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How to avoid complications after surgery in children with cerebral palsy?

Beyin felçli çocuklarda ameliyat sonrası komplikasyonların önlenmesi

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The authors reviewed most common complications and the way to avoid problems in the surgical treatment of children with cerebral palsy, with a focus on making the proper diagnosis, age at the time of surgery, and approach to nonoperative and operative treatment.

Key words: Age factors; cerebral palsy/surgery; child; lower extremity/surgery; muscle, skeletal/surgery; postoperative complications; range of motion, articular.

Bu yazıda, beyin felçli çocukların tedavisinde en sık karşılaşılan komplikasyonlar ve cerrahi tedavide ortaya çıkabilecek sorunlardan kaçınma yolları gözden geçirildi. Bu hastalarda doğru tanı koyma, ameliyat yaşı ve ameliyatsız ve ameliyatla tedavilerin önemli noktaları üzerinde duruldu.

Anahtar sözcükler: Yaş faktörü; beyin felci/cerrahi; çocuk; alt ekstremite/cerrahi; kas, iskelet/cerrahi; ameliyat sonrası komplikasyon; hareket açıklığı, eklem.

Medical assessment of a child with cerebral palsy is essential. Some of them may have medical conditions like epilepsy, congenital heart disease, malnutrition or shunts that could complicate surgery and postoperative care. There are sometimes different opinions among physicians as to what should primarily be operated – spine, foot, hip, or hand. Recent medical results and opinions of other specialists should be taken into account. Input from neurologists, pediatricians, and psychiatrists is especially important. There are not the same two patients with cerebral palsy (CP). Each patient should be evaluated individually.

In the last years, medical care of premature infants has improved significantly. Neonatal mortality of premature infants is decreasing, but they are at greater risk for short- and long-term complications. We can expect, therefore, increases in the number of patients with CP.

The aim of this paper is to explain how to evaluate patients with CP, make the right diagnosis and indication for surgery, and avoid problems after surgery.

Age at the time of surgery

Patience during the child's examination is crucial. This will allow proper patient selection for surgery and adequate treatment methods. In our hospital, children are examined in two stages: slow phase and quick phase that will allow to distinguish the real range of motion according to the form of spasticity. Making decision to operate on a child with CP requires a careful examination, team approach, and consideration. We try to avoid multiple level surgeries in children that are in the early phase of motor development and are still growing. It is better to wait until the child starts walking for a minimum of a year-period, till he or she will be fully prepared for walking. At this point, final assessment should be made and decision for surgery safety made. We are trying to stay with nonoperative treatment as long as possible in this population, as risk of rapid recurrence

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of muscle contractures in this group is high. We try to postpone the procedure until the patient is five years old or older. Multilevel surgery in teenagers with CP may cause worry in parents. These patients are much slower to heal. Recovery and rehabilitation may take a longer time, especially after derotational osteotomy of the femur. Parents, patients, and care givers should be informed about this before surgery.

Surgery - Soft tissue procedures

When performing surgery, we should think that the child is growing and muscle strength and joint position can change with age. Overlengthening is the most common source of trouble after muscle or tendon lengthening.[1] This problem can be observed also after neurectomy. As a rule, during adductor tenotomy procedures, we identify the obturator nerve during surgery to avoid damaging it. When the obturator nerve is cut during adductor lengthening or tenotomy, muscle imbalance could lead to abduction contractures of the hip. Adductor weakness could show its consequences even a few years after the operation. The results may not be satisfactory, and hyperabduction of the hip may be inadequate.[2] Hamstring lengthening in older children followed by stretching in the operating room for severe knee contractures should be performed gently. Cases of nerve palsy with the incidence of 9.6% have been described in the literature.[3] If neurological symptoms or deficit occur after surgery, removal of long leg cast, bivalving of casts, or wedging casts into flexion should be performed immediately. In the study of Karol at al.[3] resolution of symptoms occurred in 82.1% of patients. The greatest risk was in uncommunicative adolescents who were nonambulatory.[3] In this group, excessive hip flexion and/or knee extension must be avoided.

