Orthotics and Prosthetics, Vol. 34, No. 2, pp. 25-32, June 1980

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

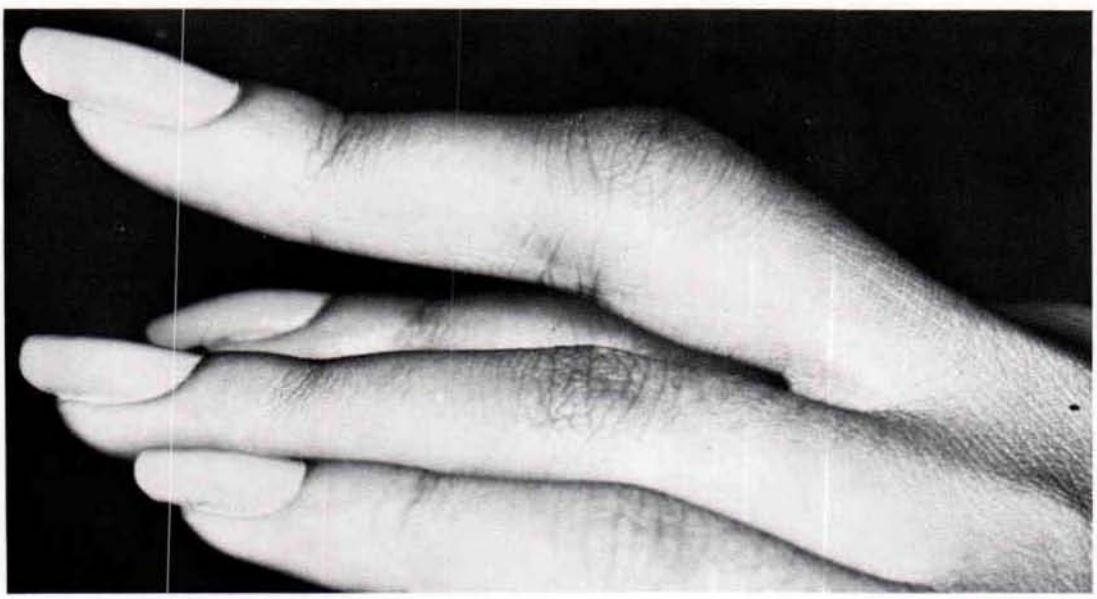

Fig. 1. an example of the boutonniere deformity.

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

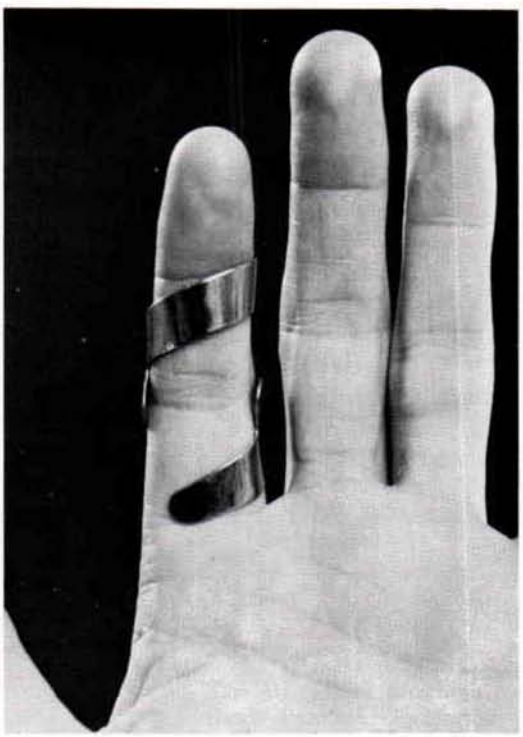

Fig. 4. Dorsal surface view of a "Boutonniere" orthosis in place.

