TREATMENT OF PARALYTIC HIP DISLOCATION AMONG SPASTIC QUADRIPLÉGIC CEREBRAL PALSY PATIENTS BY MEANS OF FEMORAL AND PELVIC OSTEOTOMY, WITHOUT OPENING THE JOINT CAPSULE (CAPSULOPLASTY)

ABSTRACT

Objectives: To show the preoperative planning and results from surgical treatment for paralytic hip dislocation among patients with cerebral palsy. The techniques used were proximal femoral varus derotation osteotomy in association with Dega iliac osteotomy, without opening the joint capsule. Methods: We performed a retrospective review of ten hips in eight patients with spastic quadriplegic cerebral palsy who underwent surgical treatment between 2003 and 2005, with the same surgical technique. The pre and postoperative clinical and radiological parameters, and the preoperative planning using an image intensifier, were assessed. The clinical parameters analyzed were: pain, hygiene-related difficulties and positioning difficulties. The radiological parameters were Reimer’s index, the acetabular index and the neck-shaft angle. These results were subjected to statistical analysis. Results: We obtained good results with this technique. After a mean follow-up of three years, all the hips were observed to be stable at the last assessment, and there was a high degree of satisfaction among the families in relation to the treatment. We also showed that preoperative planning using an image intensifier allowed us to reduce and stabilize these hips without the need for capsuloplasty. Conclusion: The authors conclude that in treating hip dislocation among spastic quadriplegic cerebral palsy patients, capsuloplasty is unnecessary for stabilizing the coxofemoral joint.

Keywords – Cerebral palsy; Hip dislocation; Osteotomy; Femur

INTRODUCTION

Cerebral palsy is a syndrome cause by lesions in the immature brain. It is characterized by abnormal control over motor function, which may interfere with sensory function and cerebral development(1). Cerebral palsy has various causes and, among these, cerebral malformation, vascular lesions, traumatic lesions, infections, metabolic disorders and toxic substances can be cited, among others. The lesions usually appear prenatally or perinatally, and the cause is postnatal in only 10% of such patients(2).

It is characterized by anatomical and physiopathological impairment(2). The greatest anatomical deformities are found in quadriplegic patients with the four extremities involved. Spasticity is the most common type of physiopathological impairment. Among the anatomical problems, the hips may very frequently be involved in this pathological condition.

The abnormalities of the hips of patients with cerebral palsy merit special attention because they may bring serious problems for patients and their families. Among the problems triggered by hip dislocation, there may be high incidence of morbid conditions, in terms of pain, muscle contractions, hygiene-related difficulties, difficulties in positioning, pelvic tilting, scoliosis, skin ulceration and fractures, among others(1,2). The prevalence of hip dislocation or subluxation among patients with cerebral palsy has been reported as 3 to 60%(2,3). In most cases, the dislocation is posterior. Anterior dislocation is rare, accounting for 1.5% of the cases, according to the literature(3,4), because of the characteristics of the musculature involved in this pathological condition.

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We believe that surgical treatment brings benefits for patients, through improving their seated position, their hygiene and, especially, the pain relating to the dislocated hip\(^{(2,3)}\).

The good results from surgical treatment for this pathological condition are very well documented in the literature. Such treatment has the aim of ensuring that the hip is in the anatomically correct position, without presenting pain, by means of proximal femoral varus osteotomy and pelvic osteotomy\(^{(5-8)}\). However, little has been written about whether the joint capsule needs to be opened in order to improve the stabilization of this hip.

The aim of our study, in addition to seeking to confirm the good results achieved through osteotomy in the femur and pelvis, was to show that with preoperative planning through using an image intensifier, a stable hip can be achieved without opening the joint capsule, in the belief that this would not influence the stabilization of the hip.

**METHODS**

A retrospective study was conducted at the Disabled Children’s Care Association of São Paulo (AACD-SP) between January 2003 and December 2005, in which ten cases of patients with spastic quadriplegic cerebral palsy presenting dislocated and subluxated hips were treated at this institution with hip reconstruction using the same surgical technique and without the need for capsuloplasty. Out of the ten patients studied, two subsequently died and therefore this analysis was conducted on eight patients.

One patient was female and seven were male. The mean age at the time of the surgery was eight years and six months (range 5 to 13 years). Ten hips were reconstructed (two patients were operated bilaterally): four on the left side and six on the right side.

The preoperative data were obtained from these patients’ medical files, in order to check the clinical and radiographic parameters. The postoperative evaluation was performed by inviting the patient to come for a new clinical and radiographic assessment.

The clinical parameters analyzed, both before and after the operation, were the patients’ complaints that were expressed through their families, such as pain, hygiene-related difficulties and difficulties in positioning. The radiological parameters used were Reimer’s index\(^{(9)}\), the acetabular index and the neck-shaft angle. The radiological parameters were subjected to statistical analysis using the Wilcoxon test.

