the Fall 1979 issue of the Bulletin of Prosthetics Research (BPR 10-32). This issue contains 541 pages, is well illustrated, and is available from the Government Printing Office for $6.50 plus $1.00 postage for delivery in the United States.

An important addition to the format of the Bulletin of Prosthetics Research is a section containing progress reports from research and development units supported formerly by the Rehabilitation Services Administration, now by the National Institute for Handicapped Research. (It is hoped that appropriate regular reports from research and development units supported by other agencies will be included in future issues in order that the "Bulletin" can provide its readers with a comprehensive picture of the total research and development effort.)

Also new and just as important is a section entitled "Abstracts of Recent Articles" prepared by Joan Edelstein of the New York University Prosthetics and Orthotics faculty.

The contents of BPR 10-32 are:

Articles

Editorial—National Institute for Handicapped Research (NIHR)—A Giant Step for Expanded Rehabilitation Research—*R.R. Leclair*

Therapeutic and Economic Impact of a Modern Amputation Program—*J.M. Malone, W.S. Moore, J. Goldstone, and S.J. Malone*

Causal Relationship Between Service-Connected Amputation and Subsequent Cardiovascular Disorder: A Review of the Literature and a Statistical Analysis of the Relationship—*Senate Committee Print No. 6, 96th Congress, 1st Session. Printed for the Use of the Committee on Veterans' Affairs*

End-Bearing Characteristics of Patellar-Tendon-Bearing Prostheses—A Preliminary Report—*K.K. Katz, Z. Susak, R. Seliktar, and T. Najerson*

The Spartacus Telethesis: Manipulator Control Studies—*J. Guittet, H.H. Kwee, N. Quetin, and J. Yelon*

A Preliminary Evaluation of Remote Medical Manipulators—*K. Corker, J.H. Lyman, and S.S. s*

Some Aspects of High Performance Indoor/Outdoor Wheelchairs—*G. Stout*

The Infrared Light Transmission Hearing Aid—*B. Leshowitz*

Reflections on Automotive Adaptive Equipment—An Essay—*E.F. Murphy*

General Information

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For issues from the period Spring 1964-Spring 1974, which are no longer available from the Superintendent of Documents, or for reproductions of specific articles needed for study or research, write: Editor, Bulletin of Prosthetics Research, c/o Office of Technology Transfer (153D), 252 Seventh Avenue, New York, N.Y. 10001.

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Manual for an Ultralight Below-Knee Prosthesis, Second Edition, A. Bennett Wilson, Jr., Charles Pritham, and Melvin Stills, Rehabilitation Engineering Center, Moss Rehabilitation Hospital, 12th Street and Tabor Road, Philadelphia, Pa. 19141; 68 pages; profusely illustrated; $5.00.

This second edition of "Manual for an Ultralight Below-Knee Prosthesis" was published to reflect changes in procedures developed as a result of an evaluation program involving more than forty fittings under field conditions by private prosthetists in the Philadelphia area.

The principles set forth in the first edition are unchanged, but the fabrication procedures have been modified slightly. The paper used in the second edition is of a quality that results in a clearer reproduction of the many photographs used to describe the fabrication procedures step by step.

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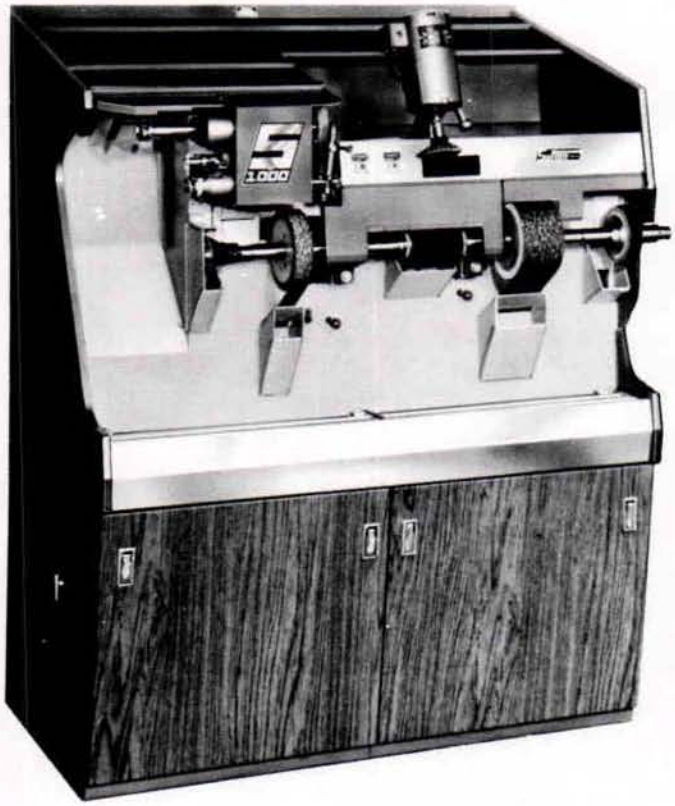

