Lack of evidence of the effectiveness of primary brachial plexus surgery for infants (under the age of two years) diagnosed with obstetric brachial plexus palsy

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CRD summary
This well-conducted review concludes that there is insufficient good quality evidence regarding the effectiveness of primary brachial plexus surgery for obstetric brachial plexus palsy (OBPP), in infants aged up to two years and further research is required. This conclusion appears reliable given the evidence presented.

Authors’ objectives
To evaluate the effectiveness of primary brachial plexus surgery for the treatment of infants, under the age of two years, with obstetric brachial plexus palsy.

Searching
The following databases were searched from July 1992 to June 2004 for both published and unpublished English language articles: CINAHL, Evidence Based Medicine Reviews, Expanded Academic ASAP, MEDITEXT, MEDLINE, PEDro, ProQuest 5000, Science Direct, TRIP and Web of Science. Search terms were reported. The reference lists of included papers were also searched, along with electronic sources including ProQuest Digital Dissertations, Open Archives Initiative Search Engine (myOAI) and the Australian Digital Thesis Program.

Study selection
Quantitative studies assessing the rate of recovery from any form of primary brachial plexus surgery for infants aged up to two years old, who have been diagnosed with obstetric brachial plexus palsy (OBPP), were included in the review. Single case studies, studies of infants conservatively managed or managed solely with drugs, and studies of surgery for secondary deformities were excluded from the review.

Included studies were mainly case studies assessing between two and 209 (mean=32) infants. Four studies compared surgery with other conservative treatments (physiotherapy and occupational therapy), a different type of surgery or no treatment. Various surgical techniques were employed in the studies including neurolysis alone, neurorisation of various nerves, nerve grafting and various combinations of these techniques. OBPP was usually diagnosed on the basis of clinical presentation alone or in conjunction with medical investigations or a history of difficult delivery. Many studies stated that the decision to operate was made on the absence of muscle activity at a certain point in time; the specific muscles involved varied and further details are reported in the review. The time point at which the decision to operate was made varied from three to nine month of age but the majority of included studies made a decision around four months of age. Recovery was assessed using a range of clinical tests including the Active Movement scale and the British Medical Research Council (BMRC) Muscle Grading System; the most frequently used test was the Mallet scale.

Two reviewers independently assessed the eligibility of articles for inclusion and disagreements were resolved through discussion.

Assessment of study quality
Two reviewers independently assessed the methodological quality of the included studies using the Critical Review Form - Quantitative Studies. This tool consists of 16 criteria including study design, sample size, presence of bias and use of reliable outcome measures. Each study scored one point if the criterion was met and zero if not. Further details of the 16 criteria are reported in the review and an earlier related review (see Other publications of Related Interest field). Disagreements between reviewers were resolved through discussion and each study was awarded a score between zero and 16 points.

Data extraction
Percentage recovery rates were reported. Two reviewers independently extracted the study data and disagreements were resolved through discussion.
Methods of synthesis
Studies were summarised in a narrative and in appendices. Clinical differences between the studies were assessed and described.

Results of the review
Twenty-one studies (n=953), including four comparative studies, twelve prospective case series and five retrospective case series, met the inclusion criteria for the review. The quality of the studies was reported as poor overall, with an average quality score of 7 out of 16; the highest quality study scored 11 points. Only five of the 21 studies fulfilled 75% of the criteria. Every study was subject to some form of bias, none obtained informed consent and none used reliable or valid outcome measures.

Recovery rates were between 11% and 100% but the two studies reporting 100% recovery were by the same researcher with only two or three participants. Six studies reported greater than 80% recovery of normal or near normal function. There was conflicting evidence as to the effectiveness of surgery compared with other interventions. The highest quality study (11 points) reported no significant improvements in the number of participants with useful function after surgery as compared with conservative management. One retrospective case-series of 112 infants (quality score 8) reported that physiotherapy had higher recovery rates compared with surgery (100% versus 90%). Two other studies, one comparing surgery to occupational therapy alone (quality score 11) and one comparing surgery to no treatment (quality score 8), reported that surgery was associated with higher recovery rates. One study (quality score 9) found that nerve transfer and grafting were superior to neurolysis and that surgery was superior to neurolysis alone. One study reported that there were no differences in function between neuroma removal and nerve grafting in comparison with neurolysis alone.

Authors' conclusions
There is insufficient good quality evidence regarding the effectiveness of primary brachial plexus surgery for OBPP in infants and further research is required.

CRD commentary
This review answered a clearly defined research question using a wide range of study designs. An extensive search for published studies was undertaken but some studies may have been missed, as topic experts were not contacted and no handsearching of journals was carried out. Appropriate precautions were taken to reduce the risk of reviewer error and bias when selecting and assessing the quality of studies and extracting study data. The methodology of the primary studies was assessed using a published tool. Differences in both study quality and clinical parameters were considered when assessing the data. Given the poor level of reporting within the primary studies and the apparent differences in interventions, study design, populations, and outcomes, the decision to use a narrative presentation of the results appears appropriate. Overall, based on the poor quality data presented, the authors' cautious conclusions appear reliable.

Implications of the review for practice and research
Practice: The authors stated that there is little good quality evidence to support the current widespread use of primary brachial plexus surgery in most OBPP clinics worldwide.

Research: The authors stated that further well-conducted and adequately controlled trials are required to investigate that effectiveness of primary brachial plexus surgery for infants with OBPP. Such trials should use the following: standardised definitions for subgrouping different types of infants with OBPP; consistent surgical protocols identifying the criteria and timing of surgery; standardised tools to assess the outcome of surgery with follow-up outcomes over longer periods.

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Other publications of related interest

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.