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Research Article

FUNCTIONAL OUTCOME OF OPEN RELOCATION OF CONGENITAL DISLOCATED KNEE WITH AND WITHOUT DISTAL ARTHROGRYPOSIS

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Abstract:

Aim: To evaluate the functional outcome of surgical displacement of a congenital knee dislocation with or without arthrogyrosis in the 6-month age group.

Methods: This Descriptive study conducted at Orthopedics Department in the Bolan Medical Complex Quetta. Group A includes patients with type III congenital dislocation of the knee (total dislocation), isolated dislocation of the knee joint for more than 6 months, dislocation of the hip and knee and clubfoot. People with paralysis disorders and unable to sit due to weakened muscle function were excluded from the study. Open reduction of the knee joint with a midline dorsal incision and plasty of the quadriceps V-Y quadriceps. Displaced knees were stabilized with the Plaster of Paris at 70 ° knee flexion for 5-6 weeks using the Ferris and Aichron defined knee function scoring system.

Results: In group B, 6 patients (12 knees) had recurrent stiffness with poor results, 5 patients (10 knees) had moderate and no good or excellent. Results in group A (knee dislocation with or without dislocation of the hip and clubfoot) were good or excellent in 22 patients (36 knees), moderate in 4 patients (7 knees) and severe with relapse of stiffness in 1 patient (7 knees).

Conclusions: The results of the surgery were excellent in isolated congenital knee dislocations and satisfactory in knee dislocations caused by clubfoot and hip dislocations. The outcome was less promising for arthrogyrosis (amyoplasia) and older walking age groups.

Key words: arthrogyrosis, congenital, dislocation, isolated, knee.

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INTRODUCTION:

In infants born with congenital knee dislocation (CDK) before 3 months of age and in patients over 6 months of age, the recommended treatment, which often requires percutaneous quadriceps tenotomy, is serial manipulation and casting¹⁻². However, manipulative treatment is generally not recommended after 6 months of age. In the advanced age group and in refractory cases, such as dislocations in Multiplex Congenita (AMC) arthrogyposis, vigorous handling leads to the risk of high-pressure skin necrosis and epiphyseal detachment³⁻⁴. In these cases, CDK surgical reduction is the only way to achieve optimal results. However, to avoid flattening of the femoral condyles and the consequent poor surgical results, surgical displacement of the CDKs should be performed at least prior to starting walking. Patients with multiple deformities and syndromes are the most resistant to treatment. They often require multiple secondary treatments and prolonged immobilization in dressings / braces, thus reducing the functional state of the limb⁵⁻⁶. Therefore, the aim of this study was to evaluate the functional outcomes of relocation surgery for a congenital knee dislocation with or without arthrogyposis in our setting. Develop strategies for the future aspects of these two conditions to prevent adult disability.

METHODS:

This Descriptive study was conducted at Orthopedics Department in the Bolan Medical Complex Quetta. Non-probability purposive sampling technique was used for selection criteria of the patients of either sex, and age group over 6 months age to 5 years. Group A included patients with isolated congenital dislocation of the knee (CDK) Grade III (total dislocation), Talipes Equino Varus (TEV) and / or CDK grade III associated with Developmental Dysplastic Hip (DDH) and without significant arthrogyptotic contractures. Patients with CDK as a part of AMC were included as group B. Patients with paralysis disorders, hypermobility syndrome, CDK type I (subluxation) and CDK type II (partial dislocation in which the knee can fully extend the range of deformation at 15-degree hyperextension) and arthrogyptotic patients with poor muscle function and an inability to stand up were excluded from the study. Patients were enrolled in the study after obtaining written informed consent, parental advice and

approval from the Institutional Review Board. Surgical treatment included open knee reduction with V-Y quadriceps plasty. In patients with DDH, TEV and associated vertical stroke (VT), TEV and VT were operated with CDK in the same position. Duration; DDH was eventually replaced by surgery 6-12 months after CDK, TEV or VT correction. CDK surgery included a midline incision from the tibial tuberosity to the mid-thigh. The quadriceps aponeurosis was separated from the muscles with an inverted V-incision, and the large medial and lateral muscles were carefully mobilized from the neurovascular bundles on both sides. Medial and lateral preparation was performed to restore the forward displaced hamstrings to their original position behind the knee flexion axis.

