

The Relationship of the Surgeon, and the Brace and Limb Shop

By JAMES E. M. THOMSON, M.D.

Lincoln, Nebr.

My introduction to braces was in medical college when working as an orderly at a crippled children's hospital in Chicago in 1912. The Orthopaedic Staff, realizing my profound interest in helping to adjust the numerous fantastic contrivances that they applied, taught me much and with time gave me certain liberties in adjusting and repairing and even changing the apparatus to make them work more efficiently.

These were the Golden Days of the Brace and Buckle Orthopaedic Surgeon. Orthopaedic Surgery has advanced far from the concepts of Nicholas Andre who coined the word Orthopaedia from two Greek words "Ortho" to make straight and "Pedia," a Child. The frontispiece of his historic treatise on this subject was a little crooked Oak Tree, being braced and straightened by a rope wrapped around its trunk, pulling against a straight post. The theory was that as the tree grew, the rope was tightened and finally the trunk would become straight as the post. You can see from this, that the principle of bracing has from the beginning been linked with Orthopaedic Surgery and the correction of deformity.

This little crooked tree has become the emblem of Orthopaedic Surgery throughout the world.

Therefore, all the doctors who correct, prevent and treat deformities of a child or adult, whether they are congenital or acquired by disease or accident, must of necessity, rely on braces and prosthetic apparatus. They are wholly dependent for a part of



This little tree which formed the frontispiece of Nicholas Andre's book "Orthopaedia" has become the symbol of Orthopaedic Surgery. The illustration was sculptured by the author, cast in bronze and forms a decoration on the entrance of the Lincoln Orthopaedic and Rehabilitation Center which also houses the Lincoln Splint and Brace Shop.

their results on the brace and prosthetic appliance maker.

We are linked together far more closely than usually recognized in the success or failure of any case by our joint efforts.

Orthopaedic and surgical training has advanced far, in many phases of corrective methods. The possibilities of surgical techniques have been expanded during the past decade to previously undreamed of realms. Due to research and discoveries in the fields of physiology, bacteriology, chemistry, bio-chemistry, metabolism, understanding hormones and the use of materials that can be buried inside the body as replacement, or as internal splinting, one might think

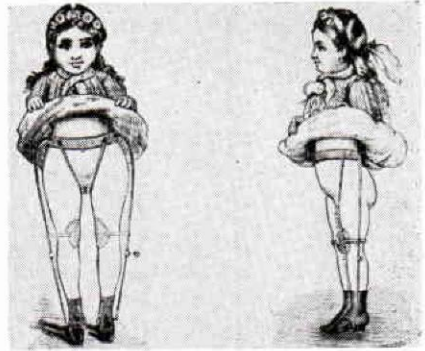
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that with time, splints and braces could be done away with or become less useful. They are even using replacement material for circulatory surgery. Vital organs of the body have been grafted from one person to another; why should not this happen to the extremities? Yes, such things have been reported.

Will the ever advancing field of surgery finally blot out the need of the brace and limb-maker? My answer is emphatically *no*. There is a funny thing about progress in the field of health and human endeavor. Strides forward always seem to make new untold opportunities for those who keep abreast of the times.

Let's look back before the turn of the century. In the great city of Chicago, there were two or three brace-makers who made all the braces that were needed. The surgeons did very little major surgery on the bones and joints. They did do some extensive tenotomies, through small $\frac{1}{8}$ or $\frac{1}{4}$ -inch holes in the skin. They likewise through similar small holes, severed contracting tissues. What they did do with wonderful effectiveness was manual, forcible stretching of the deformed parts, particularly after tenotomies and fasciotomies. These corrections were held in plaster of paris. Later, in the convalescence, a brace to maintain the correction was put on; often it was cumbersome, but usually an effective apparatus. Extensive bone operations were frowned upon as dangerous and exploitive. A child's bow-legs, were fractured in an osteoclast at the point of greatest deformity without opening the skin. At the time I started my training, ankylosing and fusion of joints to stabilize flail extremities was gaining favor.

