Positional plagiocephaly

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Français en page 495

Carl Cummings; Canadian Paediatric Society, Community Paediatrics Committee. Positional plagiocephaly. *Paediatr Child Health* 2011;16(8):493-494.

Cranial asymmetry occurring as a result of forces that deform skull shape in the supine position is known as deformational plagiocephaly. The risk of plagiocephaly may be modified by positioning the baby on alternate days with the head to the right or the left side, and by increasing time spent in the prone position during awake periods. When deformational plagiocephaly is already present, physiotherapy (including positioning equivalent to the preventive positioning, and exercises as needed for torticollis and positional preference) has been shown to be superior to counselling about preventive positioning only. Helmet therapy (moulding therapy) to reduce skull asymmetry has some drawbacks: it is expensive, significantly inconvenient due to the long hours of use per day and associated with skin complications. There is evidence that helmet therapy may increase the initial rate of improvement of asymmetry, but there is no evidence that it improves the final outcome for patients with moderate or severe plagiocephaly.

Key Words: *Craniosynostosis; Deformational plagiocephaly; Moulding therapy; Supine position*

Since the advent of recommendations to place infants in the supine position for sleeping to reduce the incidence of sudden infant death syndrome, clinicians have noted an inadvertent increase in the frequency of cranial asymmetry. This cranial asymmetry is also referred to as plagiocephaly. Cranial asymmetry in the absence of synostosis of the sutures and involving the occiput is described in the literature as nonsynostotic posterior plagiocephaly. Positional plagiocephaly (PP) is always of this type and is also referred to as deformational plagiocephaly because of the effect of forces to deform the skull shape in the supine position. The head shape is commonly described as a parallelogram. There is unilateral flattening of the occiput, with ipsilateral anterior shifting of the ear. Less frequently, the head shape can be brachycephalic, with relatively symmetric flattening of the occiput.

The objectives of the present practice point are to describe the incidence and causes of PP; to describe the differentiation from craniosynostosis; to discuss the prevention of plagiocephaly; to discuss the treatment methods available and the usefulness of these interventions; and to provide a summary of the recommendations.

INCIDENCE AND CAUSES OF PP

The incidence of PP is striking at six weeks of age, increases to a maximum at four months, and then slowly decreases over two years because most cases resolve in that time. A cohort study (1) has shown that the incidence of PP is 16% at six weeks, 19.7% at four months, 6.8% at 12 months and 3.3% at 24 months. Factors increasing the risk of PP are male sex, firstborn, limited passive neck rotation at birth (congenital torticollis), supine sleeping position at birth and at six weeks, only bottle feeding, awake 'tummy time' fewer than three times per day, and lower activity level with slower achievement of milestones (1,2). Sleeping with the head to the same side and positional preference when sleeping are also

La plagiocephalie positionnelle

L'asymétrie crânienne découlant de forces qui déforment la boîte crânienne lorsqu'un bébé est en décubitus dorsal se nomme plagiocephalie positionnelle. Le risque de plagiocephalie peut être réduit si la tête du bébé est orientée d'un côté ou de l'autre tous les jours en alternance et si on accroît les périodes en décubitus ventral pendant l'éveil. Lorsque la plagiocephalie positionnelle est déjà instaurée, il est démontré que la physiothérapie (y compris l'équivalent positionnel de la position préventive et les exercices nécessaires pour soulager les torticolis et compenser la préférence positionnelle) est supérieure aux simples conseils sur la position préventive. La thérapie par port d'un casque (thérapie de moulage) visant à réduire l'asymétrie crânienne comporte des inconvénients : elle est coûteuse, très peu pratique compte tenu de ses longues heures d'utilisation tous les jours et associée à des complications cutanées. Selon des données probantes, la thérapie par port du casque peut accélérer le rythme initial de correction de l'asymétrie, mais aucune donnée probante n'indique qu'elle améliore le résultat final chez les patients présentant une plagiocephalie modérée à grave.

associated with the development of PP. The side of occipital flattening correlates strongly to the side that the head faces when in the supine sleep position (3).

DIFFERENTIATION FROM CRANIOSYNOSTOSIS

The examination of a child with plagiocephaly should include an evaluation for dysmorphisms and syndromes. Verifying the range of active and passive motion of the neck is important to detect congenital torticollis, which will improve with physiotherapy. As torticollis improves, so will cranial asymmetry. Although much less frequent, abnormalities of the cervical spine can also lead to plagiocephaly.

Craniosynostosis involving the lambdoid sutures is the only craniosynostosis that causes occipital flattening and is relatively infrequent. If it is unilateral, there will be cranial asymmetry that must be differentiated from PP. Very often, there will be ridging of the affected suture. The skull will show ipsilateral occipitomastoid bossing with posterior displacement of the ear. This contrasts with the ipsilateral anterior displacement of the ear with PP (4).

