

SYNDACTYLY RELEASE : RESULTS OF THE FLATT TECHNIQUE

L. DE SMET, H. VAN RANSBEECK, G. DENEFF

The results of 50 web reconstructions in 35 hands in 24 patients were reviewed. The technique described by Flatt was used in all cases.

Web creep occurred in 13 webs (26%) of which 11 were operated before the age of 2 years. Active abduction was seen in 86% of the involved fingers. A normal or near normal web was seen in 74%. Cosmesis was satisfactory in 64%.

Keywords : syndactyly ; congenital ; hand.
Mots-clés : syndactylie ; congénitale ; main.

INTRODUCTION

Syndactyly or webbing of the fingers is one of the most frequent congenital malformations of the hand recorded in our files (4). The incidence has been estimated to range from 1 per 2000 to 1 per 3000 live births. According to Temtamy and McKusick (17) syndactyly has been classified into 2 major categories : solitary syndactyly and syndrome-related syndactyly, each with subcategories (Table I). The surgical classification makes a distinction between a complete or incomplete syndactyly and between a complex or simple syndactyly (7).

Numerous techniques have been described over the years, but several principles have been generally accepted : the creation of the web with a flap and skin grafting for the fingers (10). Renewed interest in syndactyly release without skin grafting has recently emerged and has resulted in discussions in journals and at meetings ; extended dorsal interdigital flaps (9), skin expansion (20) and use of preoperative distraction devices (15) have been reported. Timing of the operation is also a matter

Table I. — Temtamy and McKusick classification of syndactyly

Syndactyly	
A. Isolated	
I	Zygosyndactyly
II	Synpolydactyly
III	Ring and little finger syndactyly
IV	Complete syndactyly of all fingers
V	Syndactyly with metacarpal synostosis
B. Associated	
I	Poland
II	Acrocephalosyndactyly
IV	Constriction ring syndromes
V	Facial syndromes
VI	Occasional syndromes

of discussion. The older publications proposed a separation at the age of 5 to 6 years, while more recent authors prefer to operate between the ages of one to 2 years (7).

In order to appreciate these new approaches it is important to evaluate the classical technique (Flatt) (Fig. 1), done by one surgeon, using the same indication, timing and technique over the years.

Department of Orthopedic Surgery, U.Z. Pellenberg, Weligerveld, 1, B-3212 Pellenberg, Belgium.

Correspondence and reprints : L. De Smet.

