# Transient femoral nerve palsy in spica cast treatment for developmental dysplasia of the hip

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## Abstract

A 4 months and half female child come to our attention for congenital dislocation of the left hip, previously treated in another hospital with abduction bracing, without satisfactory results. After progressive longitudinal bilateral traction, closed reduction under general anesthesia was performed and a spica cast was applied in the so-called *human position*. The patients remained in the spica cast for 6 weeks and then the plaster cast was renewed in narcosis for another 6 weeks. Once the second cast has been removed left femoral nerve palsy was detected. Orthopaedic treatment was interrupted and in 3 months the nerve completely recovered, while the hip was still stable. We followed the child regularly since then, she is now five years old, she is totally asymptomatic, X-rays shows a residual acetabular dysplasia, with no sign of avascular necrosis.

## Introduction

Avascular necrosis of the femoral head is a worrisome complication for the developmental dysplasia of the hip (DDH) treatment; its incidence diverges among different records (most studies report an incidence of 0% to 8%)[1] and it's considerably reduced since the Pavlik dynamic treatment replaced the hip spica cast.

On the other hand several complications have been described using Pavlik harness as for example: lack of reduction,[2] inferior dislocation (obturator) of the femoral head,[3] knee instability, brachial plexus palsy, femoral nerve palsy.[1] These complications can be the consequence of a lack of either parents or/both patient compliance[1] or belong to wrong harness positioning: precise rules must be followed for Pavlik harness placement.[4] Particular warning must be dedicated to the tension of the straps, because in case of excessive hip flexion the risk of femoral nerve palsy is higher.

On the contrary instead there are no neurological periferical complications described among cast treatment side effects, according to different Authors.

We describe a case of femoral nerve palsy in a 4 and half months old child subsequent to congenital dislocation of the left hip treated with cast immobilization.

## Case Report

A 4 months and half child came to our attention for congenital dislocation of the left hip. The child was previously treated in another hospital with a Pavlik abduction harness, which led to an insufficient reduction. On routine examination a limited abduction of the left hip was the only physical sign detectable; no other local or general symptoms or signs could be detected. Static and dynamic US analysis showed a dislocation of the left hip, confirmed by X-rays (Figure 1). After progressive traction applied following the standard protocols a pelvic - bimalleolar cast was wrapped, maintaining the hip reduction, with the child in narcosis. The cast was renewed 45 days after, with a stable reduction of the left hip. MRI performed in cast under sedation showed satisfactory reduction of the femoral head in both cases (Figure 2). After the cast removal, performed in narcosis, the hip was stable, with a complete passive range of motion; the skin was intact. Emerging from general anesthesia the child showed a restriction in the spontaneous motility of the lower left limb, with evidence of discomfort or pain during passive mobilization. During the following hours a light edema of the thigh came out; vascular ultrasound gave no evidence of vascular alterations. A blood sample was taken to detect inflammation markers and all were negative. A new MRI scan confirmed the good positioning of the left femoral head, without hip swelling or skeletal abnormalities: in particular there was no bone edema neither signs of avascular necrosis. Due to pain and discomfort induced even with a gentle clinical examination of the soft tissues of the tight we preferred to suspend the

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ongoing treatment. In the following days, there was a progressive pain relief, but a reduction of the active motion of the left knee still remained, defining a lack of knee extension. Clinical neurological examination and electromyography of the left thigh disclosed a left femoral nerve injury. The child was sent to a rehabilitation program, keeping the hip in to a safe position. There was a complete recover of the neurological lesion in 3 months, without any relapse of the dislocation. Xrays performed at 5 y.o. shows no sign of avascular necrosis, residual acetabula dysplasia with AI improving compared to previous checks (Figure 3).

## Discussion

DDH early diagnosis and adequate treatment are essential to achieve the normal development of the hip joint. Pavlik harness is the gold standard treatment for newborns with unstable hips, either dislocated or subluxated. It is designed to keep the hip into a proper position in order to let it develop naturally, allowing a range of motion into the *safe zone*. On the other side, if hip reduction has not achieved after 3-4 weeks of treatment or in babies older than 6 months, the advisable procedure is reduction in narcosis and cast immobilization.[5] Pelvi-malleolar cast needs to be wrapped in human position, with care taken in molding over the posterior aspect of the greater trochanter of the ipsilateral limb. At the end of the treatment, once hip reduction and successively stabilization has been reached, abduction brace is positioned.[6]

Using this type of cast several complications such as aseptic femoral head necrosis, from 4% to 60% of cases, according to different authors are described.[1,7-9] Avascular necrosis of the femoral head is a serious complication, which can lead to joint deformity, different length of the limbs and consequent arthrosis.[10] In addiction cast immobilization can determinate skin irritation, abrasion or deeper lesion due to a less accurate cleaning of the perineal area; skin lesions combined to the humidity of the perineal area can favor the onset of either bacterial or mycotic infections.[11]

No peripheral neurological complications have been described in literature after DDH cast treatment, while they are reported as complications of Pavlik harness treatment.[1-4,12,13] In this case it is supposed that prolonged and/or excessive hip flexion can bring to femoral nerve entrapment underneath the inguinal ligament.[14] Is has to be said that left femoral nerve is much more exposed to ischemic lesion than the right one due to its lower vascular supply.[15] Femoral nerve palsy usually happens on the same side of the dysplasia, if the dysplasia is unilateral, and just on one side if the dysplasia is bilateral. It is mandatory to interrupt the use of the harness or reduce the degrees of hip flexion, until the function of the limb is regained.[16] Recovery of the femoral nerve is common and may occur in days[17] to weeks or months.[18] It is obvious that the earlier the diagnosis is done, the faster is the function regained with a more favourable prognosis.

