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Orthopaedics in secondary prophylaxy and in the treatment of the cerebral palsy

Zadania ortopedii we wtórnej profilaktyce i leczeniu dzieci z mózgowym porażeniem

Up to 20% of children are treated because of cerebral palsy (c.p.) in children's orthopaedic departments and clinics in Poland. The number of the sick children is increasing (1, 2, 4, 10).

More often than before medicine is able to save newborns with a low birth weight and premature babies (1, 2, 3, 4, 11, 12, 13, 14). Now in Poland newborns with the birth weight of 600–700g can survive (6, 7, 9). A paradox arises – the faster development of obstetrics, neonatology and micropaediatrics is, the more children with cerebral palsy appear (5). Therefore, it becomes important to discover the disease as early as possible and to treat it properly orthopaedically in order to prevent contractures, deformities and such complications as paralytic hip dislocation.

THE IMPORTANCE OF EARLY DIAGNOSIS AND TREATMENT

The diagnosis of cerebral palsy in newborns in the first 4 weeks of life is difficult and sometimes we can only suspect this disfunction. It happens that spasticity of various kinds and ranges can already be observed in newborns. The most serious form of c.p. arises when we observe full flaccidity paresis imitating paralysis in the very early period of babyhood e. g. 3 months to 1 year of age. These children usually do not have a big chance of treatment, therapeutic rehabilitation and walking, because of large and serious spasticity.

MATERIAL AND FORMS OF THE DISEASE

In the years 1993–1995 in the Children Orthopaedic Department in Lublin there were 1,136 children and 272 of them suffered c.p. and were treated. At the same time in the Clinic of Pathology of Newborns and Babies totally 2,161 children were treated and among them 161 with c.p.

The material of the Children Orthopaedic Department (1993–1995) includes: 272 children treated conservatively and among them 198 children were operated on. In this group there were 486 procedures, including 133 operations on the hip and 43 total reconstructions of the dislocated hip. The age of the children ranged from 5 months to 15 years (average 8 years 9 months). The age of the children treated in the Paediatric Clinic ranged from 2 to 36 months (average 11 months). In the Clinic of Babies and Pathology of Newborns in 53 children c.p. was diagnosed in addition to the primary illness. Those children were admitted to the Clinic for other reasons and c.p. had not been diagnosed in them before.

In children with cerebral palsy admitted to the Children Orthopaedic Department 22% had been sent by a paediatrician, 40% by a neurologist, 15% by an orthopaedic surgeon and 23% by other specialists (family doctors and others).

It is very important to observe if the child stands up or sits up earlier than other children. Earlier standing up, being a symptom of apparent pathology, is often interpreted by parents as "a mark of baby's power".

Contractures of feet, knees and hips in the first years of life have a functional character, later on they get fixed (Fig. 2, 2a, 3). In the feet, we more often observe equinovalgus deformity than equinovarus deformity (Fig. 1).

In mild forms only spastic contractures of some isolated muscle groups occur, e.g. of feet pronators, hip abductors or flexors and knee flexors. From the orthopaedic point of view pareses and contractures can be divided into two groups:

1. when paresis is observed only in limbs (the prognosis of standing and walking is good)
2. when paresis is observed both in limbs and trunk (the prognosis of standing and walking is poor).

GENERAL PRINCIPLES OF TREATMENT

In babyhood general stimulations are very important by a constant physical and psychological contact with mother and father (hugging, cuddling, stroking, touching, whispering, kissing and, of course, breast–feeding) (6). It is very important for a child to listen to music, especially to simple, easy and nice, quiet and peaceful: one cassette or two of the same music a week. Later, music becomes as necessary for the baby as 'air for the bird' or 'water for the fish'.

At the same time constant abduction of hips is very important. Constant keeping of the baby with legs apart on mother's trunk, using the Weickert's pillow, the Frejka's pillow or other splints and apparatus is necessary and fundamental (8). Starting in babyhood, mild redressions of hips, knees and feet should be performed to prevent contractures. This should be done by the parents themselves.