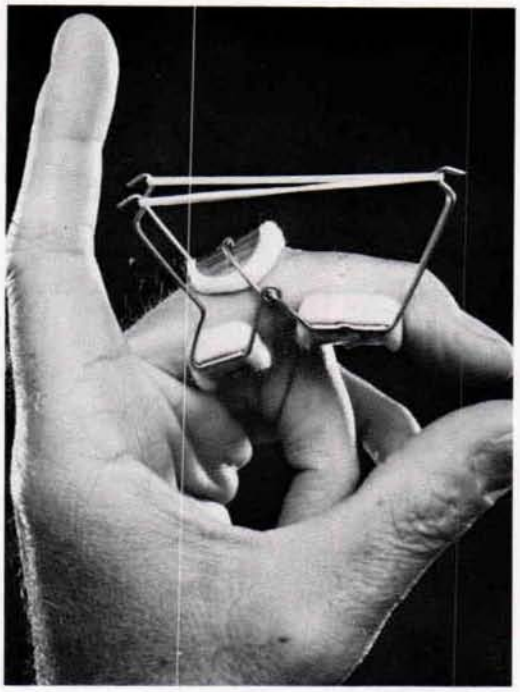

Fig. 5. A view of the dynamic reverse-finger knuckle bender.

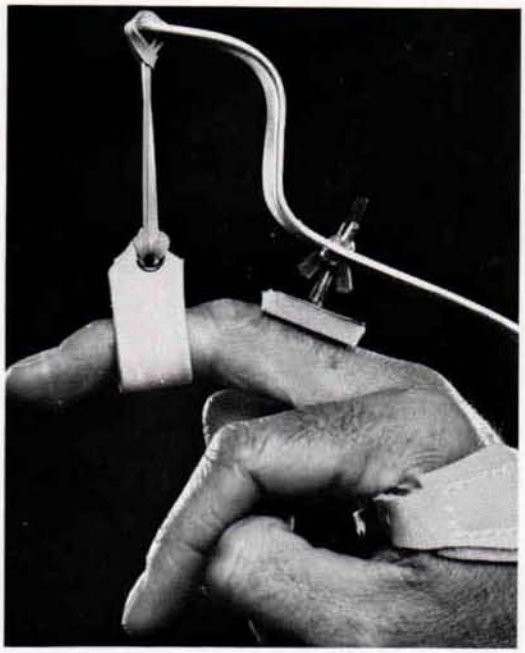

Fig. 6. An outrigger orthosis with an M.P. stop and a P.I.P. dynamic extension unit.

