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Congenital Dislocation of the Knee

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Summary: Congenital dislocations of the knee (CDK) are rare, occurring 40–80 times more rarely than congenital dislocation of the hip (CDH). In a multicentric study of the European Paediatric Orthopaedic Society, 56 cases of CDK were found in 46 babies. Many other malformations associated with CDK were noticed, and muscular abnormality was always found at the knee. According to the classification of Leveuf, three grades have to be considered: grade 3, or complete dislocation, was the most frequent. At birth, treatment consisted of physiotherapy with rigid splint. Twenty-four patients with CDK have been treated only by the conservative technique. Operations were performed according to the abnormalities of the extensor apparatus: a progressive release and lengthening of the quadricipital tendon was necessary in all cases. In all forms of treatment, the range of the knee flexion was 120°. Only two children had a bad result because of unstable knees. Results were always better with conservative treatment. **Key Words:** Congenital dislocation of the knee—Conservative treatment—Leveuf classification.

Since 1822, when Chatelain reported the first case of congenital dislocation of the knee (CDK), few series have been published. For this reason, we carried out a multicentric study within the European Paediatric Orthopaedic Society. We have excluded the dislocation that can occur in such general diseases as Ehlers–Danlos syndrome, Larsen's syndrome, or arthrogryposis.

MATERIAL AND METHODS

Forty-six patients from nine paediatric orthopaedic departments were studied. There were 56 cases of CDK since 10 children (21%) had bilateral dislocations. There were 26 girls and 20 boys. Follow-up was from 1 to 18 years (average of 8 years 7 months).

A combination of orthopedic and visceral malformations is usually the first indication of this disease. These abnormalities usually occur in the lower limbs, localized at the hips or the feet. There were 48 hip dislocations (or severe dysplasias) and 30 club feet. Craniofacial malformations of the palate, hips, or maxillary bone and some ocular troubles also occurred. Some of the 46 patients also had abnormalities of the hands, the spine, the urogenital sphere, and the bowels. Four children had a major neurologic syndrome and one had a severe heart malformation.

CDK is easy to diagnose if it occurs at birth. An irreducible genu recurvatum is the signature of the anterior dislocation of the tibia. In more than one case out of three, we noticed a rotatory dislocation with a fixed lateral rotation of the leg. Palpation sometimes reveals abnormalities of the muscles at birth; it did so in 8 of 14 patients in the Bensahel series. The quadriceps muscle and the lateral part of the knee's extensor structure are tight and contracted. When one tries simultaneously to reduce spontaneous position in abduction of the hip and the genu recurvatum, it creates tension in the gluteus medius and the tensor of the fascia lata. The patella seems to be laterally attracted during this maneuver. It is very small, but is in a high position. The study of the reducibility ratio of the deviation must be done during the first clinical evaluation for it to have a true prognostic value. Indeed, severe deviations that have a relatively good mobility have a better prospect than some mild genu recurvatums that are fixed and irreducible.

The radiographic evaluation includes anteroposterior and lateral views, the latter in flexion and

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extreme extension. Radiographs confirm the irreducibility of the anterior dislocation. Rotatory dislocation is evaluated since it is impossible to obtain one radiographic view of both the femur and tibia. Often, comparative radiographs show a delay in the development process of the ossified epiphysis of the femur or tibia.

Arthrography was not systematically pursued. It can be of value if it shows some flattening of the inferior part of the femoral condyle. The lack of the suprapatellar pouch would be a bad prognosis, but we have never observed this sign in our series.

Clinical and radiographic evaluation caused us to classify CDK into three groups according to the degree of the joint displacement (Leveuf's classification) (6,10) and the severity of the disease (Fig. 1): group I: severe genu recurvatum, 6 cases; group II: subluxation, 21 cases (Fig. 2); and group III: complete dislocation, 29 cases (Fig. 3).

TREATMENT

Physiotherapy

All cases of CDK were treated at birth with physiotherapy by progressive manipulations combined with rigid splints. The splints are regularly modified, as the deviations improve.

Some cases of CDK combined with congenital dislocation of the hip (CDH) have been treated by Pavlik harness as soon as flexion of 20° was obtained; this allowed simultaneous treatment of the two joints.

Operative treatment

Operative treatment was indicated whenever physiotherapy did not lead to satisfactory reduction. The operation is performed using a lateral approach. Operative findings have been especially valuable. We had previously observed such abnormalities as fibrous contracture of both the extensor muscle of the knee and the fascia lata. The very tight contracture of this tendon seems to be responsible for the lateral rotation of the leg. The fascia lata thickens and adheres to the aponeurosis of the vastus lateralis completely. The quadriceps is also fibrous, both atrophic and contracted. This fibrous aspect is more developed in the inferior and lateral part of the muscle, particularly in the vastus lateralis. Multiple fibrous adherences firmly fix the quadriceps and the patella to the femur.

FIG. 2. Congenital subluxation of the knee: group II. Note the displacement of the proximal tibia.

The surgical procedure is performed according to the abnormalities of the extensor apparatus. The tensor of the fascia lata is cut transverse to allow a certain amount of reduction of the lateral rotation of the leg. A progressive release of the vastus lateralis is done by cutting all adherences to the femoral aponeurosis and the intermuscular partition. The patella and the tendon of the quadriceps are then released from the anterior part of the femur. At that stage, 20–30° of knee flexion is obtained. The tendon of the quadriceps is then lengthened by V–Y-plasty (Fig. 4) so that 80–90° of knee flexion are obtained. Dal Monte has performed a systematic shortening plasty of the distal tendons of the hamstrings in order to achieve stabilization. Postoperative immobilization time is short, after which physiotherapy is recommenced so knee stiffness can be avoided.

