The Propective Study For The Treatment Of Spastic Cerebral Palsy With Highly Selective Posterior Rhizotomy
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Introduction

Spastic cerebral palsy is the most commonest type of cerebral palsy which describes mainly a motor disorder secondary to the brain under-development or injury occurred before, during, or after birth. It is often observed in the premature, low-birth-weight, difficult labor or delivery and stifle after birth infants.

The treatment for cerebral palsy mainly depended on rehabilitation therapy in the past years. In some conditions it could be treated by orthopedic operations, so as to correct the contracture of muscles, balance the muscle force and restore their functions in certain extent but it is very difficult to gain the ideal results especially in the reduction of muscle hypertone and the improvement of abnormal reflex. In 1987, Fasano et al. described an operation to cut selectively the afferent fibers of muscle spindle from the spinal posterior nerve rootlets by means of microsurgical technique and electromyography, so that the spasticity can be reduced and the abnormal reflex can be released and the skin sensitivity can be preserved. In 1981, Peacock modified Fasano's procedure by changing the operating site from conus to cauda equina (L2-L5) with satisfactory results.

This operation has been argued for decades. Today it is clear that in selected patients, highly selective posterior rhizotomy (SPR) is confirmed with good results in treatment of spastic cerebral palsy. In China, Dr. Xu Lin performed the operation initially in Beijing in 1991. Since 1992, we began to work on more than 40 patients. The muscle hypertone and spasticity have been reduced all patients right after the operation. Exaggerated deep-tendon jerk (knee and ankle) and the clonus (ankle, patellar) were no longer elicited postoperatively. The hip-joint can be fully abducted and the heels can contact the ground after operation. However, the recovery of motor functions for the cerebral palsy children, whose motor development were delayed or who cannot walk independently and actively, must undertake a long period of training in rehabilitational center. Then what are the ways of training and how long would it need for them to gain better motor functions? What is the further
results of SPR? It is not very clear about these problems up to now because the operation has only been performed for about 15 years aboard. Hence it is necessary to design a prospective study plan, to promote the results of this operation.

(A) The rehabilitational demands before operation

The motor development of the spastic cerebral palsy children are delayed. Although some of them can walk reluctantly with a cross gait but the majority are difficult to walk or even to stand, to raise their legs and to turn over independently. Hence, they usually have to be taken care of. Generally these children can reduce the spasticity postoperatively but it is still very difficult to contract the muscles and restore normal motor functions. Hence, the rehabilitational training must be taken before operation, in order to train the children how to contract the muscles actively, even in spastic state. We propose a training program to train these children to gain the ability to take care of their daily life by themselves and to train the trunk muscles for the postoperative rehabilitation of lumbar surgery. The training program includes six sets of active exercises, that include turning over on the bed, raising legs, raising pelvis, lifting the head in prone, lifting the legs in prone and squatting from standing and return. We have used this program successfully for more than 40 spastic cerebral palsy children before the operation, and restored motor functions quickly after operation.

(B) The problem about the rehabilitation after operation

In general, by means of some related training on bed for three weeks after operation, patient can learn to sit, to stand and to walk step by step. It is also important to strengthen the active hip abduction, hip flexion, ankle dorsoflexion and knee extension. At the same time it is necessary to train the coordination and balance of the lower extremities in order to improve promptly their motor postures and functions.

(C) The problem about the lumbar rehabilitation

Because the L2-S1 spinal laminae were excised in the selective posterior rhizotomy, the function of the posterior column of spinal cord were destroyed. Of course at this time, children have no degeneration in
anterior and middle columns of spinal cord, so in general they do not suffer from lumbago. But it may be a problem that Lumbago and strain of lumbar muscles may occur a little earlier in adult life. We ought to think of some modifications in the operation to preserve as much laminae as possible, for example, to preserve partial laminae of L2 and S1 as well as the whole L4 lamina. In clinical practice this modifications do not influence the surgical procedures which excise posterior roots of L2 to S1. We shall follow up and observe in future in detail.

(D) The problem of cutting intrafusal afferent fibers

Undoubtedly, selective posterior rhizotomy can interrupt the feedback circuitory to releasing hypertonus and spasticity of muscles by cutting the intrafusal afferent fibers. But when the muscles almost lost their stretch reflex function, what results would take place for the motor organs, especially in the coordination and balance functions as well as the nimbleness of extremities? What results would take place when the patellar and sexual functions would be influenced after partly cutting the fibres of L2? Obviously, we had to take a longer time to observe and follow up these questions.

(E) The problem about the hips

It was reported in some materials that one of the complications of selective posterior rhizotomy is the incomplete dislocation of the hip. We also pay attention to the development of children's acetabulum and the function of gluteus. Although we have not encountered any hip dislocation after operation, we still ought to observe in detail in future.

(F) The problem about children's Intelligence Quotient (IQ)

The IQ of our cerebral palsy children were lesser than 80, especially in the performance IQ which is even lesser. It is, of course, the result of brain injury or underdevelopment, but they lost the chance to communicate with other children, which means that the chance to be educated and stimulated and the children are in "functional isolation" from the society. Therefore, the intelligence development would strictly be limited especially in the intelligent IQ. After operation, the children's spasticity had been reduced. It gave the children the possibility to communicate with other normal children, so as to receive education and
stimulation. As a result, after this operation, the IQ ought to increase in future step by step.