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

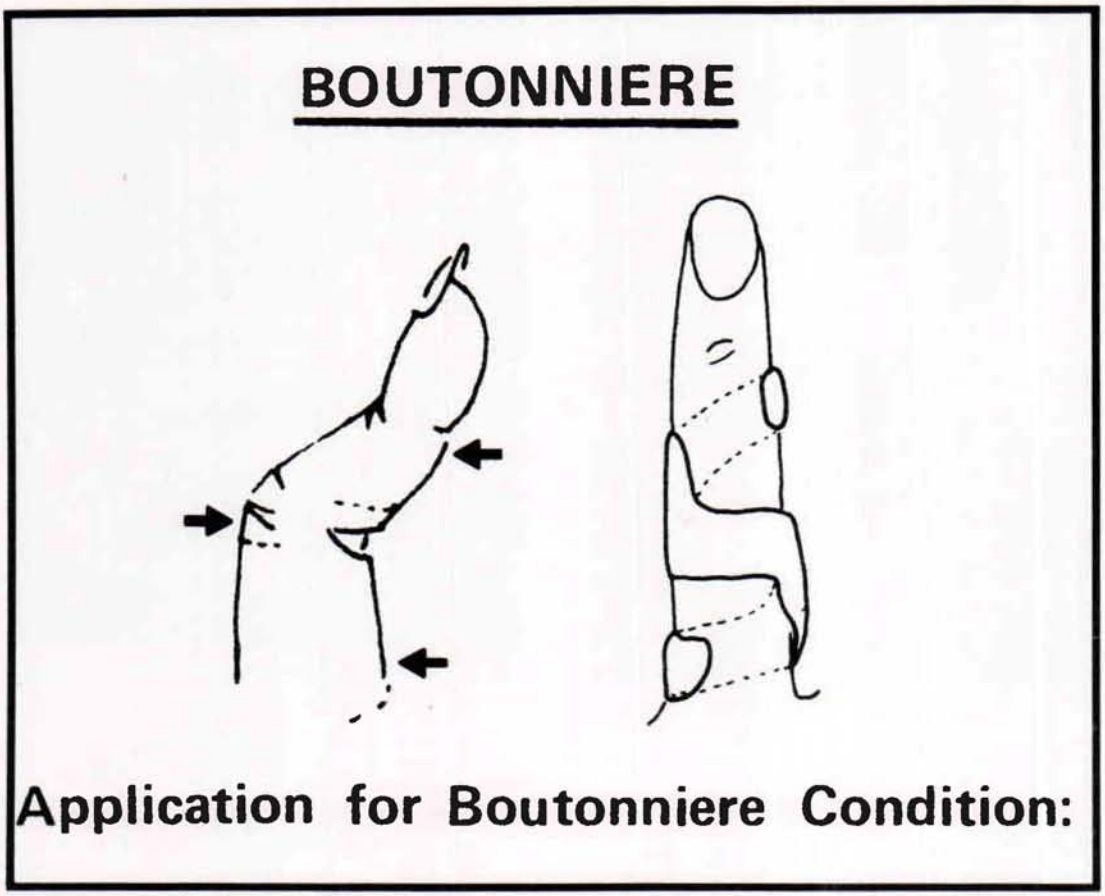

Fig. 7. A schematic showing system of forces provided by the "boutonniere" orthosis. Courtesy of Camp International, Inc.

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

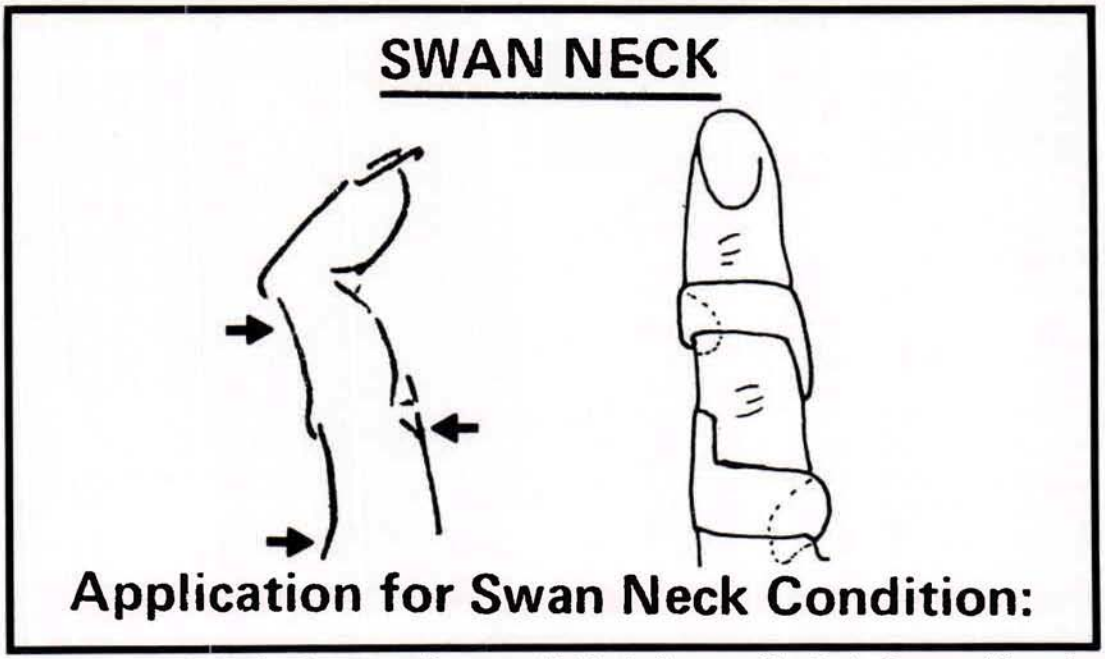

Fig. 9. A schematic showing the system of forces provided by the "swan neck" orthosis. Courtesy of Camp International, Inc.

