Acta orthop. Scandinav. 37. 387 393. 1966.

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TREATMENT OF HIP FLEXION CONTRACTURE IN CEREBRAL PALSY PATIENTS

By

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Received 4.VIII.66

PREFACE

At the conference of The Spastic Society in Bristol, September, 1965, I presented the method used in our department for treating the hip flexion contracture in spastics.

Several inquires on this topic show a widespread interest in this important subject and I feel that a short report may be justified.

INTRODUCTION

During the last decade attention has been increasingly attracted to hip flexion contracture as a disabling factor in the motor function in many cerebral palsy patients (*Michele* 1960, *Keats* 1965, *Mortens* 1965, *Sharrard* 1965).

Earlier, only patients with severe flexion contractures were operated upon—often by myo-tenotomies or osteotomies.

As the operations were usually followed by long periods in plaster casts, complications frequently compromised the results. This dissuaded us from greater activity.

In the Department I of The Orthopaedic Hospital in Copenhagen we have *for more than four years* followed a programme of treatment of the hip flexion contracture which is based on experience gained over many years.

The principle has been that operation should be combined with early, intensive, postoperative, physical treatment.

Before the operation the patient should have been through the post-

operative training programme several times so that he is familiar with the treatment postoperatively.

Having started the training in this way we consider the operation to be just an episode in the programme of treatment and in fact most patients see it in that way.

The patients are not operated upon until they feel absolutely confident in the department—and never until all natural functions are under control (urination and evacuation).

INDICATION

for operation is found when the hip flexion contracture is more than 15 degrees.

Below that size of contracture I feel that most younger patients are able to compensate in their lumbal spine without any significant disturbance of posture or gait.

At the operation we make an elongation of the psoas tendon. In cases when the rectus tendon is found to be short or when severe spasm is present an elongation of the rectus tendon is performed.

In cases where the sartorius muscle is short or the muscle is found to be spastic it is transferred to the inferior iliac spine.

Additionally it should be stated that fasciotomies of the fascias covering the tensor fasciae latae and the medial gluteal muscles are performed just below the iliac crest when necessary to complete extension of the hip joint—just as all fascial layers on the front side of the thigh are divided transversely when they give any resistance to full extension.

TECHNIQUE

1) The patient is placed on the operation table in supine position with the buttocks on a sand-bag. Placed in this way all tight structures may be palpated during the operation.
2) A towel covering the genitals and the perinæum should be fixed by sutures in such a way that one has free access to the adductor muscles if teno-myotomies are required.
3) Incision begins at the lateral border of the superior iliac spine following the lateral border of the sartorius muscle to the middle of the thigh.
4) The sartorius sheath is opened and the sartorius muscle and the lateral cutaneus nerve of the thigh are exposed.
5) The sartorius muscle is mobilized as far as the superior nerve supply, raised on a finger, and cut near the attachment.
6) The sartorius muscle is retracted to the medial side so that the rectus tendon is visible and can be exposed right up to the insertion.

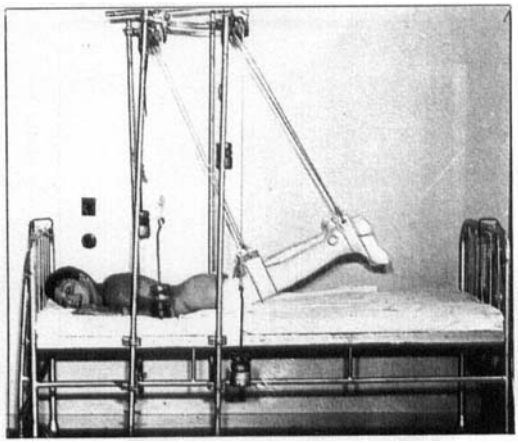

Figure 1. Patient suspended—legs in plaster casts balanced with weights.

