Prenatal bladder drainage in the management of fetal lower urinary tract obstruction: a systematic review and meta-analysis


CRD summary
This review assessed prenatal drainage of the bladder in foetuses with a lower urinary tract obstruction. The authors concluded that there is insufficient evidence to draw definitive conclusions about the effects of prenatal bladder drainage and that further research is needed. This review was generally well conducted.

Authors' objectives
To assess the effect of prenatal bladder drainage on perinatal survival in foetuses with lower urinary tract obstruction (UTO).

Searching
MEDLINE (from 1966 to 2002), EMBASE (from 1988 to 2002) and the Cochrane Library (Issue 4, 2000) were searched for studies published in any language and conducted in any country; the search terms were stated. The reference lists in reviews and identified studies were checked and the journal Perinatal Diagnosis was manually searched. Unpublished data were not sought. Only the most recent versions of multiple reports or overlapping studies were selected.

Study selection
Study designs of evaluations included in the review
Controlled and uncontrolled studies were eligible for inclusion. Case reports and case series with fewer than 5 participants were excluded. The included studies were described as uncontrolled or controlled studies.

Specific interventions included in the review
Studies of foetal bladder drainage using vesicocentesis, vesicoamniotic shunt, or open foetal bladder surgery were eligible for inclusion.

Participants included in the review
Studies of foetuses with an ultrasonic diagnosis of lower UTO were eligible for inclusion. The foetal prognosis (based on gestational age, underlying pathology, renal damage, amniotic fluid volume, and bladder refilling or urinary biochemistry after draining) varied widely in the included studies.

Outcomes assessed in the review
Studies that reported perinatal and/or infant survival were eligible for inclusion. The primary outcome in the review was perinatal survival, excluding voluntary termination of the pregnancy. The secondary outcomes included overall perinatal survival (including voluntary termination) and postnatal survival (excluding stillborns and termination of pregnancy). The review also assessed complications and failure of the intervention, and perinatal or infant morbidity.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies and resolved any disagreements on inclusion through consensus, or through recourse to a third author.

Assessment of study quality
Validity was assessed on the basis of study design, data collection, patient selection, details of the population, description of the intervention, the percentage of participants followed up and outcome measures. The review stated the ideal for each of these criteria. Two reviewers independently assessed validity.
Data extraction
Two reviewers independently extracted the data. For controlled studies, data were extracted to construct 2x2 tables for perinatal survival with bladder drainage compared with the control.

Methods of synthesis
How were the studies combined?
The range of perinatal survival rates was reported for all uncontrolled series and for series of vericoamniocentesis cases. The overall number of survivors with normal renal function was calculated. Controlled studies with adequate data were combined using a meta-analysis. Pooled Peto odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. The studies were weighted by the inverse of the variance. The influence of foetal prognosis was explored by a stratified analysis of data available from 2 studies.

How were differences between studies investigated?
Statistical heterogeneity in the meta-analyses was tested using the chi-squared statistic.

Results of the review
Sixteen studies (342 foetuses) were included: 7 controlled series (195 foetuses) and 9 case series without controls (147 foetuses).

Methodological problems with the studies included: lack of prospective data collection (15 out of 16 studies); lack of recruitment of consecutive patients (14 studies); inadequate description of the intervention (11 studies); variability within studies of the length of follow-up; lack of consistent protocols throughout the study; and a variety of methods for treatment allocation were used within studies. Details of the study design were generally poorly reported in case series.

Of the 210 attempted bladder drainage procedures using vesicoamniotic shunt or open foetal surgery, shunt placement failed in 4 cases and complications were reported in 28 cases. Nine of the complications were considered major complications (3 treatment-related deaths, 4 chorioamnionitis, 1 fistulous tract and 1 gastroschisis).

The overall perinatal survival ranged from 0 to 100% in the uncontrolled series.

Over all studies, 73% of foetuses (93 of 124 with adequate data) survived with normal renal function after vesicoamniotic shunt placement. Eleven of these cases required postnatal corrective surgery.

Meta-analysis of controlled studies.
Perinatal survival (excluding termination of pregnancy).

Compared with no intervention, prenatal bladder drainage appeared to significantly improve perinatal survival in 4 controlled studies (92 foetuses). The OR was 2.5 (95% CI: 1.1, 5.9, P=0.03).

In 2 series, the prenatal intervention appeared to significantly improve perinatal survival in foetuses with a poor prognosis in comparison with no intervention (21 foetuses; OR 8.1, 95% CI: 1.2, 52.9, P=0.03), but not in foetuses with a good prognosis (46 foetuses; OR 2.8 (95% CI: 0.7, 10.8, P=0.13). There was no significant heterogeneity in any of these meta-analyses.

Overall perinatal survival.

Vesicoamniotic shunt significantly increased overall perinatal survival compared with no intervention. The OR was 4.2 (95% CI: 2.1, 8.6). The interventions improved survival in foetuses with a poor prognosis, but not in foetuses with a good prognosis. The OR was 26.19 (95% CI: 4.39, 156.2) for poor prognosis (2 controlled studies, 46 foetuses) and 2.25 (95% CI: 0.65, 7.81) for good prognosis (2 controlled studies, 49 foetuses).

Postnatal survival (excluding intra-uterine deaths and voluntary termination of pregnancy).
Prenatal bladder drainage did not significantly improve postnatal survival in foetuses with either a poor prognosis or a good prognosis. The ORs were 9.4 (95% CI: 1.4, 62.1, P=0.02) based on 2 studies (20 foetuses) and 1.87 (95% CI: 0.39, 8.87) based on 2 studies (42 foetuses), respectively. The OR for all foetuses in 4 controlled series (84 foetuses) showed no significant difference (OR 2.2, 95% CI: 0.9, 5.6).

Authors' conclusions
There was insufficient evidence to draw definitive conclusions about the effects of prenatal bladder drainage. The limited evidence suggested that prenatal bladder drainage may improve perinatal survival in foetuses with ultrasonic evidence of lower UTO, particularly in foetuses with a poor prognosis.

CRD commentary
This was a clearly presented and generally well-conducted review. The review question was clear in terms of the intervention, participants and outcomes, but the study designs were not always clear. Several relevant sources were searched, the search terms were stated and no language restrictions were applied. The authors correctly acknowledged that publication bias might have resulted from the lack of attempts to locate unpublished studies. Two reviewers independently selected the studies, assessed validity and extracted the data, thus reducing the potential for bias and errors. Validity was assessed using specified criteria and the results of the assessment were reported.

Given the study design (case series) and the poor quality of the included studies, the wisdom of pooling the studies was questionable. The evidence presented supports the authors' conclusion regarding the lack of evidence, but the conclusions regarding effectiveness are not based on firm evidence.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that an adequately powered prospective study is required to assess the short- and long-term effects of prenatal foetal bladder drainage.

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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.