

# OPEN FLEXOR TENOTOMY FOR HAMMER TOES AND CURLY TOES IN CHILDHOOD

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Sixty-two children were reviewed between 3 and 14 years (average 9.8 years) after flexor tenotomy for curly toes or hammer toes. No patients were aware of loss of flexor power in the toes. In only 5% of 188 toes was the operation unsuccessful. When the cause of failure was identifiable it proved to be that the scar crossed one or more flexor creases. None of the operated toes had an abnormally extended posture; only one toe was stiff and this resulted from tethering by a scar.

It is concluded that open flexor tenotomy is an effective method for correcting curly toes and hammer toes in childhood. Pre-operative assessment must demonstrate that the resting length of the flexor tendons is unduly short, and that this shortening is the only cause of the deformity.

In hammer toes there is a flexion deformity of the proximal interphalangeal joint with or without a flexion deformity of the terminal joint. Curly (varus or under-riding) toes have a combination of flexion deformity, varus deviation and lateral rotation of one or both interphalangeal joints. In childhood there is seldom significant fixed deformity of the affected joints in either of these conditions. If the clinician flexes the metatarsophalangeal joint of the affected digit, then the deformities of the terminal joints can be passively corrected. This physical sign indicates that the resting length of the flexor tendons is unduly short and that tenotomy of the long flexor tendon and of the two portions of the short flexor will correct both hammer toes and curly toes. Open tenotomy is preferred as one of the three flexor tendons may elude division if closed tenotomy is performed.

Strapping has no effect on curly toes (Sweetnam 1958). Pollard and Morrison (1975) demonstrated that flexor to extensor transfer is less reliable than flexor tenotomy; transfer may result in a stiff toe which lacks the normal slightly flexed posture. Pollard and Morrison also noted a higher morbidity with flexor to extensor transfer than with flexor tenotomy.

This present paper reports the results of a review conducted at a children's hospital. But, providing the physical sign described above can be elicited, the procedure is applicable to adults also, and has been successfully performed by the senior author on patients as old as 40 years.

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## MATERIAL AND METHOD

Sixty-two children who had suffered from hammer toes or curly toes, or from combinations of these two deformities, were reviewed with one or both parents present. One patient was excluded; this girl had multiple congenital anomalies of the feet, with progressive and fixed deformity of all toes. In her, flexor tenotomy was performed primarily to prevent progressive flexion deformity and not with a view to complete correction; this limited aim was achieved.

**Indications for operation.** Minor degrees of hammer toe and curly toe are commonly seen in infancy and childhood. Many of these deformities improve spontaneously or remain sufficiently minor to require nothing more than parental reassurance. All the patients we operated on (and who are reviewed in this paper) had more severe degrees of deformity. In some there had been symptoms resulting from pressure on the dorsum of the proximal interphalangeal joint of a hammer toe or from pressure on the tip of the toe; sometimes the nail had become shortened with deformity of the surrounding soft tissue. Similar deformity of the nail had been seen on the weight-bearing side of a curly toe, and the toe under which it lay had sometimes shown chronic hyperaemia of the skin over its proximal joint. Many of the patients subjected to operation had been asymptomatic; in these the appearance of one or several curly toes was unacceptable (notably for girls), and the combination of the cosmetic deformity and the likelihood of subsequent symptoms provided the indication for open flexor tenotomy. This technique produces a toe of a normal, slightly-flexed appearance, with less morbidity than operative procedures in adult life.

The average age at the time of operation was 4 years 2 months (range 1 year 2 months to 11 years 1 month).

**The procedure.** The operation is performed under general anaesthesia and in a bloodless field. The surgeon sits facing the sole of the child's foot with the table elevated to his eye-level. Various skin incisions may be used with equal success—a longitudinal incision proximal to the proximal flexor crease, a longitudinal incision distal to it, or a transverse incision 1 mm from it. If a longitudinal incision is used it must not cross a flexor crease or the scar may lead to recurrent deformity. Currently, we prefer to use a transverse incision.

The flexor sheath is incised longitudinally; the three tendons are withdrawn from the wound over fine dissecting forceps and divided. The wound is explored to ensure that no further slips of tendon have eluded division. If the toe is very curly and still tends to curl after the tendons have been divided, then its posture may be improved by manipulation. The wound is closed with a single 3-0 catgut suture. The dressing is held in place with 2.5 cm elastic adhesive strapping and is retained until the wound is inspected at 10 days. The suture does not require removal.

## RESULTS AND DISCUSSION

The average length of follow-up was 9.8 years (range 3 to 14 years). The appearance was normal or nearly normal (with the interphalangeal joints slightly flexed) in 95% of the toes examined (Table I); none of the toes had the abnormally straight posture that may be seen after flexor-to-extensor transfer (Pollard and Morrison 1975). Stiffness occurred in only one of the 188 toes, and this resulted from a scar which caused tethering.

Table I. Results of flexor tenotomy

Appearance	Percentage of toes
Good (normal)	64
Fair (mild deformity)	31
Poor (severe deformity with or without symptoms)	5

The toe operated upon least often (Table II) was the second, which is never curly. Similar numbers of third, fourth and fifth toes were treated with similar results in right and left feet. However, significantly more third toes

obtained a perfect result than fourth toes; this was despite the third toe usually having a greater varus deformity before operation. The fourth and fifth toes had significantly more fair and poor results and this may be related

Table II. The results of operating on the second to fifth toes

Result	Second	Third	Fourth	Fifth	Total
Good	4	74	37	6	121
Fair	0	7	42	9	58
Poor	1	2	3	3	9

to the greater rotational deformity in these toes, especially the fifth. The fifth toe also tends to be abnormally small in patients with deformity severe enough to require operation; the toe is hypoplastic and still looks abnormal after operation. This study could not distinguish any difference between the results of operation for hammer toes and those for curly toes.

In 43 patients no long flexor function was noted. In 15 it was present in one or more toes and in 4 patients it was equivocal. No patients were aware of any loss of toe function.

The parents of 52 of the 62 patients were pleased with the outcome of flexor tenotomy. Five of the 10 children with dissatisfied parents had toes which had good or fair results. With only one exception, the complaint concerned the fourth toe whose slightly flexed posture was misinterpreted by some parents as still being abnormal.

Five patients had one or more toes assessed as poor; of these two had significant scar tethering, while in three there was no obvious cause for the poor result.

**Complications.** A longitudinal incision had been most commonly used in the patients reviewed. Where the skin creases of either interphalangeal joint had been crossed a scar tether resulted. Ten patients had tethers: in 3 the tethers were not significant and the results were good; and in 7 patients 9 toes were only fair and 4 were poor as a result of the tether. One patient had a stiff toe due to tethering. There were no other early or late complications.

**Conclusion.** Open flexor tenotomy is an effective method for correcting curly toes and hammer toes in children, providing there is no cause for the deformity other than the flexor tendons being too short. We feel that a flexor tenotomy is preferable to a flexor-to-extensor transfer.

## REFERENCES

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