Systematic review of the effectiveness of antenatal intervention for the treatment of congenital lower urinary tract obstruction

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CRD summary
This review concluded that antenatal bladder drainage appeared to improve perinatal survival in cases of congenital lower urinary tract obstruction, but may confer a higher risk of poor postnatal renal function. The review was generally well conducted, but reliance upon small observational studies of variable quality suggests that the authors’ caution in their conclusions is justified.

Authors' objectives
To evaluate the effectiveness of antenatal interventions to improve perinatal survival and postnatal renal function in congenital lower urinary tract obstruction.

Searching
MEDLINE, EMBASE, The Cochrane Library, CINAHL, Medion Database, SIGLE, ISTP, DARE and British Nursing Index were searched without language restrictions from 1966 to 2009; search terms were reported.

Reference lists of included studies were checked for additional articles.

Study selection
Studies that included at least five foetuses and assessed bladder drainage via vesicocentesis, vesicoamniotic shunt, foetoscopic surgery (such as cystoscopy and ablation of valves) or open foetal bladder surgery in foetuses with ultrasonographic evidence of lower urinary tract obstruction were eligible for inclusion. Eligible outcomes included perinatal mortality, measurements of renal functions in survivors and other indicators of morbidity.

Included outcomes comprised: overall survival; survival excluding voluntary termination of pregnancy (VTP); perinatal survival; and survival with normal postnatal renal function. All foetuses included had ultrasound features that were suggestive of lower urinary tract obstruction, including an enlarged foetal bladder with dilated proximal urethra, with or without associated hydronephrosis. The most frequent interventions to relieve the obstruction was percutaneous vesicoamniotic shunts (87%). Reported gestational age at diagnosis ranged from 13 to 38 weeks. Most studies were in UK and USA.

Two reviewers assessed studies for inclusion.

Assessment of study quality
Two reviewers assessed study quality according to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) criteria.

Data extraction
Data to complete 2x2 tables were extracted and Peto odds ratios (OR) for survival and their 95% CI (confidence intervals) were calculated. Study authors were contacted for additional information where necessary.

Two reviewers performed the data extraction; disagreements were resolved by a third reviewer.

Methods of synthesis
Peto odds ratios and 95% CIs were pooled in a fixed-effects meta-analysis. Subgroup analyses were performed according to the predicted foetal prognosis (according to antenatal ultrasound features or foetal urinalysis) and
comparing treatments with one another. Where tables contained cells with zeros the 2x2 table was excluded from the
meta-analysis if Peto odds ratios could not be calculated. Cochran’s Q and $I^2$ statistic were used to assess statistical
heterogeneity. Publication bias was assessed with funnel plots and Egger’s test.

Results of the review
Twenty 20 studies (n=369 fetuses) were included in the review; more than half of the included studies comprised
retrospective cohort studies. More than 80% of studies described study design, explained study size, participant
eligibility criteria, patient characteristics and follow-up and number of outcome events. Few studies addressed bias.
Reporting of interventions was poor. Follow-up duration ranged from zero to 228 months.

Compared with no treatment, antenatal intervention (Peto OR 3.82, 95% CI 2.14 to 6.82; 12 studies, $I^2=0\%$) and
prenatal bladder drainage (OR 3.86, 95% CI 2.00 to 7.45; 11 studies) improved perinatal survival. Although treatment
increased survival, the residual risk of poor long-term postnatal renal function was uncertain (OR 0.50, 95% CI 0.13 to
1.90; five studies). It was unclear whether heterogeneity was present for these comparisons.

For subgroup analysis according to predicted prognosis based on foetal urinalysis, within the good prognosis group
there was no significant difference in survival and where there was a poor prognosis the size of the effect increased
(OR 26.19, 95% CI 4.39 to 156.26; two studies, $I^2=0\%$). When VTPs were excluded from the analysis, the effect on
the overall population remained significant (OR 2.43, 95% CI 1.18 to 5.02; 11 studies, $I^2=5.3\%$). The size of the effect
remained large in the poor prognosis group (OR 8.05, 95% CI 1.23 to 52.87; two studies, $I^2=0\%$). Antenatal
intervention only showed a significant benefit in the poor prognosis group when investigating the effect of antenatal
intervention on postnatal survival after excluding VTP and intrauterine death (OR 9.36, 95% CI 1.41 to 62.05; two
studies).

There was no apparent evidence of publication bias.

Authors’ conclusions
Antenatal bladder drainage appeared to improve perinatal survival in cases of congenital lower urinary tract
obstruction, but may confer a high residual risk of poor postnatal renal function based on observational studies.

CRD commentary
The review question and supporting inclusion criteria were clearly defined. A comprehensive literature search was
performed without language restrictions, which reduced potential for language and publication biases. The likelihood
of publication bias was assessed and found to be low. Two reviewers undertook trial selection, data extraction and
validity assessment procedures, which reduced potential for reviewer bias and error. Validity was assessed using
published criteria, but the criteria used to assess study quality were not reported in full; most studies had
methodological shortcomings. It appeared that appropriate methods were used to pool the trials, although most
analyses were based on a small number of studies and heterogeneity was not reported for all analyses. Subgroup
analyses were conducted in an attempt to investigate heterogeneity.

The review was generally well-conducted, but reliance on small observational studies of variable quality suggests that
the authors’ caution in their conclusions is justified.

Implications of the review for practice and research
Practice: The authors stated that current evidence was insufficient to dictate clinical practice.

Research: The authors stated that randomised studies with long-term follow were required to investigate the role of
antenatal treatment in clinical practice.

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