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Original article

# Congenital dislocation of the knee at birth – Part 2: Impact of a new classification on treatment strategies, results and prognostic factors

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ABSTRACT

*Introduction:* An original classification of congenital dislocation of the knee (CDK) was drawn up, based on neonatal semiology. The objective of the present study was to assess impact on treatment decision-making and prognosis.
*Material and methods:* Fifty-one CDKs in 40 patients were classified neonatally into 3 types: I, reducible ($n=28$); II, recalcitrant ($n=16$); and III, irreducible ($n=7$). Number of anterior skin grooves, range of motion (RoM), flexion deficit and reduction stability were recorded. Depending on reducibility, treatment comprised: physiotherapy with splints, traction with cast immobilization, or surgery. At follow-up, knees were assessed in terms of RoM and stability.
*Results:* Mean age at first consultation was 5.6 days (range: 0–30). Mean age at follow-up was 9 years (range: 1–26). Physiotherapy with splinting achieved stable reduction in all type-I knees. Five type-II knees (31%) required traction, none of which needed surgery. Four type-III knees (57%) required surgery. Outcome was good or excellent in 82% of type-I knees, good in 68% of type II and poor in all type-III knees.
*Conclusion:* The study confirmed the relevance of the present neonatal classification to treatment, with increasing rates of surgical indication and decreasing rates of satisfactory outcome from types I to III. Therapeutic attitude can be graded according to severity of CDK.
*Level of evidence:* IV, single-center retrospective series.


## 1. Introduction

A original classification of congenital dislocation of the knee (CDK) was drawn up, based on neonatal semiology [1]. It distinguishes 3 types: I, reducible; II, recalcitrant; and III, irreducible. As well as being of prognostic value, it can serve to guide treatment.

Several treatment options have been described in the literature, from physiotherapy alone to open reduction, depending on the etiology and severity of CDK [2–10]. Indications, however, are not precise.

The objective of the present article was to assess the application of this classification in the treatment and prognosis of the 3 types of CDK. The study hypothesis was that the classification allows neonatal choice of adapted treatment.

## 2. Material and methods

### 2.1. Patients

Forty patients (51 dislocated knees) were examined by a single surgeon (RS) during the first month of life, before any treatment. Follow-up was a minimum 1 year after start of treatment.

CDK was type I, II and III in 28, 16 and 7 cases respectively.

### 2.2. Treatment

In types I and II, primary treatment systematically involved physiotherapy (anterior stretching) and an anterior full-leg splint,

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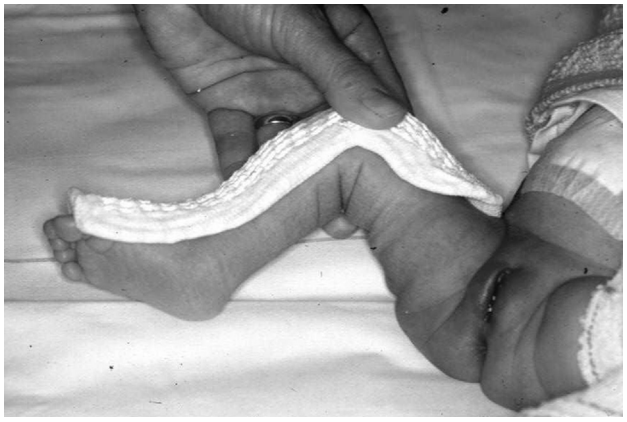

**Fig. 1.** Anterior splint.

which was regularly readapted (Fig. 1), to progressively increase knee flexion and maintain reduction. Treatment duration was 4 weeks in type I and 6–8 weeks in type II.

In type III and in case of treatment failure in type II, 1 week's progressive reduction with cutaneous limb traction was applied (Fig. 2). Initially, axial traction distracted the tibiofemoral space; a postero-anterior traction band was then positioned behind the distal femur: anterior translation of the femur combined with progressive knee flexion thus reduced the tibiofemoral dislocation. In unilateral CDK, the child was positioned in lateral decubitus (Fig. 2b); in bilateral CDK, positioning was in dorsal decubitus, either in maximum external rotation of the hip if possible (crossed traction) (Fig. 2a) or else, if external rotation was insufficient, in neutral rotation on the edge of the bed to obtain knee flexion. Daily clinical examination assessed and adapted traction. Once reduction was achieved and the knee was in 90° flexion (as checked on lateral X-ray), cast immobilization in the reduction position was performed under general anesthesia and maintained for 3 weeks.

