

RELIEVING THE SKIN SHORTAGE IN DUPUYTREN'S DISEASE BY ADVANCING A SERIES OF TRIANGULAR FLAPS: HOW TO DESIGN AND USE THEM

By GRAEME C. BAKER, M.B., F.C.S.(S.A.), and H. KIRK WATSON, M.D.
*Combined Hand Program, Hartford, Connecticut and Section of Plastic Surgery,
Yale University, New Haven, Connecticut, U.S.A.*

The Y into V advancement flap is a bad plastic surgical procedure unless in very special circumstances; the wound edges to be sutured are of unequal length and suturing them results in distortion. The same applies to the V into Y flap. The operation to be described was first reported by Deming (1962) who used the term "Y-V advancement pedicles". In the strictest sense this is correct but the difference in wound length is largely overcome and the term Y-V is probably best avoided as it may raise unnecessary prejudice.

One of us has previously described his experience with this technique in 100 consecutive cases of Dupuytren's contracture without the need for skin grafting (Watson *et al.*, 1975). In such a variable condition as Dupuytren's disease any procedure to correct it should be variable and the limits of the variability known. We have therefore studied the procedure so far as its design is concerned in the light of previous experience and the mathematics involved.

The principle of the procedure will be readily appreciated from Figure 1. A continuous series of triangular flaps are advanced into back-cuts in a Y-V way. By having a series of flaps advancing in opposite directions into back-cuts of equal length, the wound edges to be sutured become equal with the exception of those at each end of the series. When raised they give good exposure of the contracted fascia and when this is excised and the finger straightened the back-cuts open up to receive the angles of the flaps.

The size of the advancing angle. This depends on a number of factors. If the angle is narrow, say 60° or less, long flaps are required which, while providing good lateral exposure of the fascia, may have an inadequate blood supply. If the angle is made too obtuse, say greater than 90° , the flaps become short, exposure is limited and it becomes increasingly difficult to accommodate the angle of the flap in the back-cut. Since the back-cut usually opens to about 90° when the fascia is excised and the fingers straightened, and since flaps with a 90° advancing angle have proved to be safe so far as blood supply is concerned, we have accepted 90° as the optimum size.

The length of the back-cut. Palmar skin is relatively inextensible, but some extra skin is often present in Dupuytren's contracture because of web formation over the contracted band. The amount of advancement possible varies and is best assessed by direct trial when the dissection is complete. Up to 1 cm is usual and rarely can more than this be achieved. Occasionally a back-cut may be made longer in order to achieve better exposure but the extra length is sutured before the flap is advanced.

Length of the flaps. We have found at operation that when dealing with palmar skin the back-cuts may be up to one-third of the side of the flap. If, for example, there

Address for reprints: Graeme C. Baker, M.B., F.C.S.(S.A.), Reconstructive Plastic Surgery, Inc., 104 East Second Street, Erie, Pennsylvania 16507, U.S.A.

