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New Method to Reduce Complications after Acute Osteomyelitis of Hip Joints in Children

Jamshid Azamatovich Shamsiev[1], Zafar Mamadjanovich Mahmudov[2]

[1]Head of the Department of the Faculty of Improvement of Doctors in Pediatric Surgery and Anesthesiology, Samarkand City, Uzbekistan
[2]Assistant of the Department of Pediatric Surgery of the Samarkand State Medical Institute, Samarkand City, Uzbekistan

Abstract Despite the achievements of modern surgery, traumatology and orthopedics, many issues of the treatment tactics of acute hematogenous osteomyelitis of the bones that form the hip joint (AHO BHJ) remain debatable. The aim of our work was to improve the results of treatment of acute hematogenous osteomyelitis of the hip joint in children by improving the surgical method. For this, we examined 134 patients treated in a 2-clinic of the Samarkand Medical Institute, which were divided into two groups according to the treatment methodology. In group 1, which was divided into two subgroups, traditional methods were used - Gunther's hip arthrotomy and the use of the Ilizarov apparatus for immobilization. In the 2nd group, the original method of draining osteoperforations of the acetabular roof (DOAR) was applied.

Keywords Acute hematogeous osteomyelitis of the bones of the hip joint, Surgical treatment, Arthrotomy of the hip joint, Ilizarov apparatus, Draining osteoperforation of the acetabular roof

1. Actuality

According to the World Health Organization, "among acute surgical pathology of childhood, acute hematogenous osteomyelitis is 2.2-10%, and among purulent-septic infections - from 12.5% to 47%" [1]. Due to severe purulent-necrotic lesion of bone tissue "in the long term after treatment in about 15-54% of cases, various kinds of orthopedic disorders are observed (ankyloses, false joints, shortening and deformation of the osteoarticular system), leading to disability" [2,3-5,10]. Despite the achievements of modern surgery, traumatology and orthopedics, many issues of the treatment tactics of acute hematogenous osteomyelitis of the bones that form the hip joint (AHO BHJ) remain debatable. To date, most authors are convinced that in the surgical treatment of AHO BHJ, efforts should primarily be aimed at sanitizing the purulent focus and thorough immobilization of the affected limb [6-9]. It remains an important issue to improve the surgical treatment of AHO BHJ in this patient population by introducing new original techniques.

2. Aim of the Research

Improving the results of treatment of AHO BHJ in children through the use of a new surgical method.

3. Research Materials

To achieve this goal, we examined and treated 134 children with AHO BHJ, aged 6 to 16 years, who were hospitalized in the purulent surgery department of the 2 clinic of the Samarkand State Medical Institute from 1991 to 2018. Mostly boys 96 (71.6%) predominated, which is associated with their active lifestyle, the share of girls was 28.4% (38 patients).

By the type of surgical procedures performed, the patients were divided into two clinical groups. The **first group** consisted of 53 (39.6%) children conditionally divided into two groups. **1a**, a group of 33 children from 1991 to 2000 who received conventional surgical treatment after a hip joint puncture (Fig. 1a) and if they received a purulent exudate, then went on to produce arthrotomy of the hip joint according to Gunther (front access) (Fig. 1b). Group **1b**, to 20 patients from 2000-2003, in the light of the achievement of modern medicine, the next step to prevent orthopedic complications in patients with AHO BHJ, after arthrotomy, the area of the hip joint was fixed using the original technique using the Ilizarov apparatus instead of skeletal traction and immobilization of coxite plaster cast (Fig. 1c).