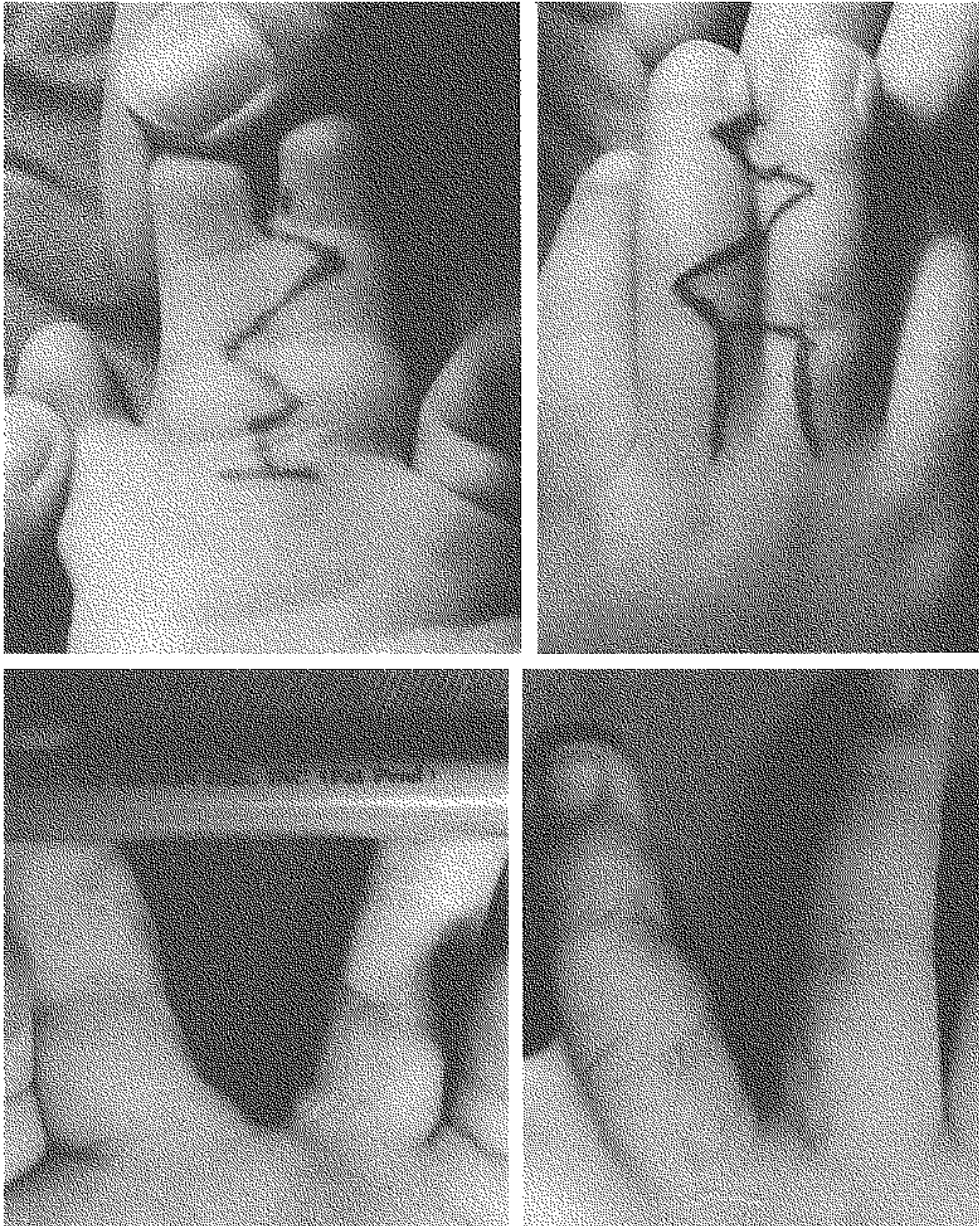


Fig. 1. - Operative technique and result.

MATERIAL AND METHOD

Surgical technique

The technique of Flatt (10), modified by Dobyns (7), has been used in all patients. Dorsally a large rectangular flap is developed, extending at least 2/3 of the way from the metacarpal head to the PIP joint. This

flap should cover the base of the web. On the palmar side a reversed T-shaped incision was made. Beyond these incisions the fingers are separated with standard Z-incisions. A full thickness skin graft is used to cover the bare areas on both lateral sides. When the pulp and nails are fused the double pulpplasty described by Lundkvist and Barfred is used for creating nailfolds (12). Bilateral cases and nonadjacent fingers are separ-

ated in the same session. For the adjacent sides a delay of 6 months is proposed before separating the second side. The operated area was covered with a bulky dressing and tulle gras gauze on the grafted areas. Routinely the patients are discharged the following day ; the dressing is removed after 10 to 12 days.

Patients

We reviewed 50 operated webs in 35 hands in 24 patients : 13 males, 11 females. Syndactyly of the first web was excluded for evaluation in this series. The mean age at operation was 2 years, 8 months (range 3 months to 13 years). Both hands were involved 16 times, the left 13 and the right 6 times. Twenty-five hands had only one web involved, 2 had 2 webs, 5 had 3 webs and 3 had all 4 webs involved. The syndactyly was a simple-complete for 21 webs, simple-incomplete in 12 webs and complex in 17 webs. In the syndrome-related syndactylies we saw a Poland syndrome in 4 patients, Greig's craniosynpolydactyly in 2 patients, and once a Mobius syndrome, a Cenani-Lenz syndrome, an Apert syndrome and a triploidy. Clinodactyly of the small finger was seen in 14 hands, a delta-phalanx in 18 hands and clinodactyly of another finger in 8 hands. Thirteen patients had only one operation, 5 had 2 operations and 6 more than 2, with one patient with a maximum of 8 operations.

