Considerations in Management of Contractures of the Neck

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APART from few enthusiasts (Aufricht 1944, Gibriel 1971) who recommend and use flaps in the management of contractures of the neck, this method is getting into disrepute because of multiplicity of donor sites of flaps; loss of contour of neck; and achieving at best a bulky skin cover which is likely to hang down or thrown into folds. There is, however, near unanimity about effectiveness of split skin grafts in correction of such deformities. The other advantages of skin grafts being, their easy availability, minimal mutilation of donor tissues, and completion of repair in a single stage.

Split skin grafts, however, have a tendency to get wrinkled and contracted so that recurrence of the deformity is not uncommon. The principle of wearing a mould or form continuously for six months to counteract this tendency stimulated the use of splints in the post-operative period after grafts had settled. A variety of splints using different materials i e. leather and metal (Cronin 1961, Gibbon 1965), acrylic (Dingman 1961), fiber glass (Cramer 1964) foam rubber (Tanzer 1964) and inflatable bags (Ousterhout 1969) have been designed. They are aimed (i) to maintain contact or to exert constantly mild to moderate pressure on the graft or (ii) to maintain neck in extension or hyperextension. Whereas these splints may be effective to a variable extent in preventing contracture of skin grafts, the designs recommended involve time and expense in their fabrication and require skilled splint makers, besides the difficulty in obtaining the materials used. These splints also are not comfortable to wear continuously for long periods because of immobilization of neck in extension, thus interfering in daily activities. Lastly being unadjustable they do not have the capacity to adjust to changing requirements of pressure needed to prevent contracture of the graft and maintain at best the status quo achieved at the time of initial application. Some times contractures may reoccur necessitating supplementary grafting (Dingman 1961).

Before discussing the measures that we consider important in preventing contracture of skin grafts in neck it may be necessary to discuss the behaviour of skin grafts in this region.

Behaviour of Skin Grafts on Neck

Ten consecutive intermediate thickness split skin grafts placed on the neck were studied. For this, grafts edge were marked with gentian violet and an exact impression of the graft was taken on a piece of damp Lint, which was subsequently transferred to a tracing paper. The surface area of the graft was measured using a planometer. Periodic

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measurements were taken for a period of six months and rates of contracture and percentage contracture calculated by using the following formula :

Contracture per unit

$$(C) = \frac{\text{Decrease of wound area over a period}}{\text{Initial wound area}}$$

Percentage contracture = Cx100

It was observed that contraction of skin grafts starts immediately after take and proceeds rapidly in the first two weeks. Significant contraction i.e. 71-95% of total contraction, occurs during this period. It is complete in three weeks or so, by which time grafts are contracted to 48-52.7% of their original size, and get settled (Fig. 1, 2).

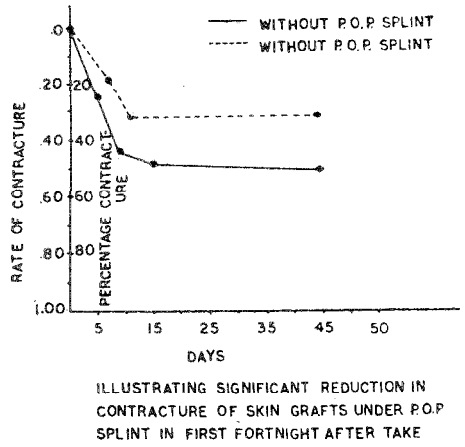

Fig. 1—Graph illustrating the behaviour of skin grafts on neck in the immediate post operative period and significant reduction in contracture after immediate application of P.O.P. splint.

It is reasonable to assume that if contraction is to be effectively countered or campensated, measures have to be taken at operation or immediately after take of grafts i.e. in first two weeks. We have tried various means such as (i) overcorrecting the defect during the surgical procedure or (ii) putting extra graft so as to compensate for the subsequent contracture of the graft but it was observed that these did not make any significant difference as regards the rate of contracture or recurrence of the contracture. Considering that wearing a mould or splint effectively counteracts contraction, and that maximum contraction occurs in first two weeks which

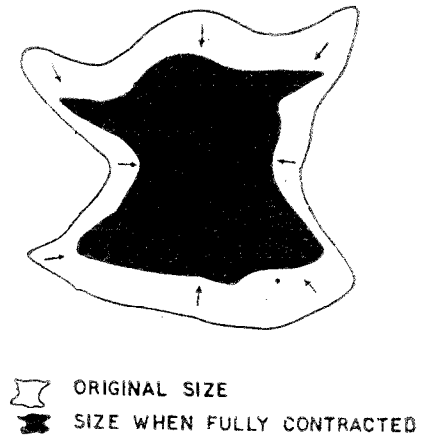

Fig. 2—Illustrates the degree to which a graft contracts on neck without application of a splint.

Fig. 3—Photograph illustrating application of P.O.P. splint conforming to neck contour in the immediate post-operative period.

must be prevented we have used and recommend the following routine.