7) The rectus tendon is cut obliquely.
8) The femoral nerve is exposed and the motor branches are isolated.
9) Between the motor branch to the rectus femoris and the other branches the circumflex vessels are isolated and the superior branches are ligated and divided. Dividing these vessels facilitates access to the distal part of the iliac muscle.
10) Now the hip is flexed and abducted, the femoral nerve retracted to the medial side, and the psoas tendon is visible. The lesser trochanter is easily palpated.
11) The distal part of the iliac muscle is resected from the insertion on the psoas tendon and the surrounding femoral bone proximally until 1½ inch from the level of the superior iliac spine. Before resection, tie or coagulate smaller vessels to the muscle.
12) At this time palpation will reveal any tightness of the facial layers which are divided transversely.
13) The cleaned psoas tendon is cut obliquely and sutured with a lengthening of 4–6 cm.
14) The rectus tendon is sutured with a lengthening of about 3–4 cm.
15) The proximal end of the sartorius is sutured to the inferior iliac spine in connection with the rectus tendon.
16) Wound is closed by suturing. The longitudinal but not the transverse incisions of the fascial layers should be sutured. Catgut in the subcutaneous tissue and nylon suture in the skin.

After operation: Plaster casts are applied from the groin to the toes with the intention of:

Firstly: Treating an eventual flexion contracture of the knee joint.

Secondly: Treating an inward rotation contracture by means of an adjustable iron cross bar.

Thirdly: To exclude synkinetic movements in knee and ankle joints in the post-operative period of training.

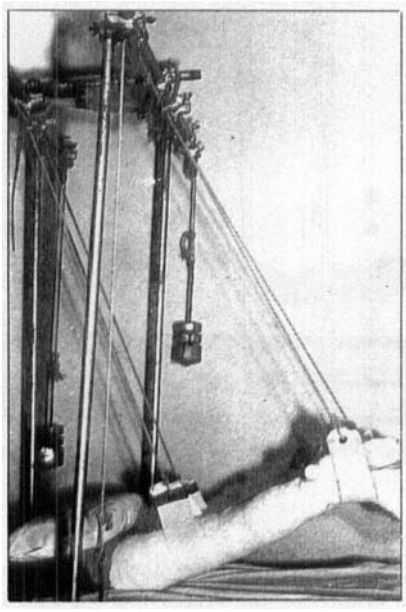

Figure 2. Patient with a sandbag on the buttocks. Details of the suspension arrangement are visible.

Postoperative Treatment after Elongating of the Psoas Tendon.

1) Treatment starts 1–2 days after operation.
2) Legs are in plaster casts from the groin to the toes—the knees are extended and the feet are in neutral position.

Position:

1) Prone twice a day for 2 hours—a sandbag is placed on the buttocks.
2) Prone twice a day for 2 hours—with the legs being suspended, balanced with weight, permitting a gradual increasing of the hip extension.
3) The patient is not allowed to sit up in bed.

Exercises:

1) Side-lying position: abduction also against resistance.
2) Prone position: active extension of the hips, also against resistance.
3) Supine position: active outward rotation of the stretched legs, also against resistance.

Plaster casts are removed 3 weeks after operation.

Exercises:

1) Maximum extension of the hips.
2) Hip elevation, standing on the opposite leg.
3) Foot exercises—specially reciprocal dorsi-plantar flexion.

4) Walking exercises, eventually with Canadian crutches.

Exercises must continue for 3 months or more.

The patient should *sit* as little as possible, preferably standing or lying in prone position.

THE MATERIAL

On the 1st of April, 1965* our material consisted of 58 patients in whom 111 psoas tendons were elongated.

Of these 53 were bilateral and 5 monolateral.

28 were females, 30 were males.

There have been no complications.

Figure 3 shows age in four groups under different diagnoses.

	Age in years				Number of cases
	0–5	6–10	11–15	>16	
Diplegia	1	18	15	4	38
Hemiplegia		1	4	2	7
Triplegia				1	1
Tetraplegia	1	4	6	1	12

Figure 4 shows the reduction of hip flexion contracture obtained by the combined treatment.

b = flexion contracture *before* operation.

a = flexion contracture *after* operation and postoperative treatment.