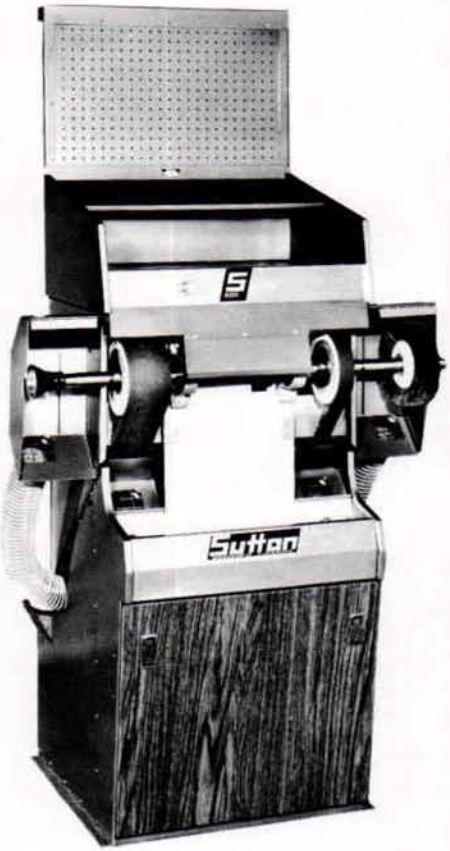

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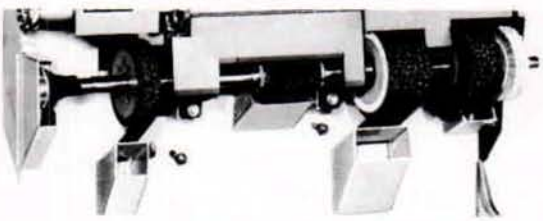

