Conservative Management of the Bilateral Congenital Dislocation of the Knee: A Case Report

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ABSTRACT

Objectives: *To raise the awareness of colleagues and other medical professionals to this uncommon condition and to improve the knowledge of medical personnel in the conservative management of congenital dislocation of the knee.*

Method: *Information was retrospectively obtained from the hospital docket, actively from interviews with the mother of the child and clinical follow-up of the patient, to derive the requisite inf ormation. Clinical and radiographic photographs of the patient's condition were also obtained from her initial presentation. The mother of the child was required to sign a consent form after a comprehensive explanation of the nature and purpose of the proposed. Ethical approval was sought and granted by the University Hospital of the West Indies/ The University of the West Indies/Faculty of Medical Science/Ethics Committee, Mona.*

Results: *The patient had serial casting performed on both lower limbs with weekly changes of the casts. There was a resolution of the anterior thigh creases and after three weeks of casting, the index case demonstrated full active pain free flexion of both knees. At 18 months follow-up, she demonstrated unassisted ambulation with normal range of motion of the knees and without any difficulties.*

Conclusion: *Early diagnosis of the congenital dislocation of the knee (CDK) is very important. Non-operative treatment usually provides more stable and greater range of motion, and much more quadriceps strength than the surgical options. The index case had idiopathic CDK as no factors were identified to determine the cause of her condition. Flexible knees were demonstrated and therefore this case would be classified as a Grade II CDK based on the Tarek grading system. This implies that serial casting should be attempted.*

Keywords: Bilateral, congenital, conservative management, dislocation of the knee

Tratamiento Conservador de la Luxación Congénita Bilateral de la Rodilla: un Reporte de Caso

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RESUMEN

Objetivos: *Sensibilizar a los colegas y otros profesionales médicos en relación con esta condición poco frecuente y mejorar el conocimiento del personal médico en el manejo conservador de la luxación congénita de la rodilla.*

Método: *La información requerida se derivó de la revisión retrospectiva de la historia clínica, las entrevistas activas con la madre del menor, y el seguimiento clínico del paciente. También*

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se obtuvieron fotografías clínicas y radiográficas de la condición del paciente desde su presentación inicial. La madre del menor fue obligada a firmar un formulario de consentimiento, después de una explicación detallada de la naturaleza y propósito de la propuesta. Finalmente, la aprobación ética fue solicitada, y otorgada por el Hospital Universitario de la Universidad de West Indies, la Universidad de West Indies, la Facultad de Ciencias Médicas, y el Comité de Ética, Mona Campus.

Resultados: *El paciente tuvo yesos seriados en ambos miembros inferiores con cambios semanales de los moldes. Hubo una resolución de los pliegues anteriores del muslo y después de tres semanas de yesos, el caso índice mostró completa flexión activa y libre de dolor de ambas rodillas. A los 18 meses de seguimiento, mostró deambulación sin ayuda con rango normal de movimiento de las rodillas, sin dificultad alguna.*

Conclusión: *El diagnóstico precoz de la luxación congénita de la rodilla (LCR) es muy importante. El tratamiento no quirúrgico proporciona generalmente un alcance de movimiento más estable y mayor, y mucha más fortaleza de los cuádriceps que las opciones quirúrgicas. El caso índice tenía LCR idiopática, ya que no se identificaron factores para determinar la causa de su condición. Se demostró flexibilidad de las rodillas, por lo cual este caso sería clasificado como una LCR de grado II, sobre la base del sistema de clasificación de Tarek. Esto implica que debía intentarse el uso de yesos en serie.*

Palabras claves: bilateral, congénita, manejo conservador, luxación de la rodilla

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INTRODUCTION

Congenital dislocation of the knee (CDK) is a relatively uncommon deformity and includes a spectrum of hyperextension disorders of the knee. The aetiology is multifactorial and is thought to arise from genetic, hereditary, developmental and mechanical factors along with adverse environmental influences. The early recognition of CDK is important. If the knees can be passively reduced and manipulated into flexion, then serial casting should be attempted. Non-operative treatment usually provides more stable and greater range of motion and much more quadriceps strength than the surgical options. A report on the result of conservative treatment of a patient with this rare entity is presented.