Well do I remember Dr. Fred Albee demonstrate in Chicago in 1912, the Albee technique of bone graft. Revolutionary and courageously, after the operation, a cast was applied. Ultimately, the patient wore a brace for



This knock knee brace of the 19th Century was very practical but it is difficult to understand how it would be tolerated with any pleasure. We have gone a long way in improving the braces children have to wear today. Only by research can we expect continued improvement in our concept of braces.

a year. Braces were a paramount to success.

One of the best things I did, during my Resident Training at this same crippled children's hospital was to advise and work with our brace-maker in the problems of these unfortunate children. The Shop was on the other side of town, so I made casts of the scoliotic trunks, bow-legs and knock-knees, club-feet, so that he could have a form on which he could contour the brace. Weeks, yes months were often required before the brace came back. By that time, sometimes the child did not need it or had out-grown it. Time was lost and effort wasted. Extensive alterations were required but we finally got them on. With time, I learned to make light weight removable plaster cast jackets for backs and extremities which could be laced up and removed for hygienic purposes and for exercise training, and also the processing of celluloid corsets. We always cautioned children wearing celluloid against playing with fire, but in those days the young girls didn't smoke, so we did not have to worry too much about the inflammable angle. Then there were leather corsets and braces for the legs that

could be fitted into shoes. Well do I recall soaking the old leather cowhide, molding and pounding it over the cast of a torso or leg, holding it into the deformed areas by means of nails or screws, and then wrapping it with hundreds of feet of twine or small clothesline to prevent change while it was drying. Then, there came the finishing. Lining it with chamois skin, punching holes in it to give aeration, re-enforcing it with steel strips, finishing it off with shellac. Arduous labor and effort, and I can assure you, very hot and uncomfortable for the patient to wear, but it was effective.

I recall many of the artificial limbs were something to be dreaded. A peg leg was far more desirable.

You must bear with me in my historical reminiscencing of personal experiences, as it is a point to an end.

When I came to Nebraska in 1916, there was one brace-maker in the State. He was in Omaha, a full day's trip to Lincoln.

"Thank goodness," I wasn't too busy.

In my little home shop, I made many simple braces, insoles and all my shoe corrections.

In 1917, World War I came. As an Orthopaedic Surgeon for the University of Nebraska Base Hospital in Northeastern France, we found ourselves as the hospital opened, a long distance from the source of supply and all at once hundreds of casualties were laid at our wards. We had no splints, no braces, nor were any to be had. Fortunately, the years of experience that the British had had before we entered the war, gave us patterns of splinting that proved invaluable, not only in saving lives and treating extensive fractures and wounds. In the open market I could buy round iron and other materials. The thing I had to do was to take some Medical Corps men and teach them to make Thomas, Jones, Airplane and numerous other splints, so essential to taking care of battle casualties. Then



Hugh Owen Thomas. The creative Orthopaedic Surgeon of the 19th Century who worked in Liverpool, England, developed many useful splints and braces for the treatment of injuries and joint diseases. Many of his braces were built by bending the iron to fit the contour of the body. This is one of his illustrations.

we began to adapt these to ambulation by cutting them off at the end at the proper length and turning the ends into the heel of their shoes. Short leg braces were made in a similar way. All types of arm braces were made. Finally, before our American supplies caught up with us, we were fabricating everything we needed.

