TABLE

Table 1: Characteristics of the 10 studies critically evaluated for this review

Author (Year)	Study Design	Assessment of Cranial Deformity	Data Class, Quality and Reasons	Results	Conclusions
Loveday et al (2001)	Active counterpositioning (n = 45) compared to helmet (n = 24).	Cranial index (CI) and cranial vault asymmetry index (CVAI).	II—Retrospective cohort study	Helmet group had improvement in average CVAI (8.0 to 6.2%) and CI (89.6 to 87.8%) over 21.9 weeks; ACP improvement in CVAI (7.3 to 5.4) and CI (88.2 to 86.2) over 63.7 weeks.	ACP and helmet treatment results similar, but ACP takes much longer.
Hutchison et al (2010)	Randomized to education about repositioning education (n = 61) vs repositioning education plus device (Safe T Sleep positioning wrap, n = 65).	Using a digital photograph, 1 researcher measured the cephalic index (CI), the oblique cranial length ratio (OCLR), and the transcranial diameter (TCD). Neck dysfunction was also assessed.	I—Prospective RCT	At 12 months, there was no difference between the treatment groups for mean CI, mean OCLR, or mean RCD.	No difference in head shape improvement for those using a sleep positioning wrap versus repositioning strategies alone.

Author (Year)	Study Design	Assessment of Cranial Deformity	Data Class, Quality and Reasons	Results	Conclusions
Lipira et al (2010)	Active repositioning (n = 35) compared to helmet (n = 35) matched for cranial vault asymmetry (CVA).	Used whole-head 3D asymmetry analysis at each visit.	II—Retrospective cohort study	Greater reduction in the mean and maximal asymmetry in the helmeted group than the repositioned group in a shorter period of time (3.1 vs 5.2 months).	Orthotic helmet provides superior improvement in head asymmetry in a shorter period of time.
Graham et al (2005)	Children with brachycephaly were treated with repositioning (n = 96) or helmet (n = 97).	The cranial index (CI) was calculated 3 times and averaged by 1 pediatric nurse practitioner.	II—Retrospective cohort study	The change in CI for children who were repositioned was not significant (86.3% to 85.7%), whereas the change for the helmet group was (91.5% to 88.4%).	Repositioning was less effective than cranial orthotic therapy for brachycephaly.

Author (Year)	Study Design	Assessment of Cranial Deformity	Data Class, Quality and Reasons	Results	Conclusions
Moss et al (1997)	Repositioning (n = 72) compared to prior helmeted group (n = 47).	Cranial vault asymmetry (CVA)	III—Retrospective cohort study with historical control. Results compared to prior study evaluating headband from same authors.	Over 4.5 months, the mean CVA went from 10.6 mm to 5.5 mm.	Repositioning and external orthotic treatment result in similar improvements in CVA.
Plank et al (2006)	Repositioning program (n = 17) compared to helmet (n = 207) in infants with moderate to severe deformity.	3D head shape analysis using laser data acquisition system. This was able to calculate 25 measurements. Scans done every 2 weeks for about 4 months.	II—Prospective cohort study	For the orthotic group, significant differences were found in all 25 variables. For the repositioning group, significant differences were found in 12 of the 25 variables, but this was attributable to head growth.	Cranial symmetry improved significantly more with helmet therapy than without.

Author (Year)	Study Design	Assessment of Cranial Deformity	Data Class, Quality and Reasons	Results	Conclusions
Mulliken et al (1999)	Repositioning (n = 17) compared to helmet (n = 36).	Transcranial diameter difference measured 3 times by the primary author at 3-month intervals until therapy completed.	II—Prospective cohort study	The reduction in the transcranial difference was greater in the helmet group (1.2 cm to 0.6 cm) compared to the repositioning group (1.2 cm to 1.0 cm).	Helmet therapy superior to repositioning.
Vles et al (2000)	Positioning (n = 39) compared to helmet (n = 66)	Cosmetic deformity score (0, severely abnormal; 10, normal) at initiation and completion of treatment	II—Retrospective cohort (no mention whether it was retro or prospective)	Helmet group had better average improvement (3.3 vs 1.6) and final outcome score (7.4 vs 6.2) in a shorter treatment period (5.3 vs 24.1 weeks).	Helmet therapy superior to repositioning and takes less time.
van Vlimmeren et al (2008)	Repositioning education (n = 32) compared to a 4-month physical therapy intervention program (n = 33)	Oblique Diameter Difference Index (ODDI) measured at 6 and 12 months	I—Prospective RCT	Physical therapy intervention group had significantly less severe plagiocephaly at 6 (30%) and 12 months (24%)	A 4-month physical therapy program led to significantly reduced risk of severe deformational plagiocephaly

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				compared to repositioning education (56% and 56%).	compared with education.
Wilbrand et al (2013)	Repositioning device (n = 25) compared to stretching exercises (n = 25)	Cranial index (CI) and cranial vault asymmetry index (CVAI) before and after 6 weeks of treatment.	I—Prospective RCT	Bedding pillow showed superior CVAI improvement to daily stretching exercises in the plagiocephaly and combined deformity patients; there was improvement in the CI for the brachycephaly and combined infants, but it did not reach statistical significance.	Bedding pillow is more effective at correcting cranial asymmetry than stretching exercise program.