PSOAS AND ADDUCTOR RELEASE IN CHILDREN WITH CEREBRAL PALSY

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In a retrospective study of 12 cerebral palsy patients with 17 hips treated for subluxation, clinical and radiographic results of psoas and adductor releases were reviewed. With an average follow-up of 4.05 years, the functional ability was improved in 3 spastic quadriplegics and 3 diplegics and maintained in 6 other patients. The CE-angle and femoral head coverage did not change significantly. The AC-index improved significantly ($p = 0.01$).

Keywords : cerebral palsy ; hip subluxation ; psoas release ; adductor release.
Mots-clés : infirmité motrice cérébrale ; subluxation ; hanche ; libération du psoas ; libération des adducteurs.

INTRODUCTION

Hip dislocation in children with cerebral palsy is a serious problem for patient and orthopedic surgeon. It affects mainly spastic quadriplegics and results in walking problems, difficulty in sitting (8), pain and perineal care problems (2, 3). The most important factor contributing to hip subluxation and eventually dislocation is muscle imbalance resulting in adduction and flexion contractures of the hip. The center of hip rotation is shifted toward the lesser trochanter, instead of the femoral head center (1, 5).

Coxa valga, increased femoral anteversion and acetabular dysplasia create an unfavorable mechanical situation, which will lead to dislocation of the hip.

The classic surgical treatment has been adductor tenotomy with or without obturator nerve neurectomy (9, 10, 11). Reports by Kalen and Bleck (6), Hoffer *et al.* (5) and Moreau *et al.* (7) have stressed the importance of addressing the psoas muscle in the treatment of this condition.

The purpose of this retrospective study was to evaluate the clinical and radiographic results of psoas and adductor releases in children with cerebral palsy.

PATIENTS AND METHODS

Between 1986 and 1994, 12 patients had psoas and adductor releases of 17 hips as their only procedure. All patients with concomitant bone surgery or surgery on the hamstrings were not included. Five patients had bilateral procedures. Age at surgery, follow-up, the degree of involvement of cerebral palsy and functional ability preoperatively and at follow-up were recorded. All patients were evaluated radiologically, including measurements of CE-angle, AC-index and femoral head coverage. Data on gait analysis were inconsistent and therefore ignored. The CCD-angle was not measured, because this is often unreliable on the AP-pelvis roentgenograph due to increased femoral anteversion.

The surgical procedure included subcutaneous release of the adductor longus tendon and psoas tendon release. Slightly inferior to the inguinal ligament the psoas tendon is located in the iliacus muscle. Psoas tenotomy is performed sparing the iliacus fibers. In this population obturator neurectomy was performed in 3 release procedures.

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RESULTS

The preoperative age of 12 patients with 17 hips averaged 6.05 years (range 2 to 13.5). The mean follow-up was 4.05 years (range 2.5 to 8). The study group included 3 diplegics and 9 quadriplegics. In 3 diplegics and 2 quadriplegics a bilateral psoas and adductor release was performed. Goals of treatment and type of surgical procedure are listed in table I.

Preoperatively 2 hips were dislocated, 7 hips subluxed and 8 were radiographically normal. At follow-up 2 hips remained dislocated and 3 subluxed, but 12 were considered normal. The functional ability improved in 3 quadriplegic patients, who became independent sitters. In 3 diplegic patients the walking ability improved.

Radiographic parameters (table II). The average CE-angle improved from 5.3° to 8.3°. The difference is not statistically significant (Wald Wolfowitz Runs test ; $p = 0.86$). Femoral head coverage again did not improve significantly ($p = 0.38$). The AC-index averaged 24° preoperatively and 21° at follow-up (significant, Student t test : $p = 0.01$).

