Surgical rates after observation and bracing for adolescent idiopathic scoliosis: an evidence-based review

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CRD summary
The authors concluded that there was insufficient evidence to recommend either observation or bracing in preference to the other for reducing the surgical rate in adolescent idiopathic scoliosis. There were limitations to this review, but the authors' conclusions reflect the limited and inconsistent evidence from observational studies.

Authors' objectives
To evaluate rates of surgery after observation (untreated) and bracing for adolescent idiopathic scoliosis (AIS).

Searching
MEDLINE, Web of Science, the Cochrane Controlled Trials Register and Clinical Evidence were searched for studies published in the English language; the search terms were reported. In addition, reference lists were screened.

Study selection
Study designs of evaluations included in the review
Clinical evaluations were eligible for inclusion.

Specific interventions included in the review
Studies that evaluated observation or bracing (including thoracolumbosacral (TLSO) and bending braces but not including Milwaukee, SpineCor or Triac) without any other prescribed interventions were eligible for inclusion. The included studies evaluated a variety of different braces including the Wilmington, Providence, Boston, TLSO, Charleston and Rosenberger. Studies evaluated full-time (16 to 23 hours), part-time (12 to 16 hours) and night-time bracing.

Participants included in the review
Studies in which most patients had AIS diagnosed at, or after the age of 8 years, and meeting current indications for bracing (age less than 15 years, Cobb angle between 20 and 45 degrees, and Risser 0, 1 or 2) were eligible for inclusion. There were exceptions to these inclusion criteria and these were discussed. Most of the included studies involved males and females; some included only females. All studies included skeletally immature patients (Risser 0 to 2); some studies included a small number of patients with Risser 3 or 4. Cobb angles at the start of bracing ranged from 20 to 49 degrees. The patients had different types of curves (including thoracic, thoracolumbar/lumbar and double major).

Outcomes assessed in the review
Studies that assessed surgery, recommended surgery, and curve progression beyond 50 degrees were eligible for inclusion. Studies had to follow patients until at least skeletal maturity to be eligible. Where reported, the included studies used different indications for surgery (including undefined progression, and progression to more than 40 to 50 degrees and various other reported criteria).

How were decisions on the relevance of primary studies made?
One reviewer selected the studies.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
One reviewer extracted the data using a standardised form and repeated the data extraction a week later. Both versions were compared and discrepancies dealt with. Attempts were made to contact authors of studies with incomplete or missing information. For each study, the rate of surgery was presented.
Methods of synthesis

How were the studies combined?
Pooled prevalence rates of surgery with 95% confidence intervals (CIs) were calculated separately for untreated patients (observation) and those who had undergone bracing, by dividing the total number of surgical interventions by the number of patients.

How were differences between studies investigated?
Differences between the studies were discussed in the text. Subgroup analysis was used to examine the effect on pooled prevalence rates of Cobb angle at baseline, type of brace, curve type, Risser sign and bracing dose.

Results of the review
Seventeen studies (n=1,953) were included. One retrospective study compared observation with bracing; the other studies provided data for one treatment only. Fifteen studies (n=1,814) provided data for the evaluation of bracing and 3 studies (n=139) provided data for the evaluation of observation.

The sample size ranged from 15 to 139.

Surgical rates varied from 1 to 43% after bracing and from 13 to 38% after observation.

Pooled surgical rates were similar for bracing (23%, 95% CI: 20, 24) and observation (22%, 95% CI: 16, 29).

Authors' conclusions
There was insufficient evidence to recommend either observation or bracing in preference to the other for reducing the surgical rate in AIS.

CRD commentary
The review addressed a clear question that was defined in terms of the participants, interventions and outcomes. Only broad inclusion criteria were specified for the study design, but this seems appropriate given the limited evidence identified. Several relevant sources were searched but no attempts were made to minimise publication or language bias. Only one author selected studies and extracted the data, and this lack of duplication by another reviewer might have led to the introduction of error and bias. Adequate details of each included study were given. The data were pooled without a formal assessment of heterogeneity. The wide range of values for surgery rates suggest that pooling might not have been appropriate. However, attempts were made to examine potential sources of heterogeneity between the studies. Although study validity was not assessed, the limitations of evidence from observational studies were taken into account in the conclusions. There were limitations to this review, but the authors’ conclusions reflect the limited and inconsistent evidence from observational studies.

Implications of the review for practice and research
Practice: The authors stated that patients should be informed that there is no definitive evidence about the risk of surgery in AIS, and that the best estimates are that some 20 to 24% of patients who are treated with bracing will go on to have surgery. They should also be told that there is no evidence that bracing is better than observation at reducing rates of future surgery.

Research: The authors stated the need for long-term studies to assess the effect of ‘patient-determined’ surgery and ‘clinically determined’ surgery on health and function throughout adulthood.

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