RESULTS

The results were analyzed separately in two groups according to the nature of the CDK treatment.

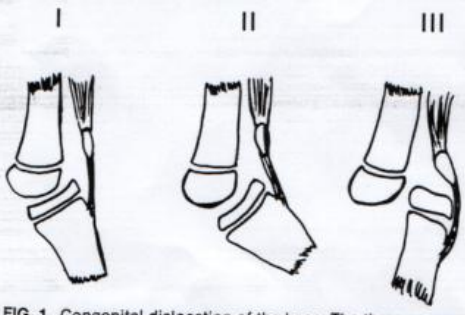

FIG. 1. Congenital dislocation of the knee. The three groups of the classification of Leveuf.

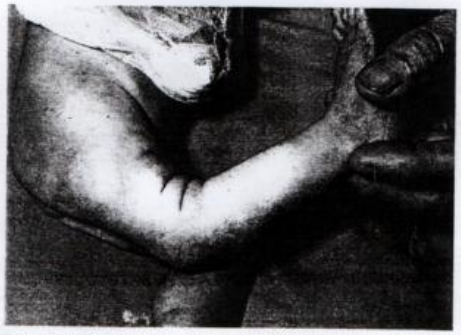

FIG. 3. Complete dislocation of the knee: group III. The folds are anterior and deep. Note the posterior protrusion of the femoral condyles.

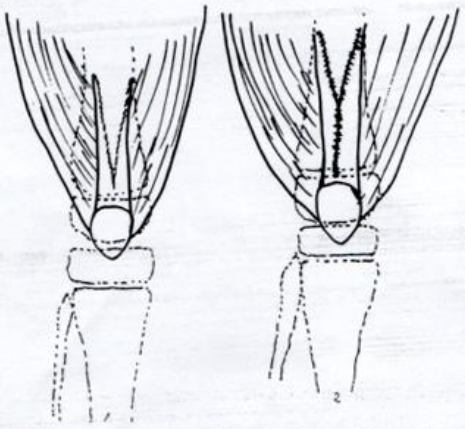

FIG. 4. Drawing of the lengthening-plasty of the tendon of the quadriceps: it allows the reduction of the genu recurvatum.

Group treated with physiotherapy

Twenty-four patients with CDK (3 group I, 6 group II, and 15 group III) were treated only by manipulations and plaster cast postures. Reduction was delayed by an average of 3 months. At final evaluation, knee extension was +5° on average (range of −10–20°) and the average flexion was 120° (range of 80–140°). All knees had more than 80° of mobility (80–130°, average of 126°). Twenty-two knees were completely stable. Two knees were unstable, with genu recurvatums of 20°.

Group treated operatively

Thirty-two patients with CDK (3 group I, 15 group II, and 14 group III) were treated operatively when physiotherapy failed. There was no strict parallelism between the amount of joint displacement at the onset and the operative indication. Indeed, operations were performed on 50% in group I, 71.4% in group II, and 48.2% in group III.

At the time of the last evaluation, knee extension averaged −5°. Only two knees had 10° of hyperextension. Another two knees lacked 5° of extension.

In all other cases, the extensor muscle of the knee was normal. Knee flexion ranged from 80 to 160°, with an average of 105°. The width of mobility ranged from 80 to 140° with an average of 108°. One knee failed to stabilize, and the patient can only walk with a splint. In all other cases, the knee stabilized completely, and quadriceps strength is compatible with normal activity (Fig. 3).

Radiographic sequelae are frequent. In the series of Bensahel (14 cases), at the last evaluation there was one patella baja, one patella alta, and one 8° genu valgum with hypoplasia of the lateral femoral condyle.

Globally, knees that were treated only by physiotherapy had greater knee flexion and better results than those that were operated on.

DISCUSSION

Frequency

CDK is rare. Depending on the height of the child, its frequency is 40 to 80 times less than CDH (12). Most of the series in the literature indicate a large female majority of CDK patients although the cause of this is unknown.

Etiology

There are numerous hypothesis concerning its etiology. Genetic factors sometimes play a role. In our series, as in some others, the responsibility of genetic factors is indicated by the high frequency of other abnormalities. Mac Farland (11) reported the case of a family where the mother and three children from three different fathers each had CDK. Provenzano (13) reported many cases of familial CDK. Curtis (3) describes an entity called "hereditary and congenital tibio-femoral subluxation." This syndrome combines CDK and some abnormalities of the face and spine. However, cases where the genetic cause is found are very rare; in the majority of the cases, heredity is not the cause.

A mechanical origin of CDK is suggested when the fetus is in an incomplete breech presentation (1). The position may explain both CDH and CDK and some malpositions of the foot. In the majority of series, the frequency of breech presentations is higher than in a normal population. This presentation, however, cannot explain the presence of other abnormalities. Fibrous contracture of the quadriceps is evident in operated cases, but it is difficult to determine whether this fibrous aspect is the cause or the consequence of the malposition of the knee.

Treatment

All authors have agreed that early physiotherapy, consisting of manipulations and of plaster cast, is necessary (4). The Pavlik harness was useful for us in three cases where a CDH was associated with a CDK. Laurence (9) suggests traction when the splints fail to produce reduction in 2 weeks. The quick institution of this treatment is essential to its success.

The operative indication is made as a result of the failure of physiotherapy. However, choosing the date of surgery can be difficult. We felt operation should be performed when the child is between 3 and 6 months of age, as soon as the orthopedic procedures have failed. Johnson (7) and Finder (5) also proposed early operation. The operative findings are similar in all series: contracture of the quadriceps, patella with hypoplasia, and, on occasion, an anterior dislocation of the tendons of hamstring muscles. Katz (8) noticed some abnormalities of the cruciate ligaments but the children in his series were old. Curtis and Bell (2) observed that abnor-