The diagnosis of PP is primarily a clinical diagnosis. Radiographs of the skull are only helpful when there is clinical suspicion of craniosynostosis or when there is worsening of head shape at an age when PP would be expected to improve (5).

The presence of PP in no way reduces the accuracy or necessity of serial head circumference measurements in the care of young children.

PREVENTION OF PLAGIOCEPHALY

Among the factors that favour the development of PP, only some can be modified. The important manoeuvres involve positioning for sleep and the use of tummy time. Because most cribs are placed against a wall, positioning the baby with his/her head to the foot or to the head of the bed, on alternating days, is recommended.

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This encourages the baby to lie on the side of the head that enables him or her to look into the room. Alternating the position should encourage lying equally on the two sides of the occiput.

'Tummy time' refers to awake time spent in the prone position. Cohort data (2) suggest that the ideal amount of tummy time is at least three times per day for 10 min to 15 min each time. Some parents may need reassurance that the prone position needs to be avoided only during sleep. As well, parents can be encouraged that tummy time aids in the progress of developmental milestones that require the prone position.

Some babies will have a strong positional preference to lie primarily on one side of the head. These babies will require more effort to lay them supine in a position counter to their preference to limit the risk of developing PP (2).

TREATMENT OF PLAGIOCEPHALY

The options for treatment of plagiocephaly are surgical and nonsurgical. Surgical intervention is required only for confirmed craniosynostosis. Nonsurgical treatment can involve positioning and physiotherapy, or the use of a moulding device (helmet therapy). The benefits of any intervention need to be interpreted in light of the natural history of the condition.

As already referred to, cohort studies indicate that the vast majority of plagiocephaly cases resolve by two years of age. There is evidence from a randomized trial (5) that a physiotherapy program combining positioning (similar to the preventive measures noted above) with exercises where needed (congenital torticollis, positional preference or developmental stimulation) is superior to parental counselling for preventive measures without physiotherapy support.

The use of moulding therapy (helmet therapy) to reduce skull asymmetry has created controversy in some countries because of marketing directly toward parents through sources such as the Internet. This treatment is expensive, is not always covered by insurance and has potential side effects. In helmet therapy programs, helmets are worn up to 23 h/day; they can be associated with contact dermatitis, pressure sores and local skin irritation (6).

Studies comparing the benefits of moulding therapy with those of repositioning therapy have several flaws. The studies available have potential biases that limit the ability to draw conclusions (7-9). There are no randomized trials, and the best evidence so far comes from cohort studies. The design flaws have included more severe asymmetry in the moulding group, older children in the moulding group and the inclusion, in the moulding group, of children who had not 'responded' to repositioning therapy. As well, there is no consistent or objective method to assess the severity of skull asymmetry.

Bearing in mind these limitations, the existing evidence suggests that the rate of improvement in skull shape is in favour of moulding treatment. One study demonstrated a 1.3 times relative improvement in skull asymmetry with moulding versus repositioning therapy (10). However, the outcome was similar in both the moulding therapy and positioning-only groups.

The overall consensus from our review of published studies is that repositioning therapy is the preferred choice for patients four months of age and younger with mild to moderate asymmetry; physiotherapy and positioning is preferable to watchful waiting; in patients with severe asymmetry, regardless of age, moulding therapy can be considered; and

the maximum age to consider helmet therapy is eight months. Because none of the studies stratified groups according to age or severity, this consensus is not well supported by evidence (7).

RECOMMENDATIONS

The levels of recommendations are described using the evaluation of evidence criteria outlined by the Canadian Task Force on Preventive Health Care (11).

- Prevention of plagiocephaly begins with positioning of the head to encourage lying on each side in the supine position. More effort may be required for the child with a strong positional preference to lie more on one side of the head. (Level II-2, Grade A)
- Prone position during awake time (tummy time) for 10 min to 15 min at least three times per day reduces the development of plagiocephaly. (Level II-2, Grade A)
- Evaluation for craniosynostosis, congenital torticollis and cervical spine abnormalities should be part of the examination of a child with plagiocephaly. (Level III, Grade A)
- Repositioning therapy plus physiotherapy as needed are the interventions of choice in most children with mild or moderate PP. (Level II-1, Grade B)
- Moulding therapy (helmet therapy) may be considered for children with severe asymmetry. In these children, helmet therapy has been shown to influence the rate of improvement of asymmetry but not its final outcome. There is insufficient evidence to recommend helmet therapy based on studies published to date for mild or moderate asymmetry. (Level II-3, Grade I)

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