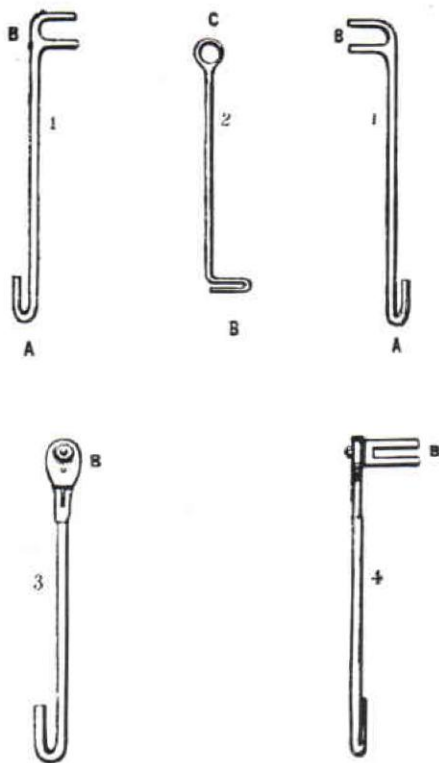
The war was over and I was back in Lincoln in 1919. There was still no brace-maker here but I had learned a great deal by that rich experience with surgery-of-war trauma, and the challenge of furnishing splints, braces and temporary prosthesis to these casualties. I was full of ideas, so when I opened my office, finding that business was slow in coming, there was plenty of time, I found. I put in my own brace shop; with an acetylene torch, anvil, vice, drill press, heavy sewing machine, shoe maker's tools and polishers. We went to work making braces, shoe pads, plates, shoe corrections, etc. My wife took over the leather work, and we spent our spare day time and evenings in this shop. We could not do

too much pounding in the day time without disturbing the tenants in the First National Bank Building, so most of the pounding was done at night after they had left their offices. I got away with the acetylene torch as long as we were there but afterwards discovered I would have been thrown out as a fire risk, had it been realized that I was fooling with such a dangerous instrument.

About 1921, I realized that if I kept up with my growing practice, I would have to get a brace-maker. Advertising did not help, they were as "scarce as hen's teeth." Finally, Dr. H. W. Orr, Dean of the Lincoln Orthopaedic Surgeons and I planned a partnership. I suggested we advertise for a mechanic who might like to take up brace work. We interviewed many. One day, a likable "Irish" youngster just out of the war applied; he liked the idea of learning a new trade. So James Casey was taught from the ground up, the rudiments of brace making.

Jim caught on rapidly and worked diligently. Ultimately after several years, we realized that it was to our advantage to simply turn the brace business over to him, as we each wished to pursue our own way, but by doing this, both of us could avail ourselves of his services. As we have progressed, Casey in his business progressed by the association with both of us. The plan worked out marvelously. Neither Dr. Orr or I were involved in the problem of production or expansion of the brace services, yet, we had close to us, a man we had trained to give us just the service we needed.

How proud I was when young Jack Casey teamed up with his "Dad" to learn the profession of brace-making. More proud am I that he has progressed and advanced with the trends of the times, never hesitating to pursue further study and go away for training to keep abreast of the need and opportunities.



Thomas developed these wrenches to bend brace iron and with these very same devices, we make alterations today. This same principle was the secret of the success of the "Thomas Wrench" used so extensively in correcting deformities of the feet.

This has been a long story *but it teaches several important lessons.* In the first place, far too often, the surgeon does not know much about braces, what they are really supposed to do, or their application or the methods of making them serve their best purpose, or when they are not performing the function for which they were made.

I think my personal experience before and during my Residency was invaluable: added to this the challenge of the war experience which had given me an insight into the problems of braces and prosthetic work, has added greatly to my own effectiveness as a surgeon. It has also

JAMES E. M. THOMSON, M.D.

The author was born in Los Angeles in 1889. He holds the M.D. Degree from Rush Medical College. Since 1916 he has been engaged in the practice of Orthopaedic Surgery at Lincoln, Nebr., except for service in World War I as Chief of the Orthopaedic Dept., University of Nebraska Red Cross Base Hospital in France. Dr. Thomson was a member of the World Health Organization Mission to Poland and Finland in 1948. He is a member of numerous medical societies, including the Academy of Orthopaedic Surgeons, Clinical Orthopaedic Society (President, 1937); Nebraska State Medical Association (President, 1948). Dr. Thomson is a fellow of the American College of Surgeons. He is the author of numerous articles on orthopaedic surgery.



contributed to my service to the patient who has to wear a mechanical apparatus for correction or stability. Lastly, it has been of value to my manufacturer of brace and prosthetic appliances; in that *we can talk a common language* and see eye to eye on perplexing problems.