Table I. — Patient group

Patient	CP type	Goal of treatment	Operation
1 (bilateral)	diplegia	to improve ambulation	psoas and adductor release
2	quadriplegia	to contain femoral head	p/a release and obt. neurect
3	quadriplegia	to prevent hip dislocation	psoas and adductor release
4	quadriplegia	to improve sitting	psoas and adductor release
5 (bilateral)	quadriplegia	to improve sitting	psoas and adductor release
6	quadriplegia	to improve sitting	p/a release and obt. neurect
7 (bilateral)	diplegia	to prevent hip dislocation	p/a release and obt. neurect
8 (bilateral)	quadriplegia	to treat hip subluxation	psoas and adductor release
9	quadriplegia	to improve sitting	psoas and adductor release
10 (bilateral)	diplegia	to prevent hip subluxation	psoas and adductor release
11	quadriplegia	to treat hip dislocation	psoas and adductor release
12	quadriplegia	to contain femoral head	psoas and adductor release

Table II. — Radiographic parameters

Patient	age at surgery (years)	follow-up (years)	CE-angle * (°)	AC-index * (°)	Fem. head coverage * (%)
1 (bilateral)	9	2.5	11/20	29/19	72/77
			21/29	18/17	79/84
2	5.5	2.5	13/10	27/19	78/69
3	6	3.5	16/3	23/23	76/55
4	13.5	4	31/24	18/14	100/100
5 (bilateral)	4	4	17/22	16/12	68/82
			-15/10	33/21	52/59
6	2	3	-5/6	39/27	50/68
7 (bilateral)	3	8	4/12	22/20	63/74
			5/3	22/27	56/54
8 (bilateral)	2	4	-6/-5	33/33	39/44
			0/0	33/36	56/50
9	10	3	15/9	11/12	79/63
10 (bilateral)	7	5	5/13	20/15	64/76
			8/14	19/15	83/76
11	3	3	-30/-40	39/39	0/0
12	13	3	0/11	19/12	59/70

* preoperatively/follow-up.

DISCUSSION

We consider maintaining the hips in reduced position is of significant importance in CP patients. Especially in quadriplegics, independent sitting balance is helpful for eating and for using the arms and hands (4). The ultimate problem of the painful dislocated hip should be avoided.

In our retrospective study we demonstrated the beneficial clinical and radiographic effects of psoas and adductor releases, even though the population was small and there was a wide range of ages at surgery.

Recent reports in the literature (7) stress the fact that most, especially quadrispastic, CP hips will sublux in the first 5 years of life. We believe that early psoas and adductor releases can prevent subluxation and possibly the need for future bony procedures on the proximal femur and pelvis. We observed a significant improvement of the AC-index, although other investigators (5) reported that the AC-index remained essentially unchanged. We also stress the fact that none of our patients was functionally worse at follow-up. Indeed, 3 diplegics and 3 quadriplegics improved.

We now tend to treat spastic CP patients with subluxing hips early. Surgical treatment with psoas and adductor releases should probably start before 5 years of age. In our opinion a thorough physical therapy program and management and prevention of recurring contractures with orthotic splints is the next most important item in the difficult treatment of these patients.

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SAMENVATTING

M. SPRUIT, G. FABRY. Release van psoas en adductoren bij kinderen lijdend aan cerebral palsy.

In een retrospectief onderzoek van 12 cerebral palsy patiënten met 17 operatief behandelde heupen, worden de klinische en radiologische resultaten van psoas- en adductor release beschreven. Het funktionele niveau van 3 diplegie- en 3 tetraplegie patiënten verbeterde en bleef bij de overige patiënten behouden. Na een gemiddelde follow-up van 4.05 jaren is er een niet significante verbetering van CE-hoek en femoral head coverage. De AC-index is significant beter ($p = 0.01$).

RÉSUMÉ

M. SPRUIT, G. FABRY. Libération du psoas et des adducteurs chez l'enfant infirme moteur cérébral.

Les résultats cliniques et radiographiques de la libération des adducteurs et du psoas ont été revus rétrospectivement chez 12 patients atteints d'infirmité motrice cérébrale, traîtés pour subluxation de hanche. Le suivi moyen est de 4.05 ans. La fonction a été améliorée chez 3 quadriplégiques spastiques ainsi que chez 3 diplégiques, et maintenue chez les 6 autres patients. L'angle CE et la couverture de la tête fémorale n'ont pas évolué de manière significative. L'index AC s'est amélioré significativement ($p < 0.01$).