Evaluation

The patients were reviewed by an independent examiner. A photograph of the hand was taken. The status of the web was evaluated, the active abduction of the fingers was measured. The cosmesis of the hand and finger was estimated. Flexion and extension deficits were measured in centimeters. Rotational and/or angular defects were measured as the angle between the fingertip and the corresponding metacarpal (Table II) (18).

RESULTS

The results are summarized in table III. The web had a normal or near normal localization in 23 and 14 webs respectively (74%). Web creep was present in 13 webs (26%). Only one needed a revision operation, and a second one is scheduled for revision. Active abduction of at least 20° was obtained in 43 webs (86%) and the cosmesis of the finger and web was considered normal or near normal in 32 webs (64%). Extension was normal in 53 fingers, slightly impaired in 26 and moderately impaired in 7 fingers (all fingers of the

Table II. — Criteria for evaluation

	Web localization in full extension and abduction	Active abduction	Cosmesis	Extension lag	PDPCD	Angulation
Grade 1	normal : < 1/5 of the distance MCP to tip	> 30°	normal	< 0.5 cm	< 0.5 cm	0°
Grade 2	1/5 to 1/4	20-30°	good	0.5-1 cm	0.5-1 cm	1-5°
Grade 3	1/4 to 1/3	10-20	moderate	1-2 cm	1-2cm	6-10°
Grade 4	> 1/3	< 10°	fair	> 2 cm	> 2 cm	> 10°

PDPCD = pulp to distal palmar crease distance.

Table III. — Summary of the results

	Web localization	Active abduction	Cosmesis	Extension lag	PD PCD	Angulation
Grade 1	23	27	8	53	67	52
Grade 2	14	16	24	26	8	16
Grade 3	11	5	14	7	7	11
Grade 4	2	2	4	0	4	7

involved hand were evaluated). Flexion was normal in 67 fingers, slightly impaired in 8 fingers and moderately and severely limited in 7 and 4 fingers respectively. Angular and rotational deformities were absent in 52 fingers, 16 had less than 5° deviation, 11 between 5 and 11° and 7 more than 10° deviation.

Web creep was seen in 11 of the 23 webs operated before the age of 2 years, while in the 27 webs operated later, only 2 developed a web creep. This difference is highly significant (Chi-square $p = 0.001$, Fischer exact $p = 0.002$).

DISCUSSION

The aim of surgical treatment of syndactyly is to improve function and cosmesis of the involved hand(s) (7, 8, 10, 15, 18). The key to a successful outcome is the shape and condition of the reconstructed web. Recurrence or web creep has been reported in 7.5 to 60% of the cases (1, 6, 11, 13, 19). The definition however is not the same for all authors. When only those who needed a revision operation are taken into consideration, we obtain an incidence of 4%, but when recurrence distally beyond one quarter of the distance between the metacarpal joint and fingertip is used as the criterion (which seems more appropriate), an incidence of 26% is obtained. Operations before the age of 2 years have a significantly higher incidence of web creep.

Besides web creep, active abduction of the fingers is also an important feature. In our series this was achieved in 86% of the cases.

Reduced range of motion and angular deformities were present only in a minimal number of fingers and were related to the structural anomalies of the involved fingers.

The association with clinodactyly of the fifth finger seen in 14 of the 35 involved hands is a remarkable finding. It was already mentioned by De Smet and Fabry (2), De Smet *et al.* (3) and Miura *et al.* (13) in several subcategories of syndactyly. It is an important feature because it can be considered as a minimal expression of syndactyly, which has particular interest for correct genetic counseling.