The hip reconstructions on these patients were performed by means of a lateral incision in the femur in order to perform varus osteotomy on this femur at the level of the lesser trochanter, with removal of a small wedge of medial base and fixation using an AO angled plate with a fixed angle of 90 degrees. Another incision of bikini type was made in the iliac in order to perform osteotomy in this bone through the Dega technique, without approaching the joint capsule or opening it. Tenotomy of the psoas and release of the adductors medially were also performed\(^{(1)}\).

The decision not to open the joint capsule was made at the surgical center before undertaking the asepsis and antisepsis measures, with the patient on the surgical table, under general anesthesia. We studied these patients’ hips and noted the degree to which the hip dislocation or subluxation could be reduced through maneuvers of abduction and internal rotation of the hip, viewed by means of an image intensifier (Figures 1, 2, 3 and 4). For the patients for whom we were able to reduce the hip through this method, we chose not to open the joint capsule. Our parameter was the normalization of Wiberg’s center-edge (CE) angle, as observed through the image intensifier during this maneuver (reducibility test; Figure 4).

The mean duration of the follow-up on these patients (defined as the time elapsed from the operation to the last consultation conducted) was three years (range, one to five years).

A plaster cast extending from the pelvis to the foot was applied after the operation, and this remained in place for an average of six weeks.

**RESULTS**

At the start of our study, ten patients underwent the operation. Two patients subsequently died because of complications inherent to their pathological condition but without any relationship to complications from the surgical treatment. These two patients were therefore not evaluated.

Before the operation, two patients did not present any complaints, while six presented pain and their families said that they had difficulties with personal hygiene. At the last postoperative consultation, five patients were without complaints; two said that the plate was sticking out but that they were free from pain, and one reported leg pain. After the operation, three patients started to practice standing up (using a parapodium), which they had not been doing before the operation.

All the patients’ families were satisfied with the surgery and said that they would be willing to go through it again.
With regard to personal hygiene, the families reported improvements in all cases. The positioning of these patients improved, both in the seated position and when standing.

In relation to the radiographic appearance, the mean for Reimer’s index went from 76% before the operation to 2.2% (p = 0.0026) at the last postoperative assessment. The mean acetabular index went from 30 degrees to 19 degrees (p = 0.0038) and the mean neck-shaft angle went from 155 degrees to 118 degrees (p = 0.0026) at the last postoperative assessment. All these parameters were statistically significant (Table 1).

With regard to complications, two patients presented eschars after the operation: one in the sacral region and the other in the heel region because of using a plaster cast. They were treated with local dressings until the wounds had healed, without further complications. One patient presented an episode of convulsive crisis during the immediate postoperative period, which responded to medication. One patient had to have the plaster cast changes at the surgical center, 15 days after the operation, because of hygiene problems. There was no loss of reduction in any of the cases studied, and all the hips that were operated remained in the correct location and centered within the standards of normality (taking subluxation of the hip to be shown by Reimer’s index greater than 30%).

| Table 1 – Radiographic parameters of the patients before and after the operation |
|------------------------------------------|----------------|----------------|----------------|
|                                         | Reimer’s index | Acetabular index | Neck-shaft angle |
| Mean       | 76.00  | 2.1    | 30.1          | 19.5        | 155       | 118.5     |
| Median     | 78.00  | 0.0    | 30.0          | 17.5        | 155       | 117.5     |

Values in degrees
Source: medical files at AACD
DISCUSSION

Hip reconstruction in cases of cerebral palsy is a controversial subject in relation to patients without a prognosis of being able to walk. In our opinion, hips should be reconstructed in children who are in a good clinical condition, since this avoids joint deterioration and the possible development of difficult-to-treat pain.

We believe that hip reduction stabilizes the pelvis and prevents pelvic tilt and posterior scoliosis.

In cases of cerebral palsy, the dislocation is progressive because of muscle imbalance, in which the adductor and flexor musculature is strong and the abductor and extensor musculature is weak\(^6\). These patients’ hips are correctly centered at birth and they evolve to progressive dislocation with acetabular dysplasia, femoral anteversion and valgus of the femoral neck.

Nonsurgical therapeutic options for pathological conditions of the hip among these patients, such as orthoses and physiotherapy, do not show good results. Hence, surgical treatment is the best option\(^2\). The surgical treatment should promote better muscle balance and reduce the dislocation, thereby making the joint close to normal and pain-free for the patient.

There is no doubt that proximal femoral osteotomy corrects valgus and large anteversion of the femoral neck. The technique of periacetabular osteotomy of the iliac that was described by Dega\(^10\) corrects anterior, lateral and posterior acetabular dysplasia and is a good treatment option used around the world. However, there is some doubt in relation to whether or not the joint capsule has to be opened in order to ensure that the hip is stable after the operation.