CASE REPORT

A one-day-old female infant born to a 23-year-old primigravida mother *via* a lower segment Caesarean section was referred to the orthopaedic team for the assessment of her lower limbs. The indications for this Caesarean section were the patient's failure to progress, post-dates with a borderline pelvis and suspected macrosomia. The neonate was noted to have no dysmorphic features, appropriate APGAR scores and normal anthropometric parameters.

The musculoskeletal examination revealed an active newborn, birthweight of 4.07 kg, with hyperex-tended knees of 70 degrees on the left and 50 degrees on the right (Fig 1.) Prominent transverse skin-folds were noted across the anterior distal thighs and prominent femoral condyles were palpated posteriorly in the popliteal fossa (Fig 2.)

Fig. 1: Newborn with hyperextension of knees bilaterally.

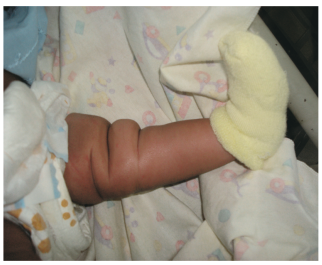

Fig. 2: Deep skin crease in distal thigh.

Ninety degrees of passive flexion was possible on the right and 75° on the left. The examinations of her spine, hips and feet were normal. The family history was insignificant for any congenital or syndromic conditions. Plain radiographs of her lower limbs and ultrasonographic assessment of her hip and knee joints were done.

The investigations revealed posterior dislocations of both knees and congruent hips however; the right-hip was subluxable (Figs. 3 and 4).

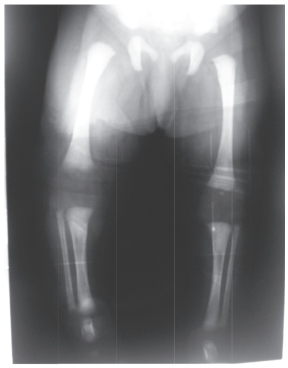

Fig. 3: Anteroposterior radiographs of lower limbs.

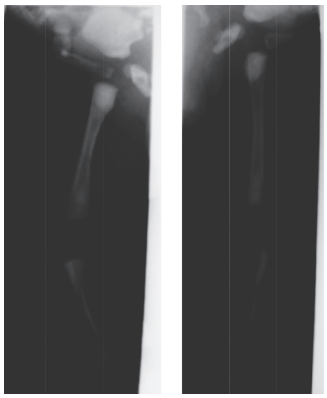

Fig. 4: Lateral view plain radiographs of right and left knee, respectively demonstrating malalignment of knee joints.

The knees were reduced and gently manipulated into flexion and splinted with long-leg casts Figs (5A–C).

Fig. 5A-F: Serial casting (A–C) and full active flexion of both knees (D–F).

She was followed up in the Orthopaedic outpatient Department for weekly serial casting and continued assessment. At the second week appointment, she was demonstrating full active flexion of the right-knee. A cast with increased flexion was reapplied to the left lower limb. On her third visit, she was actively flexing both knees and there was a resolution of the abnormal skin creases of the anterior thighs seen at birth (Figs. 5D–F.) A repeat ultrasound at the end of six weeks, showed congruent hips with no subluxation. At 18 months follow-up, she demonstrated unassisted ambulation without any difficulties and full active and passive range of motion of both knees.

DISCUSSION

Congenital knee dislocation (CDK) is a relatively rare condition with uncertain incidence and aetiology (1, 2). Many mechanical factors that have been considered as contributory are: trauma to the mother, lack of amniotic fluid, lack of intra-uterine space, or malposition of the fetus (3). Many authors classified this condition based on the radiographic findings of the femoro-tibial relationship into three grades [Fig. 6] (4–6).

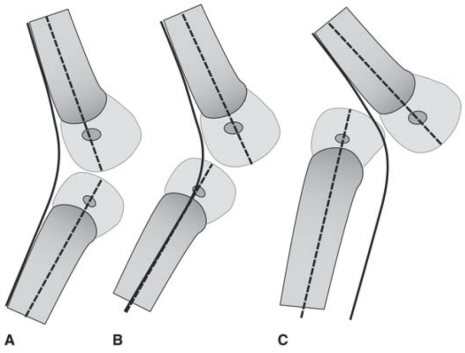

Fig. 6: The classification of congenital knee dislocation.
(A) Simple recurvatum (Grade I) (B) subluxation (Grade II) (C) complete dislocation (Grade III)

The index patient was classified as Grade II bilateral congenital dislocated knees based on these classifications. Although ipsilateral congenital hip dislocation is present in 70% to 100% of the cases, there was no evidence of hip dislocations even though the initial ultra-sound demonstrated a subluxable right-hip (4).

