

# Swaddling and hip dysplasia: an orthopaedic perspective

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Historically infant swaddling was almost a universal practice. It involved binding or bundling babies in blankets with the arms restrained and the lower limbs extended. It remains common in the Middle East<sup>1</sup> and in some ethnic groups with or without a board or cradle.<sup>2</sup> There has been a recent resurgence of swaddling because of its perceived palliative effect on excessive crying, colic and promoting sleep. Approximately 90% of infants in North America are swaddled in the first few months of life.<sup>3</sup>

A recent systemic review<sup>4</sup> concluded that in general swaddled infants do arouse less and sleep longer. Preterm infants showed improved neuromuscular development.

In the UK a recent *Drug and Therapeutics Bulletin* review of the management of infant colic<sup>5</sup> concluded that the current evidence base does not support the use of swaddling in its management. This review and the systematic review however noted the association of swaddling with developmental dysplasia of the hip (DDH), the latter concluding 'attention to this adverse effect is of utmost importance'. DDH is one of the most common congenital disorders and has considerable socioeconomic implications particularly in relation to late onset osteoarthritis. In Norway, hip dysplasia accounted for 20% of patients requiring total hip replacement younger than 40 years and 87% were women.<sup>6</sup>

There is continuing controversy about screening for DDH and in particular the case for comprehensive or selective ultrasound screening.<sup>7, 8</sup> However, early diagnosis leads to relatively simple and successful treatment with splintage.<sup>8</sup> Risk factors such as breech delivery and family history are recognised but postnatal mechanical factors are also important.

Neonatal ultrasound hip examination will show that approximately 20% of hips have dysplasia or acetabular growth retardation.<sup>9</sup> In most cases this resolves spontaneously but these hips may be vulnerable to continuing dysplasia if suitable postnatal mechanical factors are not applied.

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It is normal for infants to have hip flexion contractures which averages 28° at birth and decreases to 19° at 6 weeks and 7° at 3 months.<sup>10</sup> Swaddling forces the hips into extension and adduction and predisposes to dysplasia.<sup>11</sup> The report from Turkey showed that 88% of the study cohort had been swaddled and the relationship between hip dislocation and swaddling was statistically significant.

Hip dislocation has been produced in experimental animals by immobilisation of the hips and knees in extension.<sup>12, 13</sup> A recent animal study<sup>14</sup> however, provided new insight into the mechanism of induction of hip dysplasia by swaddling. Neonatal rats were swaddled using surgical tape applied to the hind limbs to simulate human practice.

Hip dislocation occurred predominately if swaddling commenced at birth but prolonged swaddling produced a greater rate of dislocation. Swaddling that commenced later after birth produced dysplasia but not dislocation. The study confirmed that abnormal postnatal mechanical factors are detrimental during early hip development. The authors recommended that traditional swaddling should be avoided to allow normal hip development. This advice not to apply fixed or sustained extension to the lower limbs is a reiteration of previous studies.

A high incidence of hip dislocation was reported in Navajo Indians who strapped their infants to a board.<sup>15</sup>

In Japan an educational programme initially aimed at grandmothers was commissioned to prevent traditional swaddling. Prior to this the incidence of hip dislocation was 1.1–3.5%. Following the programme the incidence was reduced to 0.2%.<sup>16</sup>

In Australia a recent threefold increase in DDH has been noted from one institution despite no systemic change in screening practices and no difference in demographics.<sup>17</sup> The authors raised concerns that the resurgence of the age-old practice of swaddling increased the risk of late diagnosed DDH.

However, the resurgence of swaddling in English speaking countries does continue. Demand for swaddling clothes increased by 61% in the UK in 2010/2011.<sup>18</sup>

In terms of current clinical practice there are some important implications. In the new Neonatal and Infant Examination protocol infants at risk for hip dysplasia will undergo hip ultrasound at 6 weeks. Those found to have dysplasia or immature hips may be treated or observed. A Pavlik harness precludes swaddling of course but it should be ascertained whether the infant is being swaddled and if so advice either to cease or to 'safe swaddle' should be given. There may be a reduced threshold for splinting immature hips in infants who have been swaddled.

'Safe swaddling' with appropriate devices should be promoted because it is recognised that traditional swaddling is a risk factor for DDH. In order to allow for healthy hip development, legs should be able to bend up and out at the hips. This position allows for natural development of the hip joints. The babies' legs should not be tightly wrapped in extension and pressed together. Commercial products for swaddling should have a loose pouch or sack for the babies' legs and feet, allowing plenty of hip movement and hip flexion and abduction.

It is now essential that midwives, neonatologists and paediatricians provide the correct advice in relation to healthy swaddling practices. The International Hip Dysplasia Institute (<http://www.hipdysplasia.org>) has issued a statement and emphasised the need for infant hips to be properly positioned to allow the fetal posture to be maintained for the first 6 months of life.

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