Fuc\(s\) et al\(^5\) achieved good results in 86% of their cases, with reduction or disappearance of the pain and improvements in hygiene and positioning, in operations on 43 hips of patients with cerebral palsy in which the same surgical technique was used, but with opening and cleaning of the joint cavity. The length of the follow-up was two years and six months, i.e. close to the mean follow-up of three years that was used in our study.

Sankar et al\(^11\) showed good results with 16 years of follow-up, among patients with cerebral palsy presenting dislocated hips, through hip reconstruction involving opening of the joint capsule. In their paper, they reported that there were few complications and that their procedure promoted pain-free hip stability, improved hygiene, absence of pressure ulcer formation, better positioning and better walking ability among the patients who could walk.

Mubarak and Wenger\(^12\) treated 18 dislocated or subluxated spastic hips with a mean follow-up of six years. Among these, 17 hips remained anatomically reduced at the last follow-up assessment. In their study, the joint capsule was opened in all the cases and obstacles that might have impede the reduction were removed (rounded ligament, transversal acetabulum or pulvinar) and the capsule was then repaired. In our study, we chose not to open the joint capsule, since we believed that the hip would not be stabilized by the joint capsule in cerebral palsy cases. Thus, with preoperative planning, hip reduction without opening the capsule would be possible in some cases. At the last follow-up assessment in our study, all the hips were seen to present anatomical reduction. McNerney et al\(^13\) performed capsuloplasty if the head migration rate was greater than 70% or if the femoral head did not reduce completely within the acetabulum. Those authors believed that there could be
recurrence of dislocation in 60% of the cases if capsuloplasty were not performed, compared with a recurrence rate of 3% among patients with Reimer’s index greater than 70% who underwent capsuloplasty. We had six hips with Reimer’s index greater than 70%, and the preoperative planning using the reducibility test showed that Wiberg’s CE angle became normalized. Thus, we were able to reduce the hip and did not need to perform capsuloplasty. We did not have any cases of recurrence of dislocation, even though our follow-up was shorter than the six years of follow-up by those authors.

In all our cases, the dislocation was posterior, which is in line with the literature. Cases of anterior dislocation among patients with cerebral palsy are rare\(^{(3,4)}\).

We agree with Settecerri \textit{et al}\(^{(6)}\), who stated that the best postoperative results are obtained among patients presenting subluxation of the hip instead of dislocation. Thus, orthopedists’ role should be to avoid complete coxofemoral dislocation through taking measures before it occurs, in order to attain better results.

We preferred to treat the hips separately, such that in cases of bilateral dislocation, we would wait for full surgical recovery on one side before scheduling the other side. Owers \textit{et al}\(^{(7)}\) treated these hips simultaneously and with good results, although their paper did not state whether the joint capsule was opened or not, for reducing the hips.

Out of the ten hips that were operated, four presented complete dislocation with Reimer’s index of 100%, while six were subluxated. Even though 40% of the patients presented dislocated hips, we achieved anatomical reduction of these cases without opening the joint capsule, and these hips were reduced at the preoperative planning stage, shortly before the surgery. Despite the dislocation, the femoral head was at the same level as the acetabulum, regarding the height, and thus we were able to normalize Wiberg’s CE angle.

None of the patients that we operated presented complaints of pain after the operation, and their families were very satisfied, which was in line with the literature\(^{(3,6,8,11,12)}\). We agree with Root \textit{et al}\(^{(8)}\), who reported that after the surgical procedure for hip reconstruction, all the patients presented better positioning with regard to sitting and no longer had any pain. Even though this surgical procedure may present complications, the good results justify the care, treatment and attention given to these patients.

In this group of patients, we found few complications. This differed from the literature, in which there have been reports of delayed consolidation, infection of the operative wound, avascular necrosis of the femoral head and fractures of the proximal femur, among other complications. We believe that the absence of complications in this study was due mainly to the small number of patients, compared with the numbers in the literature\(^{(3,12)}\), considering that this is a major procedure carried out on patients who often present clinical complications.

**CONCLUSION**

Thus, with preoperative planning through using an image intensifier, we were able to plan the hip reconstruction without the need to open the joint capsule, thereby diminishing one stage of the surgical procedure and avoiding exposure of these patients’ joints. The reducibility test at the surgical center showed that Wiberg’s CE angle became normalized through the maneuver of abduction and internal rotation of the femur, and is thus a good parameter for making decisions regarding the need to open the joint capsule in order to achieve femoroacetabular reduction. We believe that the joint capsule is not a factor in the stabilization of these patients’ hips, although a study with a greater number of patients and longer follow-up is necessary.

**REFERENCES**