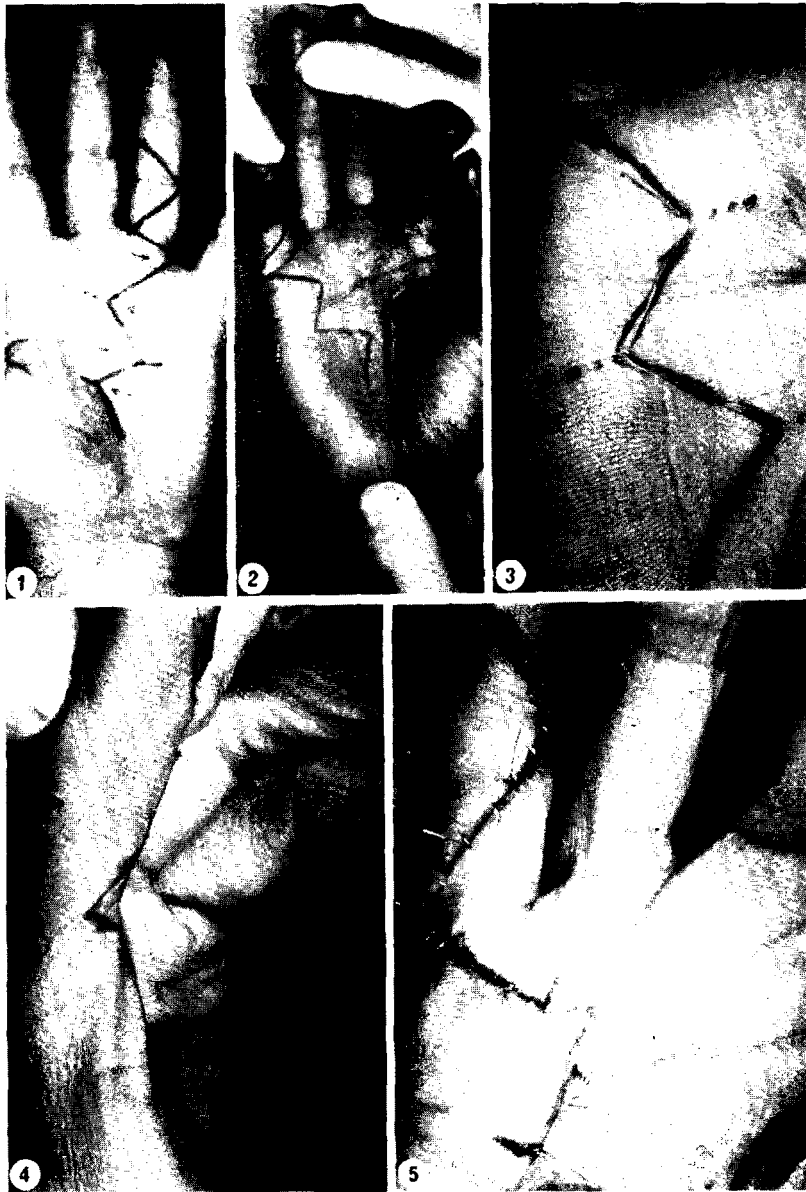


FIG. 1. A series of triangular flaps and their back-cuts drawn on a normal hand. Four flaps are usually sufficient but more may be added if required. The dotted back-cut illustrates how it may be extended for wider exposure and partly closed before advancing the flap.

FIG. 2. A case with palmar and proximal interphalangeal contraction.

FIG. 3. The length of the back-cuts may be varied so that the length gained is sufficient in the individual case.

FIG. 4. The angle of the finger flaps do not extend quite to the midlateral line.

FIG. 5. When advanced into the back-cuts however the finger flaps reach the midlateral line.

is 1 cm of lateral give, the flap cannot be advanced more than this. If the side of the flap measures 3 cm it cannot be advanced more than 1 cm. Flaps with sides of 3 cm seem therefore to be most appropriate.

Number of flaps. When the angle of the flaps has been established at 90° and their sides at 3 cm, it will be seen that usually only 4 are required, although others may be added if necessary.

Length gained. The total additional length achieved is the sum of the openings of the back-cuts. If the back-cut opens to 90° , then the mouth of the opening into which the flap will be advanced is the hypotenuse of an isosceles right angled triangle. Thus if the length of the back-cut is taken as 1, the sides of the triangle are each 1 and the hypotenuse opening is the $\sqrt{2}$ i.e. about 1.4. Mathematics of plane surfaces applied to biological tissues are notoriously unreliable but they give an indication that the maximum amount of length to be gained with 4 flaps of 3 cm side and 1 cm back-cuts is about 5 cm.

OPERATIVE PROCEDURE

The flaps and back-cuts can be regarded as occupying a rectangular space within which most of the contracted fascia will lie. The long axis of the rectangle should be positioned over the contracture as it is along this axis that the maximum length gain will occur.

A typical example of the incision is shown in Figures 2 to 5. On the fingers the angle of the flap does not extend to the midlateral line but the back-cut does and the flap is advanced into it.

Suturing is straightforward apart from the closure at each end of the series of flaps where a 4 cm side has to be stitched to a 3 cm side and some buckling may occur. But this is a not infrequent occurrence in plastic surgery and most surgeons have their own way of dealing with it.

If more than 1 finger is involved the series of flaps on the palm may branch up each finger; alternatively another series may be used for the other finger(s).

Not all contractures will require the maximum length gain possible and the size of the back-cuts may be adjusted to suit. At the other extreme even the maximum gain available may be inadequate and some other technique of skin replacement may be required.

We have had some experience of the technique on sites other than the palm and believe that it may have many applications to other types of contracture elsewhere.

REFERENCES

- DEMING, E. G. (1962). Y-V advancement pedicles in surgery for Dupuytren's contracture. *Plastic and Reconstructive Surgery*, **29**, 581.
 WATSON, H. K., BASS, D. and DEMING, E. G. (1975). Current management of Dupuytren's contracture utilizing the Deming Y-V-Z advancement incision. *Journal of Bone and Joint Surgery*, **57A**, 726.

ADDENDUM. Since this paper was sent to the publishers, our attention has been drawn to the paper by Shaw and Li in the May 1979 issue of *Annals of Plastic Surgery* (**2**, 436) which shows the technique being used in a number of situations other than the palm. Editor.