**Table 1**
Outcome assessment criteria.

| Result | Range of motion | Instability |
|---|---|---|
| Excellent | Normal | None |
| Good | Normal | Sagittal |
| | Limited flexion (90–140°) | None |
| Moderate | Limited flexion (50–90°) | None |
| | Normal | Multidirectional |
| Poor | Stiff knee | Multidirectional |

The cast was then replaced by an anterior splint (or Pavlik harness in case of associated hip dislocation), for 4–6 weeks.

If traction failed, surgery was proposed. Using a lateral approach, VY quadriceps lengthening VY [10] or quadriceps release [11,12] was performed, associated as necessary to anterior tibiofemoral arthrolysis. Reduction was stabilized with a tibiofemoral crossed K-wire and 3 weeks' cast immobilization. After K-wire ablation, a full-leg splint was fitted for 2 months, alternating complete extension and 90° flexion.

### 2.3. Assessment of results

At the last consultation, joint stability and range of motion (RoM) were recorded. Uni- and multi-directional instability were distinguished. Results were assessed as excellent, good, moderate or poor according to the criteria shown in Table 1.

Statistical analysis used Chi$^2$ and Kruskal-Wallis tests on StatView software (SAS, Cary, NC, USA). The significance threshold was set at 0.05.

## 3. Results

Table 2 presents the treatment options enabling reduction.

Non-operative treatment by manipulation and splinting achieved reduction in all type-I cases and in 11 out of 16 type-II knees: i.e., 76.4% of the series as a whole.

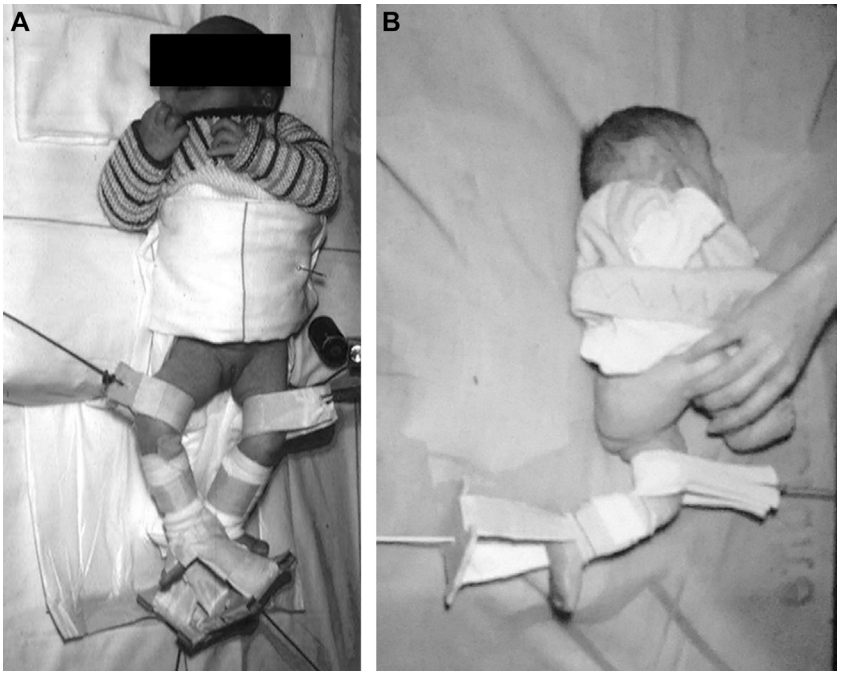


**Fig. 2.** Traction. A. Bilateral CDK with good external rotation of the hip, allowing supine positioning on the bed for crossed traction. B. Unilateral CDK with limited external rotation of the hip, requiring positioning in lateral decubitus.