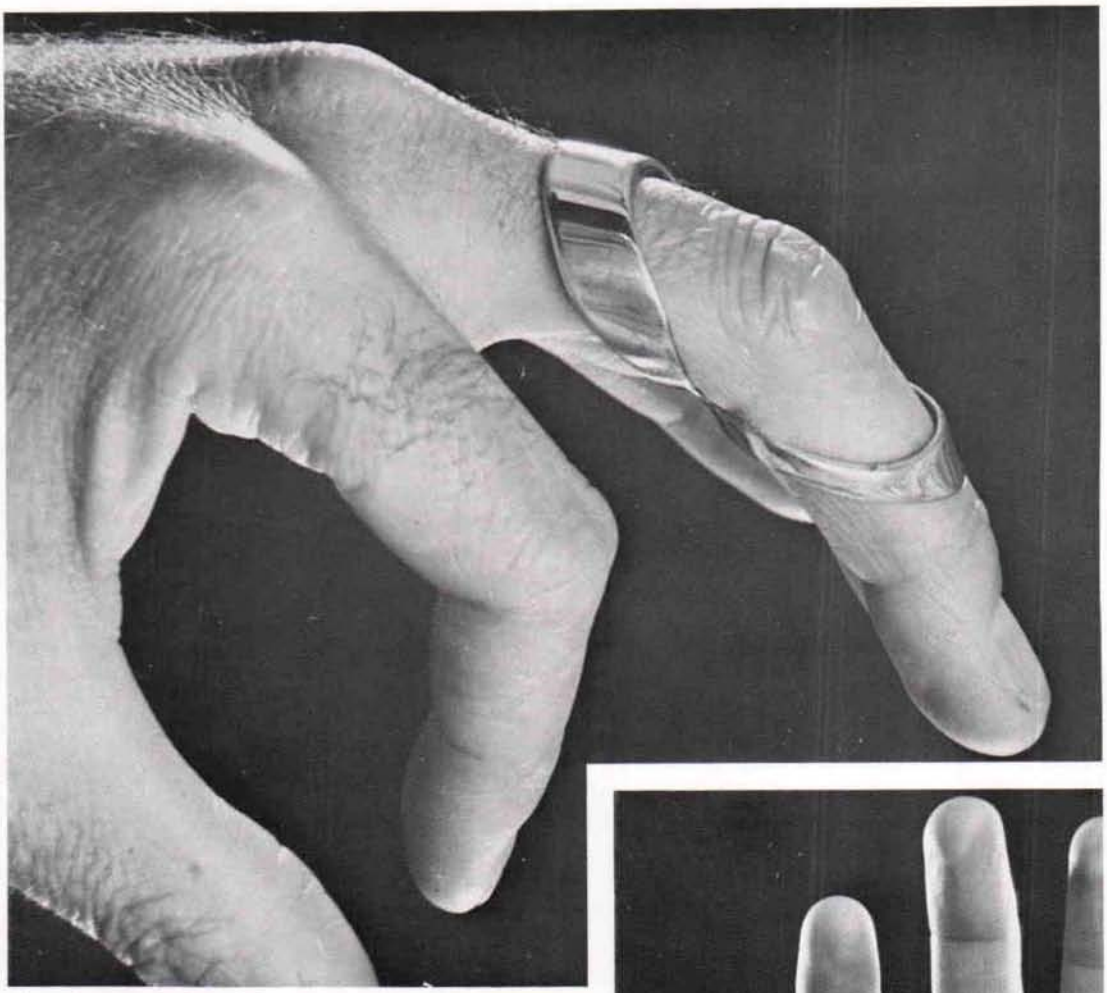

Fig. 10. Medial view of the "swan neck" orthosis. It can be fashioned from a tube of either aluminum or plastic.