Supra-patellar transverse arthrotomy made, knee flexed to over 120 degree to visualize anterior cruciate. In some older patients with severe valgus deformity of the knee, the iliotibial band has been released, keeping it insertion to the Gerdy's lump. After hemostasis was achieved, a V-Y quadriceps plasty suture was performed with a bend of 50 degrees. The displaced knees were stabilized with a Plaster of Paris dressing applied at a knee flexion of 70 ° for 5-6 weeks, followed by a gentle mobilization exercise to achieve full flexion and extension and quadriceps strength. The load was allowed for 8-12 weeks after surgery, when optimal strength and full range of motion were achieved. Knee X-rays were taken before and after knee reduction, every three months for the first year of follow-up, and then annually. The pre-designed form was used to record demographics, clinical outcomes, procedures performed for each patient, and the results were recorded on a pre-designed form at each visit. Clinico-radiological evaluation was performed on the basis of the available forms, clinical pictures and radiograph results with a minimum follow-up period of one year. The knee function scoring system defined by Ferris and Aichroth, modified by Alock and Tarek Hassan Abdelaziz, as indicated in Table 1, was used to evaluate the results at the final follow-up. Mild / Disgusting depends on whether it is affecting activities of daily living or not. All four criteria must be met to be eligible for a specific grade. If any of the criteria is not met, the score will be reduced by that criterion.

Table 1: Modified, Knee function scoring system

Grade	Flexion (range)	Extension (power)	Instability	Pain
Excellent	Full	G5	Nil	Nil
Good	>90 ⁰	>G3	Mild	Mild
Fair	45-90 ⁰	G2	Mild	Mild
Poor	<45 ⁰	<G2	Gross	Sever

RESULTS:

Of the 66 patients with congenital knee dislocation, 15 had an isolated knee dislocation and 12 had a TEV-related knee dislocation of the DD hand without arthrogryptic contracture. 11 dislocated knees were part of arthrogryposis, two had Larsen's syndrome. Patients with unilateral dislocation had grade 1 or 2 CDKs on the other side, correctable subluxation, were stable in dilatation, and did not require surgery. The age range of the patients at the time of surgery was 6 months to 4 years (Table 2).

Table 2: Deformity by age and laterality

Deformity	No. of Patients	6-12 months age		13-24 months age		25-36 months age		>36 months age			
		UL	BL	UL	BL	UL	BL	UL	BL		
CDK	n=15	7	8	6	8	1	0	0	0	0	0
CDK+CDH	n=4	0	4	0	2	0	2	0	0	0	0
CDK+TEV	n=4	2	2	0	2	1	0	0	0	0	0
CDK+CDH+TEV	n=4	1	3	1	2	0	1	0	0	0	0
AMC:CDK, CDH+TEV	n=6	0	6	0	2	0		0	2	0	2
AMC:CDK, CDH+VT:	n=1	0	1	0	0	0	1	0	0	0	0
AMC:CDK:VT	n=4	0	4	0	0	0	1	1	1	0	2
Total	n=38	10	28	7	16	2	5	1	3	0	4

In group B (patients with arthrogryptic) recurrent stiffness was observed in 6 patients (12 knees) with poor results, moderate in 5 patients (10 knees) and no good or excellent results. Comparably in group A (knee dislocations with or without hip dislocations and clubfoot) the results were good or excellent in 22 patients (36 knees), moderate in 4 patients (7 knees) and weak (1 patient) with recurrence of severe stiffness in 1 patient. knee). The poor result in the patient with isolated knee dislocation resulted from failure to follow the instructions for continuous mobilization exercises after plaster removal (Table 3).

Table 3: Outcome of Open Relocation of CDK

Deformity		No. of Patients		Laterality	Outcome			
		UL	BL		Excel	Good	Fair	Poor
CDK	n=15	7	8	UL	3	2	1	1
				BL	4	2	2	0
CDK+CDH	n=4	0	4	UL	0	0	0	0
				BL	2	1	1	1
CDK+TEV	n=4	2	2	UL	2	0	0	0
				BL	2	0	0	0
CDK+CDH+TEV	n=4	1	3	UL	0	1	0	0
				BL	1	2	0	0
AMC:CDK, CDH+TEV	n=6	0	6	UL	0	0	0	0
				BL	0	0	3	3
AMC:CDK, CDH+VT:	n=1	0	1	UL	0	0	0	0
				BL	0	0	1	0
AMC:CDK:VT	n=4	0	4	UL	0	0	0	0
				BL	0	0	1	3
Total	n=38	10	28	UL	5	3	1	1
				BL	9	5	8	6