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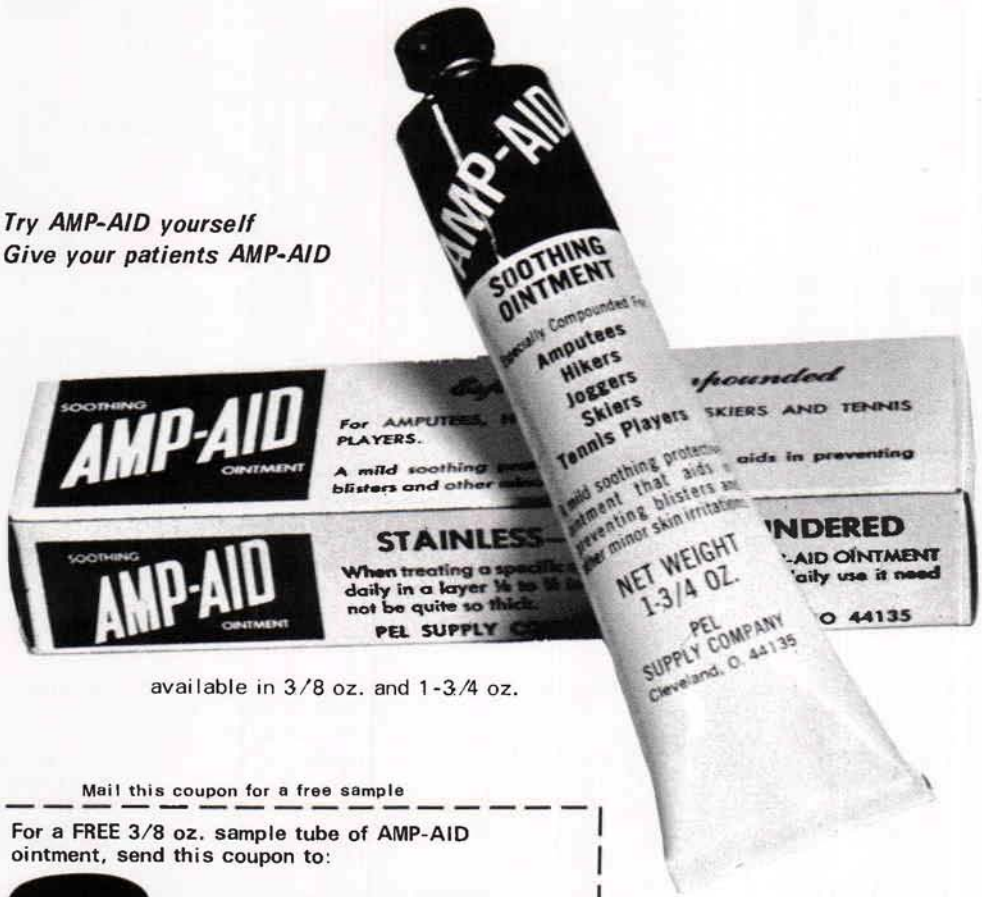

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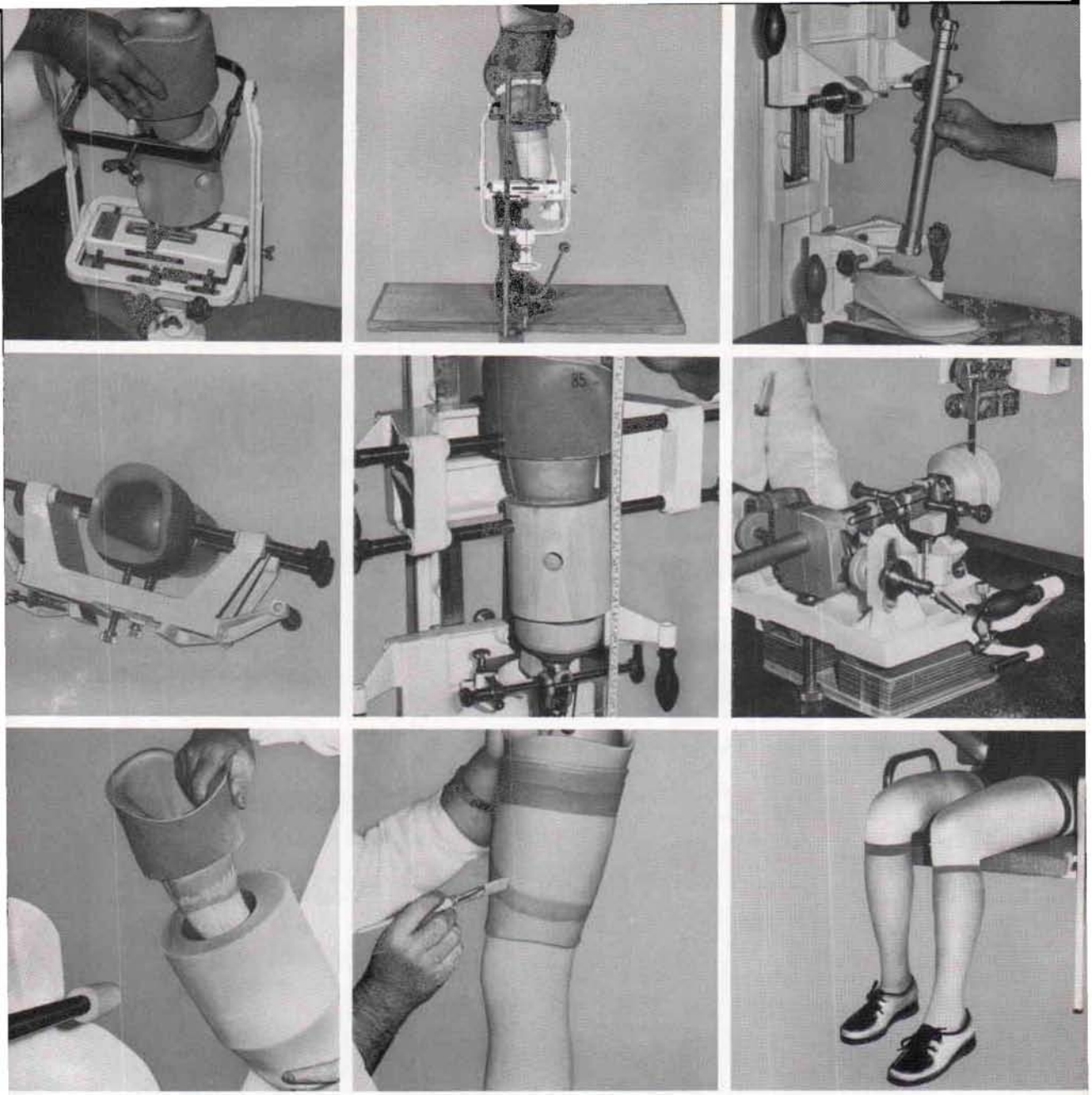

