Prolonged treatment with the Pavlik harness in infants with developmental dysplasia of the hip.
J. A. van der Sluijs et al

Harness treatment for hip dysplasia was first described in a series of papers written in the 1950s by Professor Arnold Pavlik, Professor of Orthopaedic Surgery at the Palacky-University in Czechoslovakia. Pavlik developed his harness in response to the high rate of avascular necrosis seen at that time following treatments such as Lorenz’s method of forcible closed reduction and casting in maximal abduction. Although initially devised for treatment of dysplastic hips, Pavlik later extended the indications for harness treatment to dislocated hips, recommending its use up to the age of one year, but emphasising the need for early diagnosis and reduction. His major contribution to the orthopaedic literature was his realisation that allowing movement within the harness through flexion and unforced abduction could safely facilitate spontaneous re-positioning of a dysplastic hip. This concept of unforced hip abduction was later incorporated into the definition of the ‘safe zone’ by Ramsey, Lasser and MacEwan.

Harness treatment is now a common method of management of hip dysplasia in young infants. Many observational studies have reported that early harness treatment of hip dysplasia is largely successful, with a low risk of avascular necrosis. The 1988 European Paediatric Orthopaedic Society (EPOS) multi-centre study found an overall incidence of avascular necrosis of 7.1% in 3611 hips treated by a Pavlik harness but noted that about two thirds were Tönnis I, the ‘mildest degree of alteration’. Although the authors suggested that avascular necrosis was less likely in hips treated under the age of three months, no data were presented to support that conclusion. However, both failure of treatment and the risk of avascular necrosis were (predictably) more likely in those hips with a greater degree of dislocation, in which the ossification centre was at the level of the superolateral margin of the acetabulum (Tönnis grade III hips). In these hips, there was a 14% failure rate and a 10% incidence of avascular necrosis after harness treatment.

Current North American literature recommends discontinuing harness treatment if the hip has not stabilised by 3-4 weeks after harness application. This recommendation is due to concerns about the development of avascular necrosis and posterior wall deficiency when there is prolonged bracing in a dislocated position. Closed or open reduction under general anaesthetic with application of a hip spica is traditionally the next step after failure of harness treatment. However, there has been recent interest in whether an intermediate form of bracing such as semi-rigid abduction braces could be used for some hips that fail Pavlik harness treatment. Hedequist et al reported on 15 infants treated with an abduction brace after failure of a Pavlik harness, applied at a median age of 6 days and removed at a median age of 19 days (6 to 37). These hips were either dislocated, but reducible (13 hips), or reduced, but dislocatable (two hips). A total of 13 of the 15 hips went on to stabilise in abduction bracing. Likewise, Swaroop and Mubarak reported some success in five hips trialled with a semi-rigid hip abduction brace following failure of the Pavlik harness at three weeks. These studies raise the question as to whether these hips would either have stabilised with a longer period in a Pavlik harness, or would have responded to a different kind of abduction bracing.

In the current issue of the journal, Van der Sluijs et al report the results of extended treatment of Graf III and IV hips with Pavlik harness and, in some cases, supplementation with a semi-rigid abduction brace. Graf III and IV hips are regarded as morphologically severely dysplastic and dislocatable/dislocated hips and always require treatment. Graf type III hips are thought to respond to bracing; type IV hips, even in infants under three months of age, have at best a 50% chance of responding to Pavlik harness treatment. In the current study, patients were followed by ultrasound examination and, as long as hip abduction increased, brace treatment was continued until reduction was confirmed by ultrasound. A substantial number of reductions occurred after four weeks of bracing, with progressive improvement in most Graf III hips but few Graf IV hips. However, about a third of the successfully reduced hips had some degree of acetabular dysplasia at one year follow-up, perhaps due to the older mean age at start of treatment (four months). As found in previous studies, hips that failed bracing appeared more at risk of later avascular necrosis.

This study raises a number of important questions in the management of developmental dysplasia of the hip. How do we discriminate those hips with a high chance of failing Pavlik harness treatment from those that may respond to a more prolonged course of bracing? If we can identify those hips at risk of treatment failure prior to the onset of harness treatment, it may be possible to succeed in reducing these hips with an intermediate harness only, and thereby potentially reducing the risk of avascular necrosis.
treatment, would different management protocols lead to a better long-term outcome for the hip, or are these hips destined for difficulties regardless of the type of management? For example, given the reported low success rate of harness treatment in the reduction of Graf IV hips, would this subgroup of hips have a better outcome if identified early and managed by a different approach, such as closed or open reduction under anaesthesia and casting at the age of three to four months? Such questions can only be answered by bigger prospective randomised studies using reproducible assessment techniques and objective outcome measures.

By Ms S. Stott, Associate Professor of Paediatrics Orthopaedic Surgery University of Auckland, Auckland, New Zealand Email: s.stott@auckland.ac.nz

References