Successful patients were able to walk with support, squat with support, had some degree of valgus but no instability, and had a 30-degree extension latency. In addition, patients with good CDK surgery who were operated on for DDH and related TEV had a good range of motion, negligible extension retardation, no valgus or instability, and could easily squat and walk on their own. Duration; Patients with excellent isolated CDK scores with or without surgery for DDH and related TEV were normal in all evaluation parameters. They were painless and enjoyed a normal life like the other children. Skin detachment around the incision occurred in two patients (3 knees) with AMC; one needed a skin graft, the other only needed a few dressings and an antibiotic sleeve. Whereas patients with poor and moderate outcomes have significant quadriceps atrophy; patients with good results regained good quadriceps mass.

DISCUSSION:

Two types of congenital contractures have been described; one is isolated and the other is multiple contractures, commonly known as Multiplex

Congenita Arthritis (AMC)⁷⁻⁸. Among isolated contractures, isolated congenital dislocation of the knee is the rarest. The reported prevalence of isolated CDK within AMC is 1: 3,000 live births. Overall, CDKs show a strong family association with genetic abnormalities (trisomy) significantly influenced by mechanical and environmental factors^{5,10}; It includes reduced fetal movement and uterine congestion⁹⁻¹⁰. However, the major factors of isolated CKD are traumatic mechanical dislocation and primary contracture of the quadriceps at birth and, to some extent, genetic abnormalities. Clinically radiologically, the three degrees of CDK are defined according to its severity. In stage III, a total dislocation occurs, the tibia is displaced in front of the long axis of the femur and there is no articular contact¹¹⁻¹². X-ray in the side view shows a strongly posterior tibial plateau up to 35 ° (normal adult 10 °) and X-ray intercondylar projection, significantly reduced intercondylar notch height, femoral condyles rounded than normal, elliptical with horizontal diameter greater than vertical diameter as you can see. Grade III is the least common (20%). The 2nd

degree knee has a subluxation, the longitudinal contact between the tibia and the femur is at least partially preserved. The knee is overstretched at a 45-degree angle, but can be passively bent to a neutral position. Grade II is a less common deformity (30%). In degree I, there is a longitudinal hyperextension deformity, while the joint can bend passively up to 45-90 degrees. Grade I is the most common (50%). Another procedure proposed by Tachdjian was the fractional extension of the hamstrings in CDK stage III to overcome the development of extensor lags. We haven't tested this strategy in our cases yet. Persistent valgus knee valgus, residual / recurrent contracture, and limited function requiring assistance with daily activities were common behaviors in our CDK cases with AMC¹³⁻¹⁴. Thus, for these cases, AMC Michael Bamshad et al. Identify the goal of initial therapy as joint activation, better position and function, and the long-term goal of greater joint mobility, muscle strength, and model development¹⁵⁻¹⁶. It allows independence in walking and carrying out daily activities, with or without help, in adulthood. As with Alock, the results in Table 3 in this study reflect excellent or good results in the isolated CDC and younger age group compared to good / moderate results in DDH and TEV-related CDKs and poor results in AMC-related CDKs¹⁵⁻¹⁶. Residual flexion deformity and extensor retardation were common in patients with the syndrome (AMC), but significantly less in patients with isolated and non-syndromic CDK. Shortened hamstrings and gastrocnemius muscles associated with CDK and clubfoot, respectively, in CDK were identified as the main dynamic factors that inhibit quadriceps strength development, extensor retardation, and muscle retardation in syndromes. Ooishi et al. discuss in more detail on a scientific basis that a good hip position cannot be maintained when the knee is not bent sufficiently because hamstrings are constantly tense when the knee is dislocated and the femoral head is tucked up¹⁷⁻¹⁸. Therefore, we followed the recommendations of Alok, Ooishi, Abdelaziz, and Roth to correct CKD deformation 4-6 months prior to DDH displacement¹⁹⁻²⁰.

CONCLUSION:

Therefore, good functioning of CDK is significantly correlated with age at treatment initiation, coexisting deformities or syndrome. The results of the surgery were excellent in isolated congenital knee dislocations and satisfactory in dislocated knees associated with clubfoot and dislocated hips in non-arthrogryptic patients. The result was less promising in arthrogryposis (amyoplasia) and in the older age groups. The mobilization of hamstrings to natural position behind axis of the knee and post-surgical

care with continuous mobilization and quadriceps strengthening exercises over the long duration was the mainstay of treatment. Open relocation earlier than walking age leads to best results without residual genu valgus.

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