We do not observe any positive elements of the Vojta's therapy. In our opinion, it is valuable only in diagnostics. We support and apply NDT Bobath's methods in newborns and babies with c.p. Analysing rehabilitation methods we think that their low therapeutic value is additionally destroyed by stress, tension and fear during the exercise. These methods may bring results in very mild forms of cerebral palsy (10% of cases). They can be performed, but they do not help in very serious cases (10%). In our opinion they have no therapeutic effects in the remaining 80% of cases, either.

Our complex therapy including special care, full of love, and physical and psychological contact, is called 'the second pregnancy' or 'the external pregnancy' (the term introduced by T. Karski in 1994) (6), which means that similarly to the real pregnancy, when a baby is inside its mother, it should be in its mother's or father's arms for the following 12 months! During the 'second pregnancy' special attention should be paid to proper development of hips because they are '*locus minoris resistentiae*' especially for childrem with c.p. (6). Even if sonography or X–ray examinations of babies and children inform about the proper anatomy of hips they require a prolonged abduction treatment, use of orthopaedic splints and constant observation, including the radiological one.

Active motivated strengthening of extensors without the release of a contracture of flexors is ineffective. Unfortunately, such idea of therapy is commonly applied by Polish rehabilitation doctors.

Nowadays, there exists an opinion among Polish rehabilitation doctors and in some magazines and on TV about 'advantages' of carrying babies face ahead without abduction of hips. In our opinion it is very harmful and it will lead to secondary dysplasia or dislocation of the hip joint (Fig 5, 6).

REDRESSIONS RECOMMENDED IN LUBLIN AND THE WAY THEY ARE PERFORMED

Redressions (stretching) should be performed already in babyhood and early childhood and their intensity should be higher in the period of growth acceleration. Redressions should be performed by parents, every day, with patience by application of evident, sometimes large power but in a gentle way. We do not agree with beliefs of some neurologists and rehabilitation doctors that active exercises are sufficient to overcome contractures. The expectations that motivation itself will release power in the child's mind to overcome contractures are deceiving.

In our clinic we treat children with c.p. in another way and we have good results, therefore we admit children to our Department not only from our region (74%)

but from all over Poland (26%). Unfortunately, many children are admitted too late, often in the stage of fixed structural contractures and with dislocated hips.

Among many futile and improper recommendations there is a suggestion to delay standing and walking in order to 'realise earlier physiological stages of baby's development' i.e. creeping, crawling and kneeling. It is a mistake of rehabilitation and neurology conception to force 4–6–year–olds to crawl, when they want to stand and walk. Besides, crawling fixes flexion contractures of hips, knees and equinovarus deformations of feet (Fig. 4).

Among 5–6–year–old and older children coming to our Department we observe full deformities of hips, sometimes with luxations or with subluxations or secondary dysplasia of acetabulum (Fig. 5). If contractures are big and do not surrender to redressions, children are qualified to operations. The qualification must be careful, checked, verified by repeated examination and the operation must be well planned. The child must be diagnosed in a few stages and verified by each following examination – during standing, walking, in a lying position and on the operation table after anaestesia but before the operation.

THE SURGERY

The operations conducted in our Clinic aim at removal of contractures usually in three joints of each limb in 'one–stage operation', i.e. in hips, knees and feet. The operations are conducted in a complex way during one anaestesia. The release of a contracture e.g. of flexor muscles automatically 'strengthens' extensors and decreases spasticity even in distant groups of muscles.

After the operation we apply immobilization for 5 weeks (Fig. 6). The whole treatment is defined as the RAO method (Redressions, Apparatus, Operations)*.

