INTERNATIONAL JOURNAL OF LEPROSY Volume 34, Number 1
Printed in U.S.A.

The Use of Injectable Silastic as a Prosthetic Material for Muscle Atrophy of the Thumb Web in Leprosy[1]

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Good appearance accompanying restoration of function fulfills the criteria for surgical rehabilitation. These objectives are particularly applicable to patients with inactive leprosy. Impairment affecting a deformed hand is both functional and cosmetic. Impaired function accompanies the claw hand due to ulnar nerve palsy, and the "main-en-griffe" deformity due to the combined ulnar and median nerve palsy. These deformed hands add disfigurement because of the tissue void resulting from intrinsic muscle atrophy. Predominant is the depression of the thumb web, which is due to atrophy of the first dorsal interosseous and adductor pollicis muscles (Fig. 1). Contour defects due to muscle atrophy are equally indicative of the disease, as are its functional deformities.

MATERIALS AND METHODS

The need for a method to correct this defect of the thumb web has been pointed out (1). Fat and dermis grafts have been used (3). They suffer from two main disadvantages. First, a surgical procedure is required, and, second, resorption of the graft occurs with active use of the hand. An inert filler that can be easily introduced, which will remain indefinitely, is desirable. These objectives are fulfilled by the use of an injectable plastic material, medical silastic. Reports of injectable silastic used as prosthetic material for other reasons have been enthusiastic (2, 5).

Medical silastic,[3] also referred to as Silastic RTV S-5392 (dimethylsiloxane), is a liquid silicone rubber, which, upon the addition of catalyst M RTV S-5392 (stannous octoate), can be injected into tissues, where it becomes converted into soft rubber. The change is effected within approximately five minutes following the addition of the catalyst in the proportion of one drop of catalyst to 5 gm. of medical liquid silastic. Both liquids are initially autoclaved. The silastic liquid is reautoclaved on each occasion of subsequent use. The catalyst, on the other hand, is not autoclaved again, for if it were autoclaved it would suffer a significant reduction in reactivity. The vial of catalyst is chemically sterilized instead, by immersion in 70 per cent alcohol for a period of 30 minutes. The liquid catalyst is taken from the vial with a sterile eye dropper.

The solution is injected into the posterior adductor fascial space of the thumb web, which lies between the first dorsal interosseous and the adductor pollicis muscles. The deposition is placed within the angle formed at the bases of the first and second metacarpal bones. A diffuse and smooth appearing fullness is produced on the dorsum of the thumb (Fig. 2).

The fascial spaces of the hand are described by Lannon (4), who distinguishes three such spaces in the thumb web. The posterior adductor space is a potential area located between the first dorsal interosseous and the adductor pollicis muscles. It does not communicate with the usually designated thenar fascial space, which lies anterior to the adductor muscle (Fig. 3). Deposition within a fascial space is pre-

[1] Received for publication June 11, 1965.
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[3] The injectable liquid silastic was supplied by the Dow Corning Corporation, Midland, Michigan.

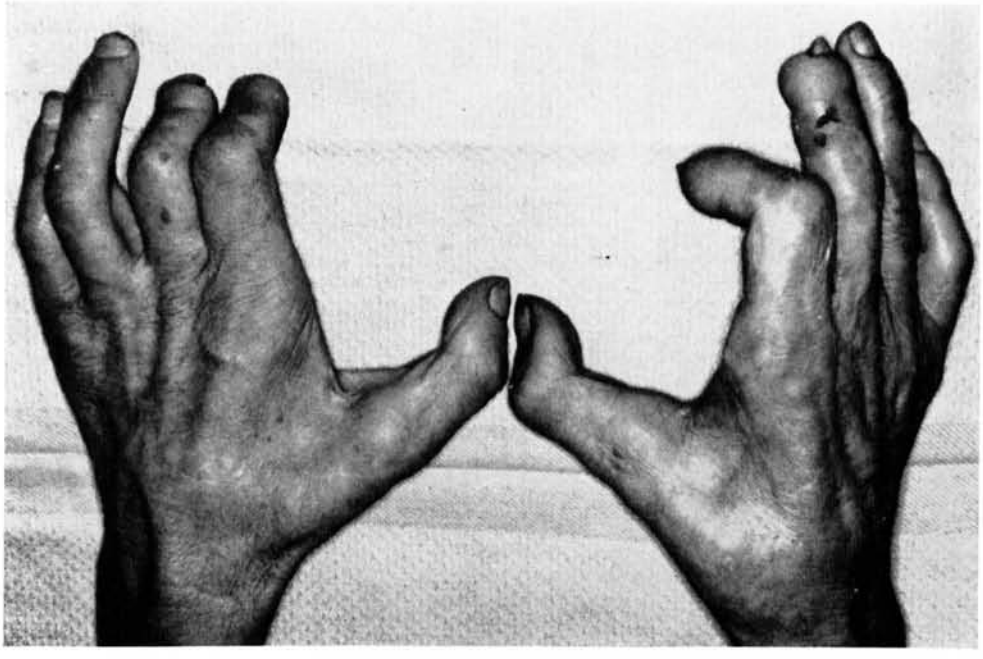

FIG. 1. Void deformities of thumb webs due to intrinsic muscle atrophy.