The diagnosis can be established shortly after birth by a physical examination with confirmation using radiography. Ultrasonography, however, is very useful in evaluating CDK. It provides a direct view of the joints, is painless and

safe. In addition, it is useful in the evaluation of the joint after closed manipulation. The success or failure of conservative treatment can also be followed up on repeated ultrasound images, allowing optimal timing for the change from conservative to surgical management of the deformity (7). Ultrasonography played a vital role in the management of the index patient particularly with the hips as a repeat ultrasound at the end of six weeks, comfortably ruled out any ongoing abnormality of those joints.

Treatment options are varied, with no clear consensus for both conservative and operative measures, reporting success depending on the severity of the disease. Conservative modalities include: gentle stretching and serial casting, use of skin and/or skeletal traction and the use of splints such as a Pavlik harness to either achieve or maintain the correction achieved with serial casting (8–10). If seen shortly after birth, then non-surgical treatment should be started promptly after the diagnosis.

Manipulation techniques involve gentle manual traction until the tibia is felt to engage with the femoral condyles, followed by the flexion of the knee. Serial casting in progressive flexion should then be performed. Gentle traction must be emphasized here as careful, non-violent manipulation is recommended. Jacobsen *et al* found a high incidence of fractures in their series of CDK during manipulation therapy that were radiographically verified (1).

In children with concomitant developmental dysplasia of the hips, the congenital knee dislocation should be treated first. A good hip position cannot be maintained as long as the knee cannot be sufficiently flexed (11). As knee flexion improves, the patient can be placed in a Pavlik harness, allowing treatment of both the knee and the hip. Stretching exercises followed by splinting and/or casting have been reported to be successful in up to 92% of cases of idiopathic CDK if treatment is initiated soon after birth (3, 8).

If an immediate manipulative reduction is not possible, a preliminary period of traction followed by manipulation and immobilization in plaster may be successful. When no further flexion is achieved after serial casting for several weeks, some form of traction can be incorporated.

Niebauer *et al* described a method of skeletal traction with a Kirschner wire through the proximal part of the tibia with the patient in the prone position being most-effective since this produces both distraction and flexion and the forces needed to reduce the dislocation. Rotational and valgus deformities could be corrected by changing the direction of the traction. Applying a band across the back of the thighs and gradually elevating the traction pulley increased the corrective force.

Abdelaziz *et al* proposed a protocol of management for CDK based on a modified grading system (12). The system used was based on clinical findings that correlated with the severity of the condition. They recommend that serial casting be performed in patients with Grade I CDK. In Grade II CDK in neonates, serial casting is started. A maximum of four weekly manipulations and castings should be attempted. If a range of flexion > 90° is achieved, serial casting is continued; if the range of flexion remains at < 90°, then it is necessary to proceed to percutaneous surgical releases.

Conservative management is not recommended for babies older than one month when first seen, Grade III CDK and recurrent CDK (12). The treatment in all cases must be conservative and optimistic in the early-stages. The prognosis with conservative treatment alone is significantly better for those babies assessed within days of birth, babies who show no evidence of a syndrome or other abnormalities, knees that are flexible and easily flexed and those patients without a family history of joint deformities.

CONCLUSION

Early diagnosis of the CDK is very important. Physical examination must be done carefully to rule out any other anomaly. The goal is to obtain a minimum of 90° knee flexion. Non-operative treatment usually provides more stable and greater range of motion and much more quadriceps strength than the surgical options. The patient discussed had idiopathic CDK, showed flexible knees and would be classified as a Grade II CDK based on the Tarek grading system. This implies that serial casting should be attempted. The hyperextended knees may have been due to a packaging problem with a borderline pelvis and suspected macrosomia thus, a relative decrease in intrauterine space.
This was a case of idiopathic congenital dislocation of the knees as no factors were identified to determine the cause of her condition.

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