There are 2 cases of congenital femoral nerve palsy described in literature; they are 2 babies, born with caesarian delivery and breech presentation who developed DDH. In these 2 cases, hip hyperflexion during pregnancy was suspected to be etiology, which led to breech presentation or on the other side inadequate extraction maneuver during birth, which caused sudden hip extension after prolonged flexion in uterus rather than other reason for nerve compression or sprain.[13]

In the relevant literature there are no femoral nerve palsy resulting from cast treatment of hip dislocation. In our case the lesion was substantiate by electromyography and all the different check-ups performed allowed to exclude osteomyelitis or septic arthritis.

**Figure 1. Radiograph at 4 months and half.**

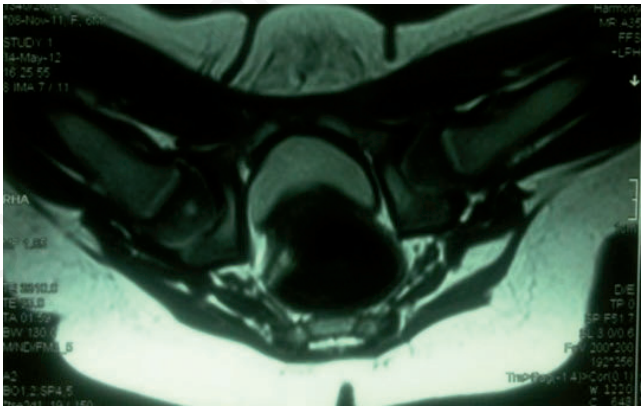

**Figure 2. MRI in cast. Note the correct direction of the metaphysis.**

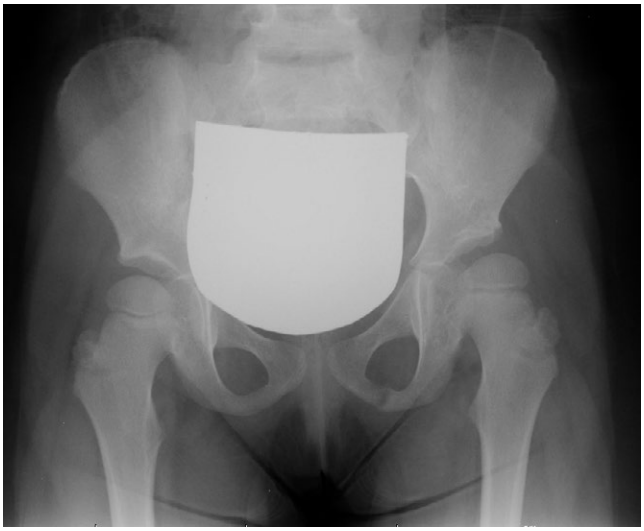

**Figure 3. Radiograph at 5 years. There are no signs of avascular necrosis. Acetabular dysplasia is present.**

The clinical findings in our patient were similar to the ones described as a complication of Pavlik harness treatment: the side involved was the same of the dysplastic hip, while on the opposite side no damages have been reported. In our case, the intense antalgic reaction associated could be due to involvement of the sensitive branch of femoral nerve. Recovery time was longer than the cases described after Pavlik harness treatment, coherently with a delayed diagnosis.

About the etiopathogenesis, differently from what it is described for cases treated by Pavlik harness, it was illogical to suppose a nerve compression underneath the inguinal ligament, since hip flexion never exceeded 90 degrees; negative family history and the lack of other episodes of mononeuropathy did not give any evidence for Hereditary neuropathy with liability to pressure palsy. Furthermore, reduction maneuver performed under narcosis was neither traumatic nor difficult, therefore prolonged cast immobilization was the only factor to which we could ascribe the neurological disorder noticed.

## Conclusions

The treatment of a congenital hip dislocation with cast requires correct limb positioning, in order to avoid femoral head vascular lesions; during the treatment, to reduce the insight of complications, careful surveillance of circulation and the skin care is necessary, at least of the browsable areas. After our experience we would like to highlight the insight of an unusual complication, femoral nerve palsy, already described for Pavlik harness treatment, but never described after an orthopaedic cast; in this case diagnosis can be delayed because it is impossible to verify the proximal motility od the limb until the cast is removed; the diagnosis of femoral nerve palsy can led to a modification of the therapeutic program planned. In our patient we could obtain a complete neurological recover, longer in time compared to what it is described by the other Authors, according to prolonged application of the noxa patogena.

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