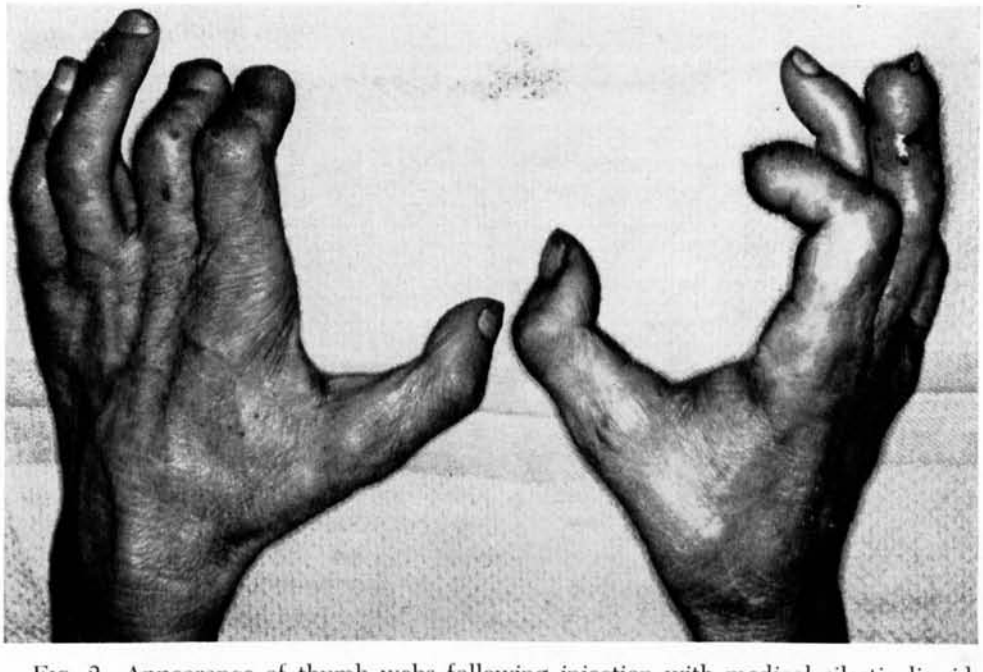

FIG. 2. Appearance of thumb webs following injection with medical silastic liquid.

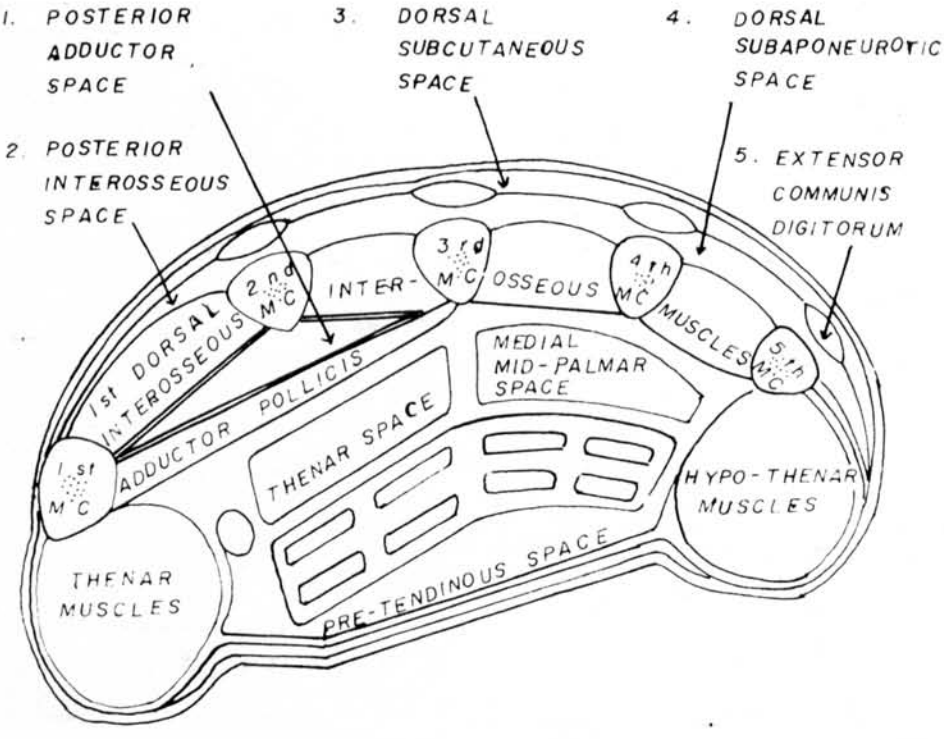

FIG. 3. Diagrammatic illustration of fascial spaces of the thumb web.

ferred to a subcutaneous location, since the prosthesis remains confined and is retained within the limits of the space.