		Degrees of hip flexion contracture						
		1–15		16–34		35		0
		b	a	b	a	b	a	
Diplegia	38	1	16	27	0	10	0	22
Hemiplegia	7	1	3	5	0	1	0	4
Triplegia	1			1				1
Tetraplegia	2	0	5	9	0	3	0	7
		2	24	42	0	14	0	34

From the figure it will be seen that no patients were left in the two groups with hip flexion contracture of more than 16 degrees.

34 patients had no hip flexion contracture.

* Since then we have performed this operation on some thirty patients, who have not been reexamined.

24 had a contracture less than 15 degrees.

Among these were several with a minimal contracture.

The gait is improved in all cases subjectively and objectively. The patients say that they not get tired so quickly as they did before operation.

The posture is improved in many cases. Before operation 45 patients had a hyperlordosis and after operation only 2 had a persisting hyperlordosis.

Forward tilting of the body is more common after operation in patients who are mentally defective.

COMMENTS

Earlier methods of treatment of the hip flexion contractures such as teno-myotomies or osteotomies followed by plaster casts have given unsatisfactory results.

The reasons are frequent complications such as decubital ulcers and the lack of active treatment through long periods of time.

"Closed" operations often left tight structures compromising the results (*Cozen* 1966).

If, for example, by an adductor-tenotomy, a tenotomy of the psoas tendon is performed, the effect on the flexion contracture of the hip may be small, as a big part of the iliac muscle may maintain the contracture.

For these reasons I consider wide open operations to be necessary in cases with hip flexion contracture (*Mulroy* 1966).

Tendons must be elongated, if they are shortened or if their muscles are very spastic.

Fascial layers must be divided where they are a hindrance to full extension.

Capsulotomy of the hip joint is not necessary to obtain satisfactory results.

Haemostasis must be complete.

Early mobilization and training must be considered as one of the most important features of the treatment and absolutely necessary to secure a good result—and because of the altered muscle balance around the hip joint after the operation training and exercises must continue for a very long time.

SUMMARY

The operative treatment of the hip flexion contracture in cerebral palsy patients must be combined with early, active exercises and training.

The operation of the hip flexion contracture is described and the programme for the postoperative treatment is given in detail.

111 elongations of the psoas tendon were performed up to April, 1965.

The number has steadily increased since then.

The primary results are reported.

RESUME

Le traitement opératoire de la contracture de flexion de la hanche chez les malades souffrant de paralysie cérébrale doit êthe combiné avec des exercices actifs et un entraînement instaurés très rapidement.

L'opération de la contracture de flexion de la hanche est décrite et le programme du traitement post-opératoire est donné en détail.

111 élongations du tendon psoas ont été pratiquées jusqu'en Avril 1965.

Depuis leur nombre n'a cessé d'augmenter.

Les résultats primaires sont rapportés.

ZUSAMMENFASSUNG

Die operative Behandlung der Hüftbeugekontraktur bei Patienten mit cerebraler Parese muss mit frühzeitigen, aktiven Übungen und Training verbunden werden.

Die Operation der Hüftbeugekontraktur wird beschrieben und das postoperative Behandlungsprogramm wird bis ins einzelne dargelegt.

111 Verlängerungen des Psoassehne wurden bis zum April 1965 ausgeführt.

Ihre Anzahl hat seither stetig zugenommen.

Es wird über die primären Ergebnisse berichtet.

REFERENCES

Cozen, L. (1966) An Atlas of Orthopaedic Surgery. Lea and Fibinger, Philadelphia, p. 513.

Keats, S. (1965) Cerebral Palsy. Springfield, Illinois, p. 112.

Michele, A. A. (1960) Iliopsoas. Springfield, Illinois, p. 197.

Mortens, J. (1965) *Danish med. Bull.* **12**, p. 22.

Mulroy, R. D. (1966) *Clinical Orthopaedics and Related Research* **38**, p. 81.

Sharrard, W. J. W. (1965) cit. Mortens, sep.