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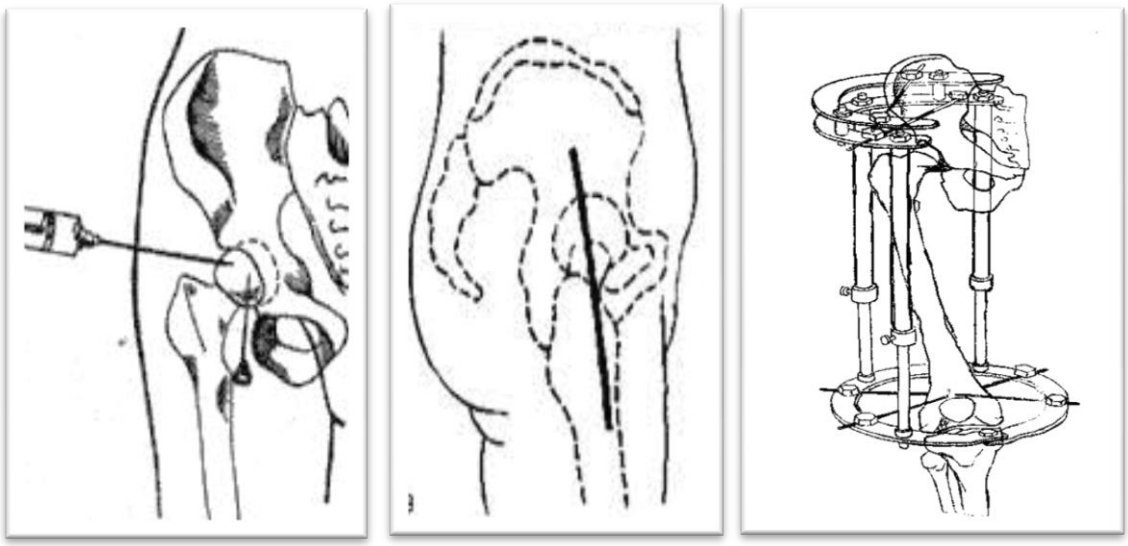

a b c

Figure 1. Hip puncture (a), Gunther access (b) and extrafocal distraction osteosynthesis by Ilizarov apparatus (schemes)

The **second group** consisted of 81 (60.4%) children who had an autopsy performed by the method of draining osteoperforation of the acetabular roof (DOAR) that we developed (patent for the invention of the Republic of Uzbekistan No. IAP 03082 "Method for the surgical treatment of acute hematogenous osteomyelitis of the bones of the hip joint") (Fig. 2).

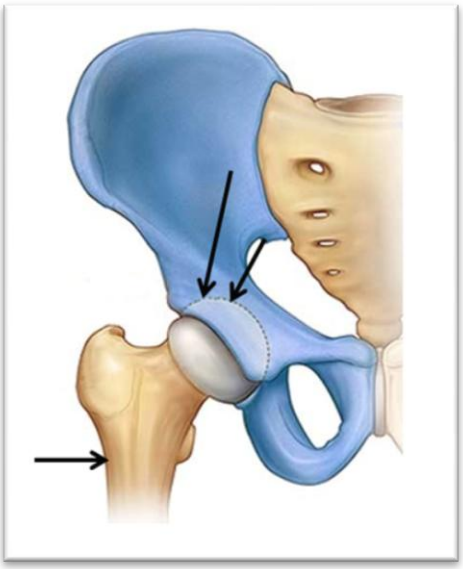

Figure 2. Draining osteoperforation of the acetabular roof (schemes)

The possibility of implementing the proposed method of treatment was justified by several points:

- drainage and sanitation of the purulent lesion in the hip joint is achieved by access through the iliac fossa - medial access, aimed at minimizing the degree of injury to the massive muscle layer of the surrounding hip joint, ligamentous apparatus and its capsule, ensuring adequate drainage and sanitation of the lesion, preventing the spread of the purulent process outside the joint.

4. Results

The analysis of the clinical course showed that the application of the proposed methods of surgical treatment of AHO BHJ allowed to significantly reduce the duration of the period of hyperthermia from 9.36±0.88 to 3.57±0.18 and the length of hospital stay from 43.18±2.96 up to 22.89±0.66 bed days in group 2. Moreover, children from this group were discharged for outpatient treatment without a plaster immobilizing dressing, with completely healed wounds.

Table 1. The incidence of complications in children with AHO BHJ depending on the methods of surgical treatment

Complications	Firstgroup, n=53				Secondgroup, n=81	
	1a, n=33		1b, n=20			
	абс	%	абс	%	абс	%
Pneumonia	22	66,7	14	70,0	32	39,5
purulent foci in the soft tissues	14	42,4	3	15,0	2	2,5
metastasestootherbones	5	15,1	1	5,0	2	2,5
Pressuresores	9	27,3	4	20,0	-	-
Pathologicalfracture, dislocation	6	18,2	11	55	-	-
Mortality	3	9,1	-	-	-	-