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

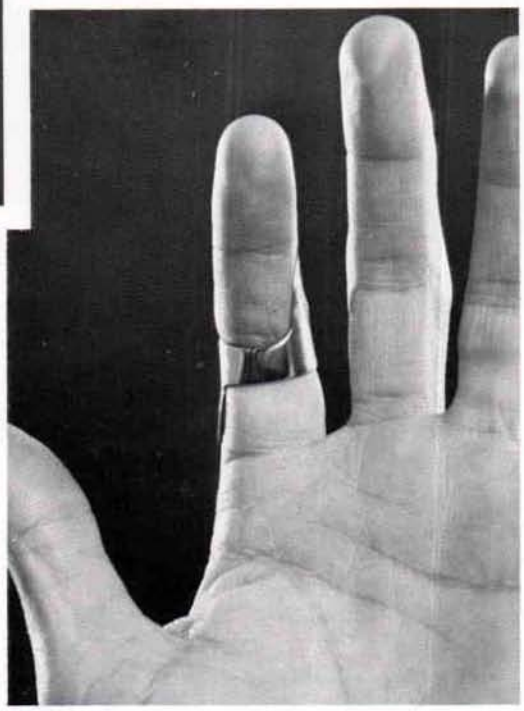

Fig. 11. A volar view of a "swan neck" orthosis. Flexion of the P.I.P. joint is allowed while extension is restricted.

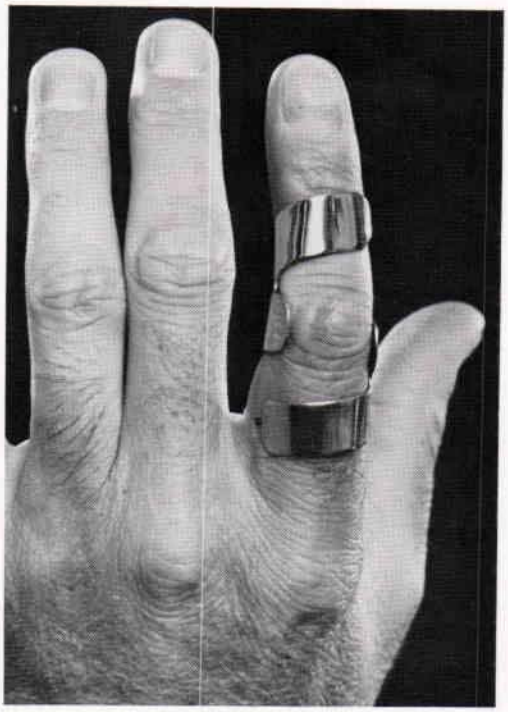

Fig. 12. A dorsal view of a "swan neck" orthosis. The distal band encourages extension of the D.I.P. joint.

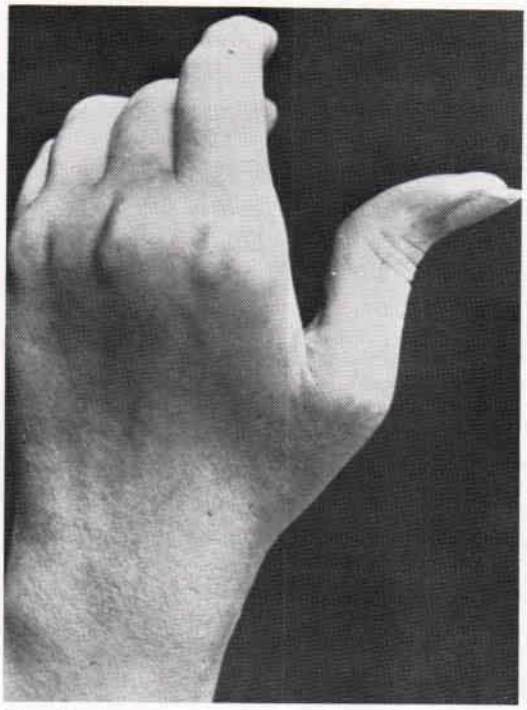

Fig. 13. An example of the boutonniere deformity in the thumb.

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

[1]Richard D. Koch, C.O.
Director of Orthotics and Prosthetics
University of Michigan Hospital
Ann Arbor, Michigan 48109
[2]David A. Bird, A.B., C.O.
University of Michigan Hospital
Ann Arbor, Michigan 48109

References

(1) Bennett, Robert L., "Orthotic devices to prevent deformities on the hand in rheumatoid arthritis," *Arthritis and Rheumatism*, 1:5, Oct. 1965.

(2) Cailliet, Rene, *Hand Pain and Impairment*, Chapter V, p. 120.