

Treatment of Irreducible Hip Dislocations in under 6 Months Old Newborns with the Developmental Dysplasia

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Abstract Developing dysplasia of hip joint (DDHJ) is one of frequent orthopaedic pathologies of childhood. According to various data the frequency is from 4 to 7 per 1000 alive-born babies, but it is difficult to calculate the real frequency of the pathology. research was to study methods of therapy for HFB dislocation in infants under The objective of this research was also detection of certain types characterized by increased risk of development of non-satisfactory results in the patients of that group.

Keywords Dysplasia, New born babies, Treatment

1. Introduction

Developmental dysplasia of the hip (DDH) is one of frequent orthopaedic pathologies of childhood. According to various data the frequency is from 4 to 7 per 1000 alive-born babies, but it is difficult to calculate the real frequency of the pathology [2]. Severity degree of DDH varies from mild instability to development of complete dislocation of the femoral head. The Pavlik harness is one of the most commonly used orthopaedic devices for conservative management of DDH, with success rates of 95% to 100% reported for treatment of hip instability [1,2]. But these indicators correspond to their use in mild degrees of instability which developing in DDH. However, infants with hip dislocation, despite the treatment, do not have such reliable results [3-7]. In clinical examination of these patients reducibility or even irreducibility of femoral head to acetabulum is defined. There are certain problems in the treatment of irreducible hip; so when Pavlik harness is used, the level of poor results is from 37 to 100% [3-7]. Unsuccessful results obtained by application of Pavlik harness are eliminated by means of closed or open reduction of femoral head.

A variety of indicators of frequency, methods of diagnostics and results of treatment of DDH which are described in references shows lack of the standardized screening and medical protocols at treatment of this disease. This variety also arises owing to widely range of the

congenital deformation developing at DDH. The researches conducted earlier had single center character which often consisted of the retrospective analysis. About it, we conducted a multicenter prospective research of children regarding detection of dislocation of femoral head.

The main purpose of our study was to study methods of treatment of irreducible dislocation of the hip in infants below 6 years of age. The aim of this study was also to identify certain types of patients at increased risk of developing unsatisfactory treatment results for this cohort.

2. Materials and Methods

The research included babies aged up to 6 months with a negative symptom of Ortolani at which the irreducible hip was radiologically confirmed. Irreducibility of the hip revealed by ultrasonic scanning of femoral head at which the unsuccessful attempt of its reposition was carried out to acetabulum and also by X-ray analysis on which high dislocation of the hip was diagnosed. All cases of teratological dislocation of the hip were excluded from this research. The minimum follow-up period was 20 months.

Results of the treatment mostly depended on the age of patient, degree of lateroposition of femoral head, sex, type of treatment and condition of the opposite hip joint. The data were processed with the help of Excel software.

During the period from January of 2017 to December 2018 were 412 hips in 327 children. From them in 78 hips of 69 patients were confirmed as irreducible clinically and on rentgenologically. 17 patients were excluded from research due to insufficient term of observation period. Thus, the study involved 59 hip joints in 52 patients (41 girls, 11 boys). Average age was 1.9 months (from 0.1 to 5.9 months). 33 of them were unilateral left, 12 unilateral right and 7 patients had bilateral pathology, 40 hips was left and 19 right side.

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The radiological research of hip condition in 56 cases was estimated by ultrasonography where revealed reduction of cover degree of femoral head of less than 10% and also lack of improvement of this indicator was noted at the dynamic test. To 3 patients rentgenological examination was applied (the age was 3.7, 4.9, and 5.9 years). The hips of these patients corresponded to instability degree III/IV on IHDI scale and also there was a negative symptom of Ortolani.

At treatment of 40 patients (46 hips) initial method of treatment there was an application of Pavlik harness. In 2 patients (3 hips) application of the Pavlik harness was assigned after unsuccessful treatment in abduction splint. Results of treatment were analyzed depending on application of the Pavlik harness and alternative methods of treatment by separate groups.

Treatment without Pavlik harness application. Though in most cases as initial method of treatment the Pavlik harness was applied, but in 13 hips (12 patients) other alternative methods of treatment were applied. To 2 patients (3 hips) abduction splint was implied in the beginning of treatment and to 10 the closed or open reposition of femoral head. In all cases concentric reposition of femoral head was reached. Average age of installation of primary diagnosis of the operated patients was 4.0 months (from 1.4 to 5.9 months) whereas middle age during application of an operational method of treatment was 7.5 (from 3.2 to 11.7 months).