In group 1a, the use of traditional methods of treatment with the use of Kirschner spokes in some patients led to suppuration of wounds around the spokes, due to the fact that pus accumulated in the hip joint was drained outward along the spokes. The latter did not heal for a long time with the formation of subsequent fistulas. There were also purulent sagging in the soft tissues with the formation of phlegmon, pathological fractures of the femoral neck with a dislocation, despite fixation with Kirschner spokes. In these patients, the course of the main process was more protracted, as evidenced by the relatively long period of fever. The

percentage of complications associated with the function of external respiration (66.7%), the formation of purulent foci in the soft tissues (42.4%), metastases to other bones (15.1%), and pressure sores (27.3%) was also relatively high. In addition, we observed pathological fractures and dislocations during treatment (18.2%). Only in this group there were deaths, which amounted to 9.1% (the causes of mortality were: late admission of patients to the hospital with respiratory complications already and ineffective sanitation of the purulent focus, which aggravated the intoxication of the body and rendered the treatment unproductive).

Particular attention should be paid to complications associated with the function of external respiration, which were characterized by severity and a direct threat to the life of patients. When the Ilizarov apparatus was immobilized, the percentage of these complications was lower than the corresponding values compared with the first group of patients by 10.6%.

In patients with DOAR, the percentage of early postoperative complications was also reduced. Complications associated with the function of external respiration (39.2%), the formation of purulent foci in the soft tissues, metastases to other bones (2.5%), pressure sores, pathological fractures with dislocations and mortality in the treatment process were not observed.

5. Distant Results

Of 134 patients with AHO BHJ, long-term treatment results were studied in 104 (77.6%) patients in the period from 1 year to 25 years after discharge from the hospital. Including in 45 (84.9%) patients of the first group (1a group of 26 patients and 1b group of 19 patients), and in 59 (72.8%%) of the second group. The outcomes of treatment of AHO BHJ were traced in terms of 1-2 years in 5.8%, 3-5 years in 9.6%, 6-15 years in 38.5% and 16 years and above in 46.1% of patients.

The following parameters served as criteria for evaluating the results of treatment of AHO BHJ: the patient's presence or absence of complaints, examination data, the presence or absence of orthopedic complications (shortening of the lower limb, hip ankylosis, fracture of the femoral neck and pathological dislocation, pelvic deformity), state of limb function. The transition to a chronic form of the disease (the presence of pain, fistula, relapse, etc.) and the clinical and radiological restoration of the bone structure of the affected bones were taken into account.

As can be seen from table 2, the comparative analysis showed that the greatest number of complications in the long term after discharge of patients from the hospital was noted in the 1st group, where ankylosis of the hip joint was observed in 62.2% of patients. In the 2nd group, where DOAR was used as a surgical treatment, the percentage of ankylosis was 12 times lower than in the 1st group and amounted to 5%. The same trend was characteristic when comparing other complications: Tight mobility in the hip joint in the 1st group - 26.7%, in the 2nd - 18.6%,; shortening of the affected limb in the 1st group –91.1%, in the 2nd –28.8%, i.e. 3.16 times less likely; pelvic deformity in the 1st group - 55.5%, in the 2nd - 5.1%, i.e. 10 times less often; transition to the chronic form in the 1st group - 31.1%, in the 2nd group - was not detected.

Table 2. Characterization of complications in the long-term period after treatment of AHO BHJ in children, depending on the method of treatment

Complications	1 group (n=45)	2 group (n=59)	Total (n=104)
Ankylosis	28 (62,2%)	3 (5,1%)	31
Tightmobility	12 (26,7%)	11(18,6%)	23
Limbshortening	41(91,1%)	17(28.8%)	58
pelvicdeformity	25 (55,5%)	3(5,1%)	28
transition to a chronic form	14 (31,1%)	-	14

Note: some patients had 2-3 complications at a time.

6. Conclusions

The method of draining osteoperforation of the acetabular roof in the treatment of acute hematogenous osteomyelitis of the bones of the hip joint in children, aimed at minimizing the degree of trauma to the massive muscle layer of the surrounding hip joint, ligamentous apparatus and its capsule, providing adequate drainage and sanitation of the lesion, preventing the spread of g as a result, the duration of the patient's hospital stay decreases from 42 to 23days, mortality from 9.1% to 0%, and validation in remote periods.

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