TYPES OF OPERATIONS

a) In treatment of equinus deformity we perform operations according to Vulpius, Streyer and Baker methods, while lengthening of the Achilles tendon is performed only in hemipareses. Excessive and inconsiderate lengthening of the Achilles tendon is a very serious complication leading to overcorrection!

b) The best operation to release knee contracture is a procedure according to Thom (15), which has been performed by us for 25 years (7). This method con-

* RAO method – Redressions–Apparatus–Operations (the name was introduced by T. Karski, 1993.

sists in lengthening of *m. semitendinosus*, *M–semimembranosus*, *m. biceps femoris* and sometimes *m. gracillis*. Both heads of *m. gastrocnemius* are desinserted and later the medial head is connected to the tendon of *m. semimembranosus*, while the lateral head of *m. gastrocnemius* to the tendon of *m. biceps femoris*.

c) The tenotomy of adductors is often performed to improve hip stability. After the operation children are provided with plaster casts in correcting positions for 4 – 5 weeks. We use apparatus and splints for the next month.

d) In children walking with their feet directed inside the transposition of *m. semitendinosus* on *m. biceps femoris* is performed and a plaster of Paris in the out rotation is applied for 5 weeks. After this operation walking becomes elegant, proper and nice.

e) In upper limbs we release flexor contractures of wrists and fingers by the disinsertion of flexors from medial epicondylus. We often perform the transposition of flexor *carpi ulnaris* on extensor *carpi radialis*. The whole treatment by the RAO method should be continued up to 15th year of age.

CONCLUSIONS

1. The threat of occurrence of c.p. should be diagnosed in newborns and babies. The final diagnosis can be made later on.

2. The early treatment consists of stimulations (so–called 'second pregnancy', breast–feeding, music, bathing in warm water) as well as treatment of hips and their constant protection against dislocation.

3. In older children the best method of treatment is coordinated redressions, apparatus and sometimes operations (the RAO method).

4. Children over 1 year of age can stand and walk if the hips are normal. It is a big mistake to force 3–4–5–year–old babies to crawl.

5. If there are fixed contractures of hips, knees or feet, operations are necessary.

6. Hips should be examined precisely with constant application of abductor splints and every 6–12 months X–ray examination should be made.

7. The complex treatment should be continued up to 17th year of age; with auxiliary balneo–, hydro–, thermo– and kinesitherapy. Apparatus should be constantly used, especially in children till the age of 10–12 years.

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STRESZCZENIE

W Klinice Ortopedii Dziecięcej średnio rocznie leczymy do 25% dzieci z mózgowym porażeniem. Pacjenci są leczeni według metody RAO, która w opinii Zespołu Kliniki i na podstawie wieloletnich obserwacji jest jedynym efektywnym sposobem terapii. Stosowanie takich metod rehabilitacyjnych, jak: NDT Bobath, Petö według nas ma tylko znaczenie uzupełniające. Efektyw-

Fig. 1

Fig. 2

Fig. 6

ność terapii dzieci z mózgowym porażeniem zależy od ciężkości choroby, ewentualnego współistnienia zaburzeń towarzyszących i od stopnia usunięcia przykurczów, a także skuteczności leczenia aparatowego i redresyjnego po zabiegu.

W pracy autorzy podają typy deformacji, zasady leczenia, które powinno być rozpoczęte już w okresie noworodkowym i niemowlęcym. Przedstawiono także metody operacyjne, zasady stosowania aparatów ortopedycznych i redresji.

EXPLANATION TO FIGURES

Fig. 1. Kamila M., No 861222. Cerebral palsy. Sufficient stabilisation of the legs and trunk. Flat and valgus feet deformities. The child can stand and walk only with the help of her mother.

Fig. 2. 2a. Kamila M., No 861222. Ely's test shows the contractures of *mm. recti* (*mm. quadriceps*). Up leveling of the pelvis during the rapidy flexion of the knees.

Fig. 3. Kamila M., No 861222. Holt's test shows flexion contractures of the knees.

Fig. 4. Kamila M., No 861222. Crawling fixed contractures of the knees and equines deformities.

Fig. 5. Dorota K., No 780409. Mistreatment and rehabilitation during the 12 years. High luxation of the left hip. At this age no possibility for hip reconstruction.

Fig. 6. Kasia Ś., No 871203. After the reconstruction of both luxations hips. Now in plaster of Paris. Seven weeks after the second operation.