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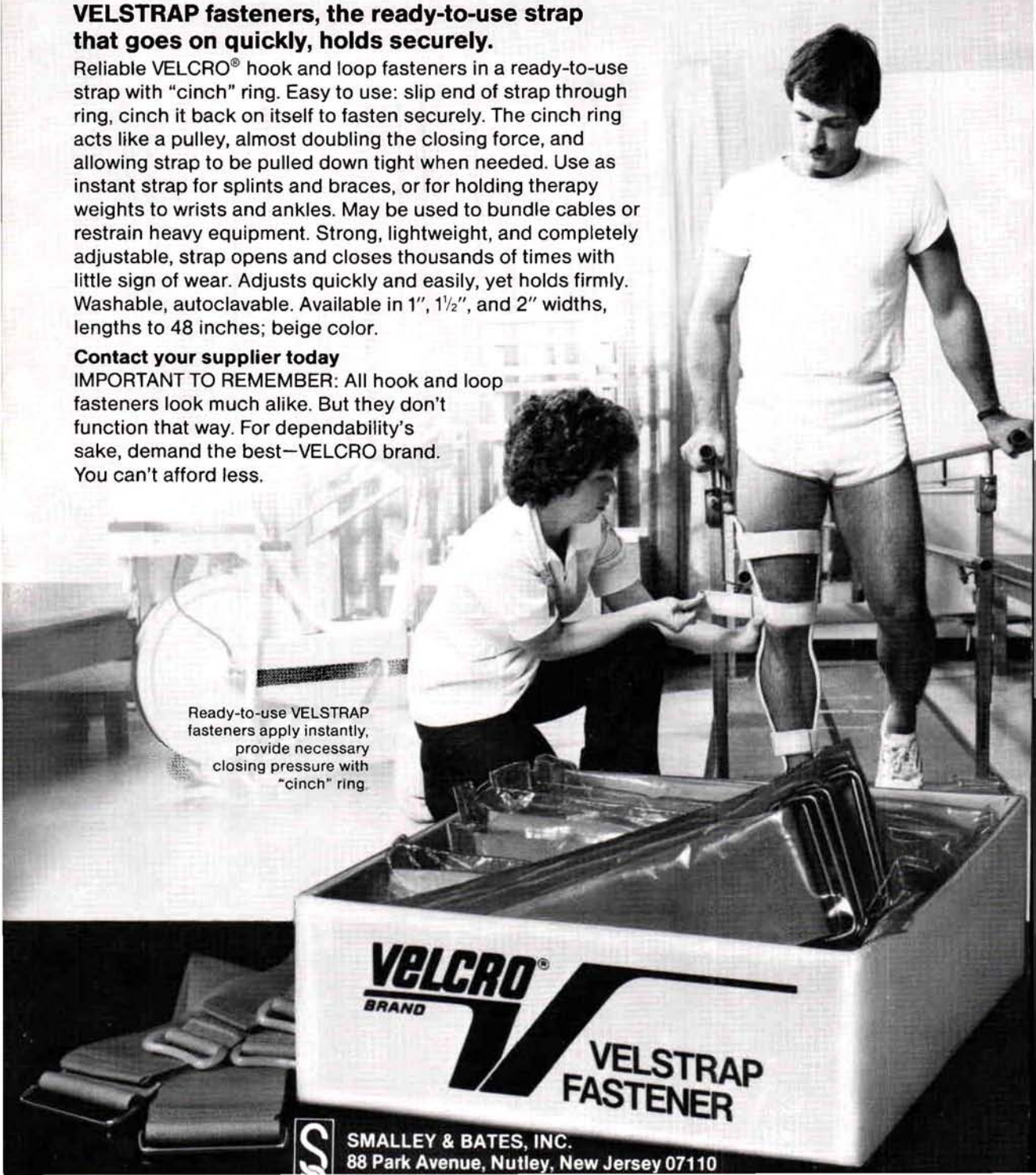