REFERENCES

1. D'Arcangelo M., Gilbert A., Pirrelo B. Correction of syndactyly using a dorsal omega flap and two lateral and volar flaps. *J. Hand Surg.*, 1996, 21-B, 320-324.
2. De Smet L., Fabry G. Type II syndactyly or synpolydactyly. *Acta Orthop. Belg.*, 1992, 52, 209-212.
3. De Smet L., Mulier T., Fabry G. Syndactyly of the fourth and fifth finger. *Gen. Couns.*, 1994, 5, 45-49.
4. De Smet L., Matton G., Monstrey S., Cambier E., Fabry G. Application of the IFSSH-classification of congenital anomalies of the hand. *Acta Orthop. Belg.*, 1997, 63, 182-188.
5. De Smet L., Matton G., Monstrey S., Cambier E., Fabry G. Application of the IFSSH-classification of congenital anomalies of the hand. 6th Congress of the IFSSH, Monduzzi Ed. Bologna, 1995, pp. 935-936.
6. Deutlinger M., Mandl H., Frey M., Freilinger G. Spätergebnisse nach operativer Korrektur von Syndaktylien und Symbrachydaktylien. *Z. Kinderchir.*, 1980, 44, 50-54.
7. Dobyns J. Syndactyly, in Green D. (Ed.), *Operative Hand Surgery*, Mosby, St. Louis, 1989, pp. 346-363.
8. Eaton C., Lister G. Syndactyly. *Hand Clin.*, 1990, 6, 555-575.
9. Ekerot L. Syndactyly correction without skin-grafting. *J. Hand Surg.*, 1996, 21-B, 330-337.
10. Flatt A. The care of congenital hand anomalies. *Quality Med. Pub.*, St. Louis, 1994, pp. 228-275.
11. Keret D., Ger E. Evaluation of a uniform operative technique to treat syndactyly. *J. Hand Surg.*, 1987, 12-A, 727-729.
12. Lundkvist L., Barfred T. A double pulp flap technique for creating nailfolds in syndactyly release. *J. Hand Surg.*, 1991, 16-B, 32-34.
13. Miura T. Clinical study of congenital anomalies of the hand. *Hand*, 1981, 13, 59-68.
14. Moss A., Foucher G. Syndactyly: Can web creep be avoided? *J. Hand Surg.*, 1990, 15-B, 193-200.
15. Paley D., Egelseder A. Distraction treatment of syndactyly. Presented at the third symposium on "Congenital malformations of the upper limb", Milano, Italy, June 13-15, 1997.
16. Percival N., Sykes P. Syndactyly: A review of the factors which influence surgical treatment. *J. Hand Surg.*, 1989, 14-B, 196-200.
17. Temtamy S., McKusick V. The genetic of hand malformations. *Birth Defects Series*, 1978, XIV, pp. 301-361.
18. Toledo L., Ger E. Evaluation of the operative treatment of syndactyly. *J. Hand Surg.*, 1979, 4, 556-564.
19. Van der Biezen J., Bloem J. Treatment of syndactyly and results in 31 children (in Dutch). *T. Geneesk.*, 1993, 137, 27-32.
20. Zama M., Santecchia L., Borghese L., De Stefano C. Skin grafting versus expansion for syndactyly correction. Presented at the third symposium on "Congenital malformations of the upper limb", Milano, Italy, June 13-15, 1997.

SAMENVATTING

L. DE SMET, H. VAN RANSBEECK, G. DENEFF, G. FABRY. Syndactyly correctie : resultaten van de techniek volgens Flatt.

Het resultaat van 50 gereconstrueerde webs in 35 handen van 24 patiënten werd geëvalueerd.

Alle patiënten werden behandeld volgens de techniek van Flatt. "Web creep" werd 13 maal teruggevonden, 11 maal bij patiënten geopereerd vóór de leeftijd van 2 jaar. De gereconstrueerde web was normaal of bijna normaal in 74% van de getroffen vingers, met 64% een behoorlijk esthetisch resultaat.

Actieve abductie was mogelijk bij 86% van de vingers.

RÉSUMÉ

L. DE SMET, H. VAN RANSBEECK, G. DENEFF, G. FABRY. Libération de syndactylie : résultats de la technique de Flatt.

Les auteurs rapportent les résultats obtenus dans 50 reconstructions commissurales réalisées au niveau de 35 mains chez 24 patients. La technique décrite par Flatt a été utilisée dans tous les cas. Une rétraction commissurale s'est produite dans 13 commissures (26%), dont 11 avaient été opérées avant l'âge de 2 ans. Une abduction active était notée pour 86% des doigts concernés. Une commissure normale ou quasi normale a été observée dans 74%. Le résultat esthétique était satisfaisant dans 64%.