The most common complication seen after Achilles tendon lengthening for treatment of equinus deformity is overlengthening. Heel cord that is too long will cause hyperdorsiflexion and limited active plantar flexion of the foot during walking. These children will have crouch as they get older. In our opinion, it is better to undercorrect the deformity and repeat the procedure after a couple of years rather than overdoing. Some equinus is functional much better than calcaneus position of the foot. Alternative treatment, such as gastrocnemius fascial lengthening may be optimal, as Achilles tendon lengthening may result in over-weakening of the triceps surae muscle.[4]

The split tibialis posterior transfer for children with hemiplegia gives very satisfactory results, but certain points should be remembered.[5,6] First of all, the equino-varus foot deformity must be flexible. If passive correction cannot be achieved, bony correction with soft tissue procedures should be considered. Care should be taken to detect supination of the foot. These patients will be candidates for split tibialis anterior transfer to the cuboid. Tendon transfers are not indicated for young and growing children. The results can be disappointing. The correction may be lost with time and the patient may end up with opposite deformity. That is why we recommend waiting for this procedure after 10 to 12 years of age. In the group of younger children with corrective deformities, we perform Achilles tendon or gastrocnemius fascial lengthening together with botulin injections to the other contractured muscles followed by correction in the cast.

Surgery - Bone procedures

The risk for hip displacement in the whole CP population is about 27-35% and is directly related to gross motor function.[7,8] About 80% of children with spastic tetraplegia will have hip displacement.[8] Nonambulatory patients have a higher risk for hip dislocation or subluxation especially between the ages of 3 to 8 years. In ambulatory patients, the risk is much lower. Physical examination performed even by experienced surgeons may fail to detect hip subluxation especially when the child is obese. For this reason, every nonambulatory child and those with asymmetric spasticity should have radiographs taken to assess the status of the hips. We repeat hip radiographs at least once a year in this group of patients. In children before the age of 5 years, hip displacement with a migration index of 50% suggests soft tissue releases as the treatment of choice. Bony hip procedures in this age group are related to very high rates of failure. Older patients will have a much more benefit from bony reconstructions. Care should be taken to distinguish hip pain caused by subluxation from other conditions: abdominal pain, constipation, hernias, or spastic muscles.

During surgical procedures certain technical points will allow to avoid most of the problems. Satisfactory adductor lengthening during varus derotational osteotomy is essential. Otherwise, adduction contracture may occur. Iliopsoas muscle should be released in nonambulatory patients. This muscle is a very strong hip

flexor that turns the hip proximally. Leaving it intact most probably will lead to relapse. Parents should be informed that their child may have limb length inequality after unilateral varus osteotomy.

One of the most common mistakes that could be made during proximal femoral osteotomy is overcorrection. Most dislocations in children with CP are posterior and superior. There is often a deficit of posterior and superior part of the acetabulum, so extensive correction of anteversion may cause redislocation. In addition, pelvis osteotomies will not improve posterior coverage of the femoral head. Salter osteotomy will correct anterior acetabular deficit, but also leave the posterior part of the acetabulum uncovered. That is why this osteotomy should not be indicated in this situation. The preferred acetabular osteotomy in children with CP is that proposed by Dega.[9] It allows covering both anterior and superior acetabular deficits without uncovering the posterior acetabulum. Chung et al.[10] found that, after Dega osteotomy, the anterosuperior, superolateral, and posterosuperior covering of the femoral head had improved significantly. The mean acetabular volume increased by more than two thirds. Anterior redislocation is much less common, but is more difficult to diagnose. Radiographic appearance of anteriorly dislocated hip joint can imitate that of a normal hip. The hips of these children are usually in an abducted, externally rotated, and extended position. Radiographs in axial view or computed tomography can be very helpful.

Special consideration should be given when offering the patient some of the salvage procedures of the hip. The Girdlestone and Castle procedures or proximal femoral resection performed in skeletally immature patients may be complicated by a spectacular proximal migration. Furthermore, pain relief in these patients may not be immediate and may take a couple of months or more.[11-13] Heterotopic ossification following surgical procedures in children with CP is another source of trouble. It occurs in about 16% of patients. The risk factors that cause heterotopic ossification are degree of involvement (quadriplegic), ambulatory status, capsular release, infection, and previous hip operations.[14]

Casting

Casts should be avoided in children with CP if possible. They can cause a lot of problems. Efforts should be made to place a decent amount of padding under the cast to avoid skin irritation. Many of our patients have a sensation deficit and will not report problems related to blisters, ulcerations, or wounds under the cast. Above-the-knee cast and immobilization carry a risk for femoral fractures. After removal of the cast, attempts to stand or exercises for range of motion restoration may be the reason of fracture. Weight bearing should also be delayed due to the possibility of implant loosening in osteoporotic bone of poor quality.

Conclusion

Treatment of patients with cerebral palsy is not too difficult if you remember that every patient is different and should be evaluated individually. Taking in consideration this basic information, we are able to avoid most complications after surgery in patients with CP.

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