Recommended Procedure

On the sixth post operative day after primary dressing a plaster of paris splint is applied which conforms to the contour of the neck (Fig. 3). This maintains the shape and

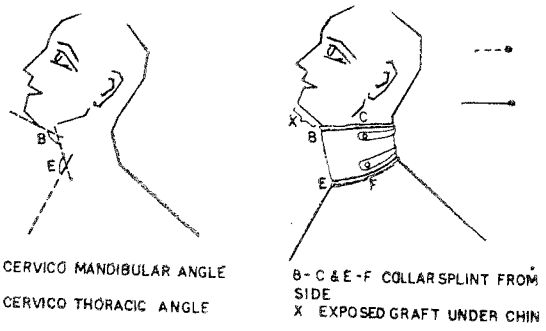

Fig. 4—Line drawing illustrating the design of a cervical collar splint.

size of the graft by exerting constant compression until the graft is settled i.e. in 2 to 3 weeks, when the proper splint is applied, the design of which is given as under.

Design of Splint

It is a form of cervical collar in which b-c is measured from cervico mandibular angle to cervico-thoracic angle i.e. just above manubrium sterni, in mid line and c f=a d is measured from just below angle of the mandible to a point where the cervical skin turns outwards towards the shoulder (Fig. 4). These measurements must be carefully taken so as to have the desired effect. The collar is made of plastic material or thin aluminium sheet and has a sponge rubber lining. It carries two straps for tying at the back of neck (Fig. 9). The collar extends from cervicomandibular angle to cervicothoracic angle vertically and to the mid-lateral line of the neck on sides and when tied firmly it exerts uniform pressure on the graft.

Behaviour of Skin Graft under the splint

Six intermediate thickness grafts placed in the neck after release of contracture were studied as previously after following the routine recommended. The data made available are very revealing. The application of plaster of paris splint immediately after graft take and subsequent application of cervical collar does not completely inhibit contracture of skin grafts but minimizes it significantly. Contracture of the graft to the extents of 30 to 40% continues to occur but is spread over a much longer period i e. four wekes or so. Thereafter, the skin graft stretches

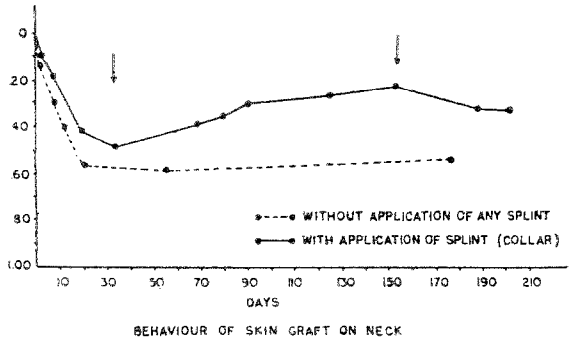

Fig. 5—Graph showing behaviour of skin graft on neck with or without application of cervical collar splint.

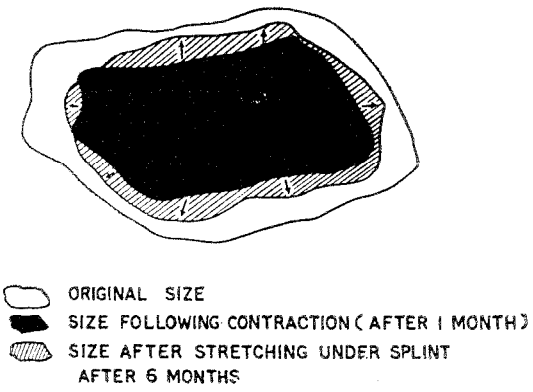

Fig 6—Illustrating the change in size and shape of the skin graft on neck under the cervical splint.

Fig. 7, 8, 9 - Photographs, preoperative, post operative with cervical collar and showing the final result in profile in a case of contracture neck.

dually and continues to stretch for the next six months when the graft finally settles (Fig. 5-8). This stretching is directly related to the amount of compression exerted by the splint. If however, the splint is removed earlier as was done in one patient at the end of five months, the skin graft contracted immediately by 10% and then got settled. It is apparent therefore, that the ability of the graft to contract under the splint persists for six months and that splintage for six months day and night is necessary.

In order that the splint is optimally effective it should be tied so as to exert adequate pressure which can be adjusted by the patient, to its limit of tolerance. It has been our experience that just a contact of the splint with the graft or maintaining neck in extension is not sufficient to prevent contraction as is aimed at by most of the splints designed. As the amount of pressure exerted is directly proportional to the tightening of the splint, the pressure exerted can be adjusted depending on the changing requirements of pressure needed to maintain the desirable pressure on the graft.

Summary

Behaviour of skin grafts on neck has been studied and effective measures in the form of a P.O P. splint after 7th postoperative day and subsequently a cervical collar of simple design are recommended to prevent contracture of skin grafts on neck in cases of cervical contractures. The cervical collar properly used significantly stretches the graft and thereby improve the results of repair.

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