Technic. Minor features of the technic are listed in order to facilitate initial use of this viscid fluid:

(a) The need for a local anesthetic varies with the extent of sensory perception and deep pain appreciation by the patient.

(b) Five to 10 ml. of silastic have been required for injection into the space of the hand. One drop of catalyst is added for each 5 ml. of silastic liquid.

(c) The silastic liquid is autoclaved in a beaker possessing a wide opening. This facilitates subsequent pouring of the viscid fluid into the syringe.

(d) A separate 10 ml. syringe, with a 3 inch 17 gauge needle, is used for injection into each web space.

(e) The silastic liquid is poured into the barrel of the syringe with needle attached, after which one or two drops of catalyst are added.

(f) The silastic liquid is injected into the posterior adductor fascial space. The skin puncture wound should preferably not overlie the site of the injection. This reduces the escape of silastic liquid which can be further prevented by supplying pressure over the injection site.

(g) Introduction of the silastic liquid is slow. It is begun immediately following the addition of the catalyst. A constant and forceful pressure is applied to the syringe.

Immediate postinjection reaction. Patients with partial or total loss of sensation experience little or no discomfort from the injection. Those possessing sensation may experience a sudden intense pain with distention of the fascial space. The acute pain subsides within one or two minutes, but soreness persists. The soreness gradually diminishes, to subside completely within a period of approximately four hours. Pain and other types of discomfort have not recurred.

Follow-up examination. Although this report concerns a small series of only 14 cases, the constancy of both subjective and objective postinjection results justifies a preliminary follow-up report. The patients were observed over a period of 3 to 12 months. Inquiry elicited no complaints. Each patient expressed complete satisfaction. It was remarked "it not only looks normal; it feels normal." Examination revealed absence of pain, tenderness, stiffness, and restriction of motion. The skin overlying the web was movable, including the webs of patients in whom subsequent acute reactions of erythema nodosum involved the area. The fullness of the dorsum of the web was diffuse and smooth. Palpation indicated that the prosthetic material occupied the apical portion of the web triangle. X-ray examination revealed a diffuse, homogeneous increased density in the area.

Injections were administered to patients with marked atrophy of the adductor pollicis and the first dorsal interosseous muscles resulting from combined ulnar and median nerve palsy. In one patient a previous opponens tendon transplant had been applied to the thumb. In two other patients the contracted web had been corrected by Z-plasty. Of interest was the remark that the injection was followed by an increase in the strength of the thumb that carried the opponens transplant. It is conceivable that the prosthesis might contribute some functional value by providing body to the web for stabilizing the thumb.

Patients with inactive leprosy, in whom no further definitive surgery of the hand was required, were selected as candidates for this procedure. It is felt that maximum functional improvement should be obtained before injection of silastic is considered.

SUMMARY

Eradication of the void defect involving the thumb web is necessary for complete surgical rehabilitation of the hand deformed by leprosy.

A simple, effective and safe method employing an injectable prosthesis is described. Silastic liquid is injected into the posterior adductor fascial space of the thumb to produce a normal appearing fullness of the web.

Surgery for correction of functional impairment of the hand takes precedence over this procedure.

RESUMEN

La extirpación del defecto de incapacitación que envuelve a la membrana interdigital del pulgar, es necesario para la rehabilitación quirúrgica de la mano deformada por la lepra.

Se describe un método simple, efectivo y seguro empleando un prostésico inyectable. El silastic liquido es inyectado en el espacio fascial posterior del adductor del pulgar, para producir un aspecto normal completo del tejido.

La cirujía para la corrección funcional deteriorada de la mano, tiene precedencia sobre este procedimiento.

RÉSUMÉ

La correction de la perte de substance survenant au niveau de l'encolure du pouce est nécessaire si l'on veut obtenir une réhabilitation complète de la main déformée par la lèpre.

Une méthode simple, efficace et sans danger, qui repose sur l'emploi d'une prothèse injectable, est ici décrite. Un liquide silastique est injecté dans l'espace aponévrotique postérieur de l'adducteur au niveau du pouce afin de produire l'apparence d'un remplissage complet de l'encolure.

La chirurgie visant à corriger la lésion fonctionnelle de la main prend cependant le pas sur l'emploi de ce procédé.

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