Treatment with Pavlik harness application. Totally in 48 hips (41 patients) at which including 1 patient in whom abduction splint was initially used, Pavlik harness were applied. All patients carried Pavlik harness constantly within day. All patient, at an interval of 2 weeks, were examined by ultrasonography to monitoring of a status of hips. From them 32 were the left and 16 right hips, including 7 patients with bilateral pathology. From 48 irreducible hips treated by Pavlik harness in 27 (56.3%) excellent results were achieved. Total time spent in Pavlik harness varied from 43 to 106 days. For the remaining 21 patients (48 hips, 43.7%) with nonsatisfactory results, such as no reduction of the hip, other therapeutic methods were applied. The age of patients with excellent results at the time of the initial diagnosis was averaged 1.2 months (0.1 to 4.0 months) and those with unsatisfactory results was averaged 1.6 months (0.1 to 4.0 months). From 32 irreducible left hips in 22 (68.8%) reduction had been achieved; conversely, this result was achieved in only 31.2% of the right irreducible hips (5 out of 16 hips). In 48.8% (20/41 patients) of cases, there were deviations in the development of the opposite joint, and 7 patients had bilateral irreducible hips. All of these 7 patients were treated with Pavlik harness. Reduction of both hips were achieved in only 2 patients, in 1 patient had only of left hip; in the remaining of the patients, reduction of the hip wasn't be achieved. To these 9 irreducible hips were used operative methods of treatment. In the 13 remaining patients there was a pathology of the opposite hips in the form of reducible dislocations (8 hips), subluxation (2 hips) and in 3 DDH. The minimal observation period was 20 months

(average 25.9 months; ranged from 20 to 58.0 months). At the end of this observation period, all hips were evaluated by rentgenography according to IHDI scale; 53 hips were classified as 1 and 6 as 2. A higher acetabular index (26°) was noted among the patients with nonsatisfactory results who had been treated with Pavlik harness.

3. Discussion

At the moment irreducible dislocations are the most severe form of DDH. The sparest treatment for these patients is application of Pavlik harness with compulsory continuous clinical and sonographic monitoring of hip development.

In case of conservative treatment of irreducible hip worse results were observed in the group of patients with right-side pathology; that is why the reason of that kind of result is questioned. In case of DDH, due to intra-uterine left-sided occipital predisposition, left side is mostly damaged. In that position left hip is adducted in relation to mother's sacral bone, and that potentially promotes development of dislocation there.

In our research the number of girls prevailed, and that corresponded to the data provided in references [2]. Some authors think that the treatment of DDH is more difficult in boys compared to girls [11], but that fact was not confirmed in our work.

According to some authors treatment of bilateral hip dislocation is more complex than that of unilateral pathology [3,6,12]. However, in our work we did not reveal statistically confirmed facts relevant to irreducible dislocations. Besides that, in case of unilateral irreducible dislocation the positive result was not affected by the condition of the opposite hip joint. Analysis of the results of treatment of bilateral and unilateral irreducible dislocations determined that the prevalence of successful reduction of Pavlik harness was higher in cases of unilateral pathology. Though due to the small number of the patients that difference was not significant.

In two out of 41 patients (5%) application of PH was cancelled due to the development of paresis of femoral nerve. In literature there are few references to the development of paresis of femoral nerve in hip dislocation; Murnaghan et al. [13] studied the prevalence of development of neurological complications in cases of severe forms of DDH. Presence of these complications was further taken into account in the process of treatment of patients with irreducible hip dislocations.

The average follow-up period for the examined patients was 2 years. Within that period none of the patients needed additional surgical intervention because of remaining dysplasia. It should be noted, that in four patients acetabular index was above 30° , but less than 40° . In the group of patients with irreducible hip dislocation who applied Pavlik harness, we noted significantly high acetabular index.

In the literature there are many references dedicated to the results of DDH treatment in Pavlik harness. Usually they

study patients with various stages of DDH. Irreducible dislocations were mentioned only in some of them listed in the introduction [3-6]. That is why there is past clinical precedent when due to incomplete understanding of the indications and mechanism of orthopaedic brace application patient rejects to use it. In brace hip is in more safe position with abduction and flexor, rarely in extensor. That was reliably demonstrated by Salter [16] in his studies on pigs. Later hip joint retardation in development can be observed. That fact is revealed in weekly ultra sound monitoring of hip development. Nonsatisfactory result is the reason for rejection to use Pavlik harness; it should be noted that that decision should be made within the first week of the treatment. Special decision to use Pavlik harness or other braces for the primary treatment of DDH should be made only in case of completely certain positive result of it, i.e. successful reduction and absence of any factors preventing reduction.

Among clinics and centers performing treatment of the pathology there are many disputable moments in the strategy of the therapy. These discrepancies make direct comparison more complicated. It is impossible to recommend something on the basis of the study of the results of these methods. Besides that, application of Pavlik harness is variable. It consists of estimation of its usage, term of usage, and presence of ultra sound and clinical monitoring important for the development of the final result of DDH treatment.

Thus, that research provided a possibility to analyze the choice of strategy for treatment of irreducible congenital hip dislocations. Nowadays it is rational to apply Pavlik harness for the next four months in cases of irreducible congenital dislocations in children under 6 months. As a result of the study we revealed that, often non-reducible and non-satisfactory outcomes of treatment in Pavlik harness were observed in right hip and the reason of these nonsatisfactory outcomes was high prevalence of avascular necrosis of femoral head development.

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