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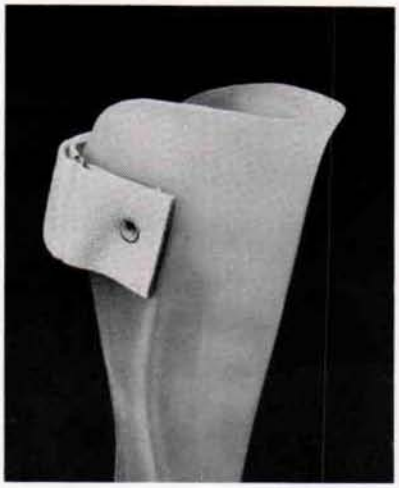

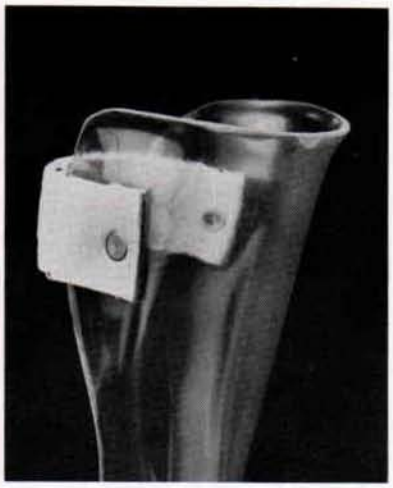

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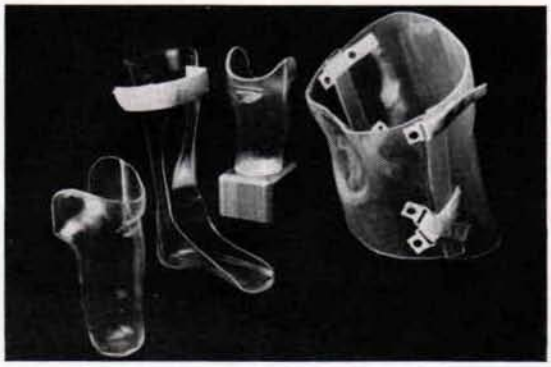

