Dura-splitting decompression of the craniocervical junction: reduced operative time, hospital stay, and cost with equivalent early outcome

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Dura-splitting decompression of the craniocervical junction (CCJ) in patients with Chiari I malformation without syringomyelia was evaluated. This was compared with duraplasty in patients with syringomyelia.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population included all paediatric patients with Chiari I malformation on whom a CCJ decompression was performed by one of the authors at a tertiary children's hospital between July 2000 and October 2002.

Setting
The setting was tertiary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness evidence and resource use data were both derived from a hospital database on patients with Chiari I malformation who had undergone CCJ depression surgery at a tertiary children's hospital between July 2000 and October 2002. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
It appears that the costing was carried out prospectively on the same sample of patients as that used in the effectiveness analysis.

Study sample
The study sample included 24 patients with Chiari I malformation who had undergone a CCJ decompression at a tertiary children's hospital between July 2000 and October 2002. It appears that the sample size was not determined in the planning phase of the study to assure a certain power.
Study design
This was a non-randomised controlled trial that was carried out in a single centre. The patients were divided into two groups according to whether or not they had syringomyelia. Twelve patients with syringomyelia underwent a standard CCJ decompression and 12 patients without syringomyelia underwent a dura-splitting CCJ decompression. Blinding was not used in the study. The mean follow-up period was approximately 15 months in both groups.

Analysis of effectiveness
The primary health outcomes used were:

- the outcome score, ranging from -1 (poor outcome, all symptoms worsened) to 2 (good outcome, all symptoms resolved);
- blood loss;
- complications; and
- readmission.

It appears that the analysis of the clinical study has been conducted on the basis of treatment completers only. The groups were generally shown to be comparable in terms of their age, gender distributions, and presenting clinical symptoms. The exceptions were incidence of headache and incidence of scoliosis alone and urinary incontinence. T-tests were used to compare all quantitative data for each group.

Effectiveness results
The clinical outcome scores demonstrated that most major presenting symptoms improved or resolved in both groups.

The mean outcome score was 1.53 for duraplasty and 1.67 for dura-splitting. The difference was not statistically significant.

The anaesthesiologists' estimates of blood loss were no different between the groups. Mean blood loss was estimated to be 80 mL (range: 25 - 250) for the duraplasty group and 73 mL (range: 25 - 300) for the dura-splitting group. The difference was not statistically significant.

There were no cerebrospinal fluid (CSF)-related, or any other complications, among those who underwent dura-splitting CCJ decompression.

One patient in the duraplasty group was readmitted to the hospital.

Clinical conclusions
Dura-splitting decompression for paediatric Chiari I malformation is better tolerated by the patients and avoids exposure to CSF-related complications compared with CCJ decompression and duraplasty.

Measure of benefits used in the economic analysis
No summary measure of benefits was used. The study was, in effect, a cost-consequences analysis.

Direct costs
The direct costs included the total hospital charges. Resource use quantities such as operative time, total operative room time and hospital length of stay were reported, but the unit costs were not. The estimations of the quantities and costs were based on actual data from the hospital database for the period between July 2000 and October 2002. The price year was not reported. Discounting was not performed, which was appropriate as the time horizon was less than 2 years.
Statistical analysis of costs
The resource use and cost data were treated stochastically, and the authors used standard t-tests at a 5% significant level.

Indirect Costs
No indirect costs were included.

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was not carried out.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The total hospital cost was $7,705 in the dura-splitting group versus $9,795 in the duraplasty group, (p<0.001).

Synthesis of costs and benefits
The estimated benefits and costs were not combined.

Authors' conclusions
Dura-splitting craniocervical junction (CCJ) decompression in paediatric patients with Chiari I malformation and without syringomyelia is safe, provides good early clinical results, and significantly reduces resource use.

CRD COMMENTARY - Selection of comparators
Although no explicit justification was provided for the comparator used, it would appear to represent current practice in the authors' setting. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness data were derived from a non-randomised controlled trial, which was inappropriate for the study question. The sample size was small and no power calculations were reported. Thus, it was not possible to ascertain whether the results obtained were due to the intervention or to chance. The patient groups were not shown to be comparable in all aspects at analysis. T-tests were undertaken to take potential biases and confounding factors into account.

Validity of estimate of measure of benefit
No summary measure of benefits was derived. The reader is referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The perspective adopted in the economic analysis was not stated, but it seems to have been that of the hospital as only the total hospital costs were included in the analysis. Some relevant costs were omitted from the analysis. In particular,
the costs resulting from the subsequent readmission of one duraplasty-treated patient for aseptic meningitis were not included. The consideration of such costs, as the authors reported, would have increased the advantages seen in the dura-splitting group. The costs and quantities were not reported separately, although resource use was reported. It appears that an appropriate statistical analysis of the quantities was performed. The costs were treated stochastically, but no sensitivity analysis of the costs was conducted. The price year was not reported, which will hamper any possible inflation exercises.

**Other issues**

The authors did not compare their findings with those from other studies, so it was not possible to assess the extent to which their results agreed with those from other published studies. The authors directly addressed the issue of generalisability of their results to other settings. The authors do not appear to have presented their results selectively. The authors’ conclusions reflected the scope of the analysis. The authors did not report any further limitations to their study.

**Implications of the study**

The study implied that dura-splitting CCJ decompression should be used in paediatric patients with symptomatic Chiari I malformation but without syringomyelia. The authors recommended a long-term follow-up study and a multi-centre, prospective randomised controlled trial comparing dura-splitting CCJ decompression versus CCJ decompression combined with duraplasty in a uniform patient population.

**Source of funding**

None stated.

**Bibliographic details**


**PubMedID**

15835106

**DOI**

10.3171/ped.2004.101.2.0184

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Adolescent; Adult; Arnold-Chiari Malformation /complications /economics /surgery; Child; Child, Preschool; Costs and Cost Analysis; Decompression, Surgical /economics /methods; Dura Mater /surgery; Female; Humans; Male; Neurosurgical Procedures /economics /methods; Prospective Studies; Syringomyelia /complications /economics /surgery; Time Factors; Treatment Outcome

**AccessionNumber**

22004009193

**Date bibliographic record published**

31/05/2006

**Date abstract record published**

31/05/2006