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Splinting for the non-operative management of dysplasia of the hip in children under six months

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Question

How effective is splinting and which splinting strategies are best for the non-operative management of developmental dysplasia of the hip in children under six months of age?

Context

Developmental dysplasia of the hip (DDH) covers a spectrum of hip abnormalities in babies ranging from completely dislocated hips to immature hips which show a delayed physiological development but are stable within the socket throughout examination. DDH is associated with premature osteoarthritis and is the cause of 10% of all hip replacements. In western countries, DDH is a common condition which occurs in about 10 per 1000 live births, with one per 1000 being completely dislocated.

Treatment of DDH depends on its severity and the baby's age. In babies under six months of age, abduction splints are often used to guide the hips into the socket. Dynamic splints, such as the Pavlik harness, still give the legs some freedom to move whereas static splints, such as the fixed abduction brace, fix the legs in position. Occasionally, double diapers which gently push the legs apart are used to act as a splint. However, there is no consensus on which severity of DDH mandates treatment and on when to start splinting, which splints to use, the duration of splinting, weaning versus cessation and the long-term follow-up. Hence, treatment varies by country, hospital and even between practitioners in the same hospital. Moreover, splinting can cause complications such as avascular necrosis and parents remain concerned about its effects on bonding between parents and baby and on gross motor skill development because of the decreased tummy time.

This Cochrane review aimed to assess how successful splinting is and which strategy would be best.

Criteria for study selection

The review included studies comparing dynamic splinting, static splinting or double diapers with no splinting or delayed splinting (usually by 5- 6 weeks). The participating babies were under six months of age with DDH of any severity. The main outcomes were acetabular index, need for operative intervention after splinting and complications including avascular necrosis and femoral nerve palsy. The acetabular index, the angle between the Hilgenreiner line and the acetabular roof as determined by radiographs, is a proxy for hip health as it is a known predictor of osteoarthritis long-term. Usually, an acetabular index angle below 30 degrees is considered normal in babies aged over six months, and below 25 degrees is considered normal at 24 months.

Summary of the results

The authors identified six randomized controlled trials (RCTs) which included 576 babies and 16 non-randomized studies which included 8237 babies. The review authors chose to only draw conclusions supported by randomized study data due to the bias associated with the included non-randomized studies.

Immediate dynamic splinting versus delayed splinting or no splinting

Four RCTs and nine non-RCTs compared immediate dynamic splinting to delayed dynamic splinting or no splinting. Two RCTs looked at stable hips, one at unstable (dislocatable) hips and one considered both conditions.

Two randomized studies (256 babies) found there may be no evidence of an effect of splinting stable hips at first diagnosis versus active surveillance on acetabular index at one year, but the certainty of the evidence is very low. Similarly, two RCTs (181 babies) reported there may be no evidence of a difference in acetabular index at two years. There were no studies who reported the effect on acetabular index at five years. Four RCTs reported on the need for surgery after splinting (434 babies, very low-certainty evidence). In three of these studies, no surgical interventions occurred in either treatment group and in the fourth study two babies in the immediate dynamic splinting group were treated surgically. Three RCTs looked at complications and reported no cases of avascular necrosis or femoral nerve palsy (390 babies, very low-certainty evidence).

Dynamic splinting versus static splinting

One RCT and five non-RCTs compared dynamic with static splinting. The RCT reported no cases of avascular necrosis with either treatment (118 hips, very low-certainty evidence), but did not report on any other outcomes of interest.

Other comparisons

One study compared double nappies with delayed or no splinting, but did not report any outcomes of interest. No randomized studies compared immediate static splinting with delayed static splinting or no splinting, double diapers with single diapers or immediate removal of the splint after treatment with weaning.

Results from the non-randomized studies aligned with the findings from the randomized studies and did not provide additional clarity.

Conclusion

Although splinting is a very common treatment for the non-operative management of DDH, there is a clear lack of evidence that supports its effectiveness.

For babies with stable hips, splinting may make little or no difference at any timepoint compared to delayed or no splinting. For babies with unstable hips, delaying splinting up to 6 weeks may have little or no effect on the acetabular index or the need for surgery at one year. Current evidence for all primary outcomes is of very low certainty meaning that we are very uncertain of the effects of splinting.

Implications for practice

Whilst consensus guidelines may assist with decreasing the unnecessary variation in treatment strategies at the moment, it is clear that more well-conducted randomized studies and a robust evidence base are needed to inform the evidence-based treatment of DDH.

REFERENCE:

Dwan K, Kirkham J, Paton RW, Morley E, Newton AW, Perry DC. Splinting for the non-operative management of developmental dysplasia of the hip (DDH) in children under six months of age.

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