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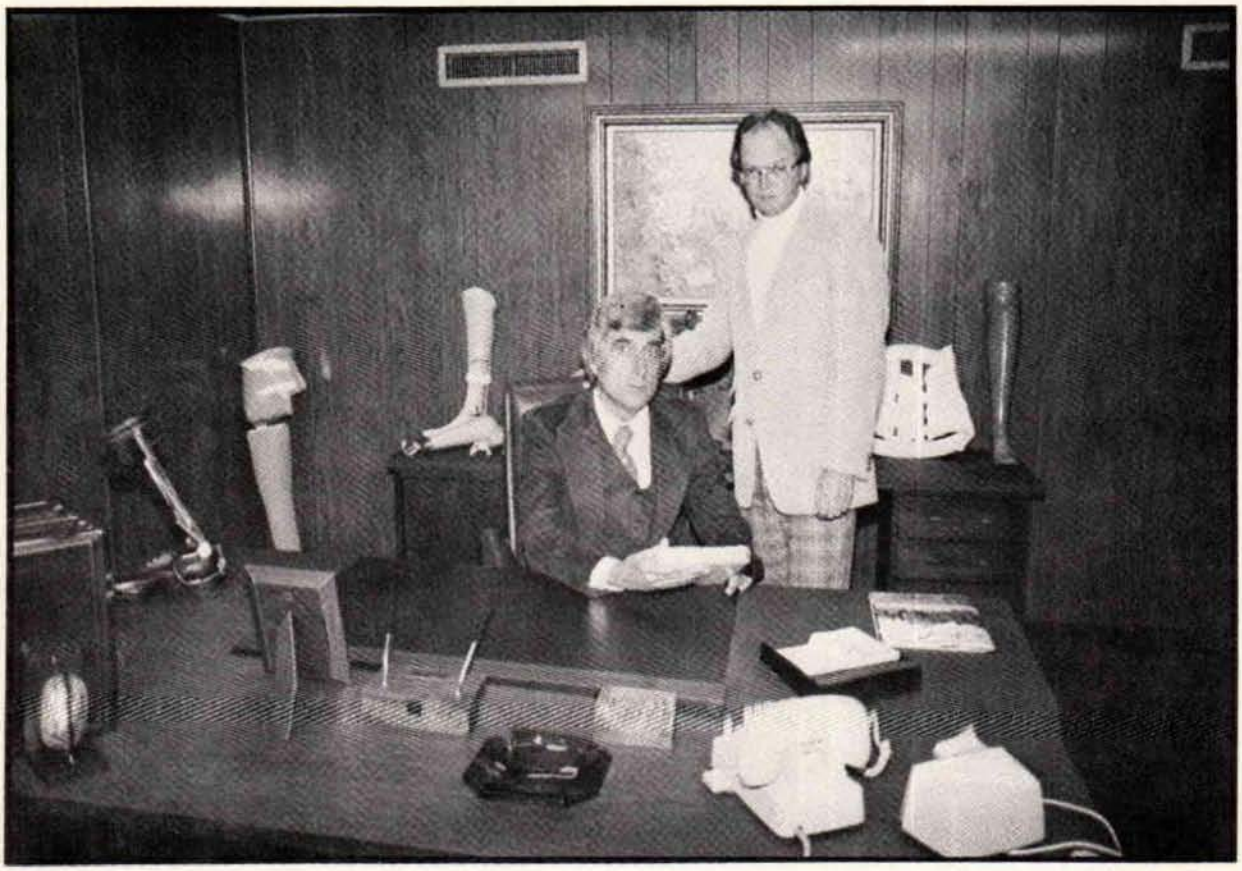

President Bill Hamilton and Immediate Past President Bill Brady announce that the American Orthotic and Prosthetic Association has published a book entitled *Selected Reading—A Review of Orthotics and Prosthetics* which presents an outstanding review of orthotic and prosthetic procedures. Mr. Brady and Mr. Hamilton have announced that as a membership benefit each AOPA member will receive a free copy.

The American Orthotic and Prosthetic Association (AOPA), representing firms that manufacture and fit orthoses and prostheses (braces and artificial limbs), is publishing a book entitled *Selected Reading—A Review of Orthotics and Prosthetics*, to fill a long-standing need for a comprehensive orthotic and prosthetic reference. AOPA has recognized the needs of the orthotist, the prosthetist, and the entire rehabilitation clinic team regarding a good reference book.

Mr. Brady and Mr. Hamilton state that this book is the first of its kind and is not only a must for every orthotist and prosthetist, but also a requirement for the library of every medical doctor, physical therapist, occupational therapist and nurse who work with orthpedically handicapped.

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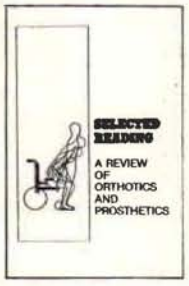

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