In other words, I think that in training surgeons of trauma and Orthopaedics, greater stress should be made in the direction of giving them practical experience in the field of, and the problems of the manufacture of braces, splints and prostheses. Without this experience, a surgeon is looking into a realm of therapy through a small screened window and gaining but a blurred image of the potentialities involved.

The *second lesson* to be learned from this story is, that if the brace and prosthetic profession is to maintain a position of prestige, the members must remember that they are not mere mechanics, following the rule of the thumb, fabricating defined designs and stabilizing devices for physical weaknesses or whittling out conventional sockets, but rather, they are

an integral *part of an important team of therapists* of the maimed and halt.

You are actually physiological mechanical engineers of the highest order, who if you do not constantly delve into engineering research, pursue advanced study zealously and maintain high standards, will be caught wanting as time goes on. Too few are trained in the engineering principles that are fundamental to brace manufacture, nor are many sufficiently acquainted with the anatomical and functional factors essential to mechanical success of stabilizing appliances.

Research and engineering has made tremendous advances in the artificial limb making. Great engineering institutions and industry as well as the Armed Forces and Veterans' Services have contributed generously to these improvements. Fortunately, you have been able and quick to absorb this and pass it on to the amputee. But further research is needed in the field of making of braces by the use of plastics, new metal alloys and fabrics. The whole field of brace making has hardly been scratched from the stand-

point of research except in a few places. Research offers a tremendous challenge to your organization.

Lastly, there is a lesson of confidence, patience and cooperation to be learned between the teammates, (the surgeon and the brace-maker) not only in solving the therapeutic needs of the patient but also in assuring the success of the appliance from the time it is put on—throughout the course of treatment. Our obligation is more than simply putting on the brace or prosthesis and fitting it properly. The idea involves following through, together training the patient in the proper use of the apparatus. This is truly a joint obligation. When either of the team fails to carry out his part, he fails in a contractual therapeutic junction.

Far too often, the brace-maker never sees the patient after he applies the brace. Often, the doctor when he sees the patient, doesn't know whether the brace fits or not, or if the patient

can stand to wear it. Unfortunately, he may not be able to stand it, even though he has paid for it; he may throw it away, go to another doctor or the doctor will say, "you will get used to it in time." Remember, *we are both involved* in this therapeutic attempt to accomplish a result. It isn't how splendidly you have finished the brace or how pretty the contraction is, that makes a difference. *Therefore, I feel that every doctor and brace-maker* should go over the patient and his appliance every so often until the end of the therapy, to make sure that he is getting the most good out of the apparatus. Too often, a brace is worn too long or not long enough, or has been out-grown; nobody recognizes the needs for a change.

If these ideals are followed, surgeon and appliance maker will find themselves prospering and their work increasing by being of greater value to humanity.

Letter from Japan

OALMA headquarters has received the following letter, written from Japan by our colleague, William A. Tosberg, CP&O. Mr. Tosberg, was sent to Japan in March at the request of the Japanese Government to conduct four courses in suction sockets. Upon his return, he will resume his duties as Director of Research and Service in the Prosthetic Division of New York University's Institute of Physical Medicine and Rehabilitation. He is also a member of the faculty of the Medical College.

May 26, 1956—from Tokyo.
"Dear Glen:

Greetings to you, Lester and to your staff. I am about to leave Tokyo for Korea and for home by way of Europe.

The three suction socket courses conducted here in Japan were very successful and I am sure that they will lead to an improved amputation service in the not too distant future.



Mr. Tosberg with Japanese students.

Yesterday we had a 3-hour meeting with the Executive Committee of the Japanese Limbmakers Association. Among other suggestions I discussed the function of the American Board for Certification. The interest shown leads me to believe that a similar movement will start here soon.

The skill of the Japanese technician is very high but his fundamental knowledge is limited. Training courses such as just concluded will be of great help.

Please remember me to all—Bill Tosberg."