POST BURN FLEXION CONTRACTURES OF THE HAND CONSIDERATIONS IN MANAGEMENT

C. P. SAWHNEY

SUMMARY

Proper initial treatment of flexion contractures is simple but neglect produces crippling deformities. The author over the years has followed an approach which comprises of complete release of contracture, its coverage by intermediate thickness split skin graft, use of Plaster of Paris splint, static and dynamic splints which prevent recurrence and encourage movements. Thus it was possible to restore full function to almost all hands treated at our hospital.

Proper initial management of deep burns of flexor surface of the hand is simple and can ensure early restoration of function. Mismanagement and neglect however, leads to crippling deformities whose management is difficult, time consuming and may not be entirely satisfactory. We present our experience in the management of such deformities during the past two decades.

Aims of Treatment

Treatment is aimed to achieve full correction of the deformity, restoration of the palmar arch and full function to the hand as early as possible so as to permit normal physical and psychological development.

Principles of Treatment

1. Excision of scar, release of contracture and complete correction of the deformity.
2. Resurfacing the resultant raw area with intermediate thickness split skin graft.
3. Correction of residual deformity in immediate post-operative period by application of static splints.
4. Prevention of skin graft contraction and recurrence of the deformity by prolonged use of dynamic splints.
5. Encouraging early active and passive movements to restore mobility to small joints, prevent stiffness and allow the small atrophic muscles of the hand to develop.

Timing of Treatment

Early treatment is recommended to avoid development of secondary contractures of the deeper structures, to restore function as early as possible, and permit normal skeletal development (Fig. 1). As the prolonged use of splints in the post-operative period is obligatory to prevent recurrence, full co-operation of patient is necessary. The operation may be deferred till the age of 5 years in infants and smaller children, because they tend to wriggle out of the splints.

Operative Technique

Fingers: A transverse incision is given across the contracting scar at the point of its maximum tension and it is fished out at its extremities. Gentle dissection is then carried out in a plane deeper to the scar while the finger is gradually extended. Care is taken, to avoid damage to digital vessels and nerves which are superficial and often displaced. However, when the vessels, nerves or tendons get taut and bow strung or the capsular ligaments resist complete extension of fingers, further dissection is discontinued.

Palm: Incision starts in the palm across the scar at the point of maximum tension and at the level of transverse palmar crease and ex-
Fig. 1. Photograph showing flexion contracture of fingers and palm, with little and ring fingers almost buried in palm.

Fig. 2. After complete release and take of skin graft on 6th post-operative day.

Fig. 3. Application of Plaster of Paris splint on 6th post-operative day after graft take to prevent rapid contraction of skin graft in the immediate post-operative period.

Fig. 4. Application of dynamic splint with pressure on graft in palm and webs with sponge rubber and traction on the graft over fingers.
Fig. 5. At follow-up after 9 months showing final result.

Fig. 6. Same case (Fig. 1) showing closure of the fist.

Fig. 7. Showing a gross flexion contracture of hand.

Fig. 8. Showing the patient (Fig. 7) after complete release at a single stage and restoration of full function.
tends transversely on sides. Distally the incision extends into each web space and proximally it runs upwards between thenar and hypothenar eminences on to the wrist where it fishtails. The palmar scar and the contracted skin is excised exposing palmar aponeurosis which also has to be excised to get complete correction and restoration of a normal palmar arch. This exposes the deeper vessels, nerves and tendons in their sheaths covered with subcutaneous fat.

The dissection is completed under a tourniquet which is released to catch any major bleeders. After ensuring haemostasis the tourniquet is reapplied. An intermediate thickness split skin graft is sutured in place over the resultant raw area and immobilized by tie over sutures. In younger patients complete separation of fingers in gross deformities is deferred and the resultant raw area is skin grafted to produce a mitten hand. The fingers are separated and web contractures released subsequently at a second stage when grafts have settled.

The first dressing is done on the sixth post-operative day and after ensuring complete take of skin graft (Fig. 2) a Plaster of Paris splint moulded to the palmar hollow, webs and fingers is laid and maintained to prevent rapid contraction of the skin graft in the immediate post-operative period (Fig. 3). The dressing is changed as frequently as necessary until the graft is consolidated i.e. by 3 weeks and then the patient is instructed to wear splints, static or dynamic as required, to prevent skin graft contraction and recurrence of deformity (Fig. 4).

**Correction of Secondary Deformity**

Frequently full correction is not possible at primary operation especially in long standing contractures and gross deformities, because of secondary contracture of blood vessels, nerves, musculo-tendinous units and capsular ligaments. The residual deformity is corrected by gradual and sustained traction by specially designed static splints, which by pressure on the graft prevent its contraction and by gradual traction stretch the contracted soft tissues to their normal dimensions without producing damage. The splints are worn soon after consolidation of graft which can now stand the stress of compression and stretching. The period during which the residual deformity is corrected depends on the severity of the contracture, its duration and the age of the patient, but generally it is achieved in few weeks. After getting full correction with static splints the patients wear dynamic splints which not only maintain the corrected position and prevent recurrence of contracture but also help in early mobilization of small joints. The patients are encouraged to do active and passive movements. The splints are kept for 8-9 months until grafts have lost ability to contract.

**Results**

By complete release of flexion contractures in one or two sittings and prolonged use of splints we have been able to achieve excellent results even in hands which were crippled and thought to be beyond salvage (Fig. 5 and 6). Full restoration of function could be achieved in almost all cases (Fig. 7 & 8). Some residual contractures at the site of junctional scars or minor skin graft loses, requires subsequent minor corrections. Proper and prolonged use of splints held the key to success especially in the region of webs. Splints had to be worn continuously for 8-9 months otherwise grafts contracted with rapidity even if the use of splints was discontinued for 24 to 48 hours.

Split skin grafts on palmar surface of the fingers and hand behave very well. After they are settled, they become soft and pliable and tolerate functional stresses. They adhere well to the deeper structures and over a period of time develop creases and wrinkles as normally seen in the palm under the influences of normal movements. Even when whole palmar surface of the hand is replaced by a skin graft the return of protective sensations is adequate for the day to day functions.
The Author
Dr. C. P. Sawhney, M.S., F.A.M.S., Professor and Head, Plastic Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India.

Request for Reprints
Dr. C. P. Sawhney, House No. 1030, Sector 24-B, Chandigarh, India,