



SFM Fetal Therapy Practice Guidelines: Fetal Fluid Aspiration

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Abstract

Keywords

- ▶ informed consent
- ▶ thoracocentesis
- ▶ ultrasound
- ▶ vesicocentesis

Fetal fluid aspiration is commonly required from the pleural cavity or bladder and is termed as thoracocentesis or vesicocentesis, respectively. These procedures are performed for diagnostic and therapeutic indications. A detailed pre-procedure counseling and informed consent of the patient are necessary explaining the procedure and risks involved. These can be performed under aseptic precautions using ultrasound guidance with the help of 22-gauge needle.

Fetal fluid aspiration: Thoracocentesis/Vesicocentesis

Indications for Thoracocentesis

1. Isolated idiopathic fetal hydrothorax/pleural effusion (diagnostic and therapeutic)
2. Congenital pulmonary adenomatoid malformation (macrocytic type)

Indications for Vesicocentesis

Vesicocentesis is done to examine the bladder fluid to assess the renal function and the efficacy of intrauterine shunt placement in cases of lower urinary tract obstruction treatment in cases where the exact cause is not known.

A. CONSENT

I have been explained in a language that I fully understand that my baby has an excessive collection of fluid in the lung space/ excessive urine in the bladder (due to obstruction of flow to urine), and I will be undergoing a procedure involving removal of the collection of fluid/ urine with the help of passing a needle in the lung

space/bladder of the baby through my womb under local anesthesia. The risks and benefits of this procedure have been explained to me and I after understanding them, give my free and willful consent to undergo the procedure.

B. MATERNAL RISKS

- Pain
- Minimal bleeding
- Miscarriage 1%
- Infection

C. FETAL RISKS

Immediate:

- Abnormality in fetal heart rate requiring emergency cesarean section
- Bleeding into the fetal lung/bladder
- Injury to adjoining organs like the heart and vessels

Delayed:

- Reaccumulation of fluid.

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D. INFORMATION LEAFLET FOR PATIENT

Thoracentesis: Fetal pleural effusion is an accumulation of fluid in the chest cavity of a developing fetus. As the fluid increases, it can compress the developing lungs and heart. The underlying cause of pleural effusion in a fetus may include genetic issues, infection, and heart or lung conditions. The outlook for each individual case depends on the amount of fluid in the chest. A high amount of fluid can lead to fetal heart failure (hydrops) and pulmonary hypoplasia (underdeveloped lungs). Fetal pleural effusion is sometimes also called fetal hydrothorax. After ruling out any other causes of fluid accumulation in the fetal chest and that the only problem is severe compression of the fetal heart and lungs, we can perform a thoracentesis, a procedure performed under continuous ultrasound guidance in which we use a small needle to drain the fluid. The fluid will be tested to determine its origin—this helps us identify the cause of the fluid build-up and guide treatment. The fluid is also tested for infection and chromosomal abnormalities.

Vesicocentesis: A vesicocentesis involves using a needle to withdraw excess fluid from the fetal bladder. This is done under ultrasound guidance. Fetal urinary tract obstruction is a condition that is caused by the blockage of fetal urination. Because your baby cannot empty its bladder in utero, the bladder may become very large and distended resulting in the need for drainage. Multiple procedures may be needed as the urine keeps on accumulating. This helps to prevent damage to the kidneys. This procedure may also be used to assess the character of fluid in the bladder.

E. COUNSELING STATEMENT FOR MEDICAL RECORDS

The patient has been counseled regarding the need, process, risks and benefits of this intervention and an informed and valid consent has been taken for the same.

F. EQUIPMENT AND DEVICES REQUIRED

- 2% lignocaine solution, normal saline
- 22-gauge needle (9 cm/15 cm/18 cm/22 cm in length)
- High-resolution ultrasound
- Sample collection vials

G. PRE-OP CHECKLIST

- Signed consent
- Signed F form
- Signed G form
- Heparinized vials

H. PRE-OP PREPARATION OF THE PATIENT

- Consent for karyotyping, fetal urine sampling, and laboratory testing
- Ensure the patient's bladder is empty
- Antibiotic prophylaxis (optional)

I. OPERATING ROOM REQUIREMENT

- Ultrasound machine
- Sterile covers for ultrasound probe

- Standard universal sets for operative site disinfection and sterile draping
- 22-gauge spinal needle (9 cm/15 cm/18 cm/22 cm in length)
- 20 ml syringes

J. PERSONNEL REQUIREMENT

- Operator: Trained in ultrasound and ultrasound-guided procedures
- Nurse to set tray and provide things

K. PROCEDURE STEPS

The patient is laid in a supine position after she evacuates her urinary bladder and the part is prepared for the procedure using aseptic precautions.

Thoracentesis

In this procedure, under ultrasound guidance, a 22-gauge needle (length of the needle is determined by measuring the distance between the point of entry and the site from where fluid would be aspirated) is inserted into the chest of the fetus and the pleural fluid is drained. During thoracentesis, the fluid can be tested for underlying conditions that may have led to fetal hydrothorax. In up to 10 percent of patients, this procedure completely resolves fetal hydrothorax. In most cases, there is reaccumulation of the fluid wherein repeat thoracentesis is not a viable alternative, as it will not be able to prevent underdeveloped lungs. In such a scenario, thoracoamniotic shunt may be considered.

Bladder Aspiration

Various studies have suggested that biochemical analysis of fetal urine can provide valuable information regarding the prognosis for renal function and identify cases that require in utero intervention. Fetal urine biochemistry is one of the methods for evaluating the glomerular and tubular functions quantitatively and can be used for predicting postnatal renal function

Under ultrasound guidance, a 22-gauge needle (the length of the needle is determined by measuring the distance between the point of entry and site from where fluid would be aspirated) is inserted into the bladder of the fetus and the urine is aspirated and drained. A minimum of three bladder drainage procedures are completed over 5 to 7 days. Complete bladder drainage and analysis of fetal urine for sodium, chloride, osmolality, calcium, b₂-microglobulin, and total protein (–Table 1) are performed at 24 to 48 hours intervals.

The initial bladder drainage procedure evaluates urine that has been present in the fetal bladder for a long duration and does not reflect the present renal function. After 24 hours, the second bladder drainage procedure is performed. This represents urine that has drained from the upper tract into the bladder. The

Table 1 Prognostic urine values for selection of fetuses for prenatal intervention

Urine electrolytes	Good prognosis	Poor prognosis
Sodium	< 90 mmol/L	> 100 mmol/L
Chloride	< 80 mmol/L	> 90 mmol/L
Osmolality	< 180 mOsm/L	> 200 mOsm /L
Total protein	< 20 mg/dL	> 40 mg/dL
Beta2 microglobulin	< 6 mg/L	> 10 mg/L
Calcium	< 7 mg/dL	> 8 mg/dL

Note: Based on the last urine specimen obtained by serial bladder drainage (three to four times) at 24–48 hours intervals between 18 and 22 weeks of gestational age.

third bladder drainage procedure is then performed on the following day representing urine that has recently been formed by the kidneys and is most reflective of the degree of underlying renal function and damage.

M. POST-OP CHECKLIST AND POST-OP MONITORING OF MOTHER AND FETUS

- Document fetal heart activity and also show it to the patient at the end of the procedure.
- If the woman is Rh negative (nonisoimmunized), anti-D 300 µg to be given.
- Ultrasound scan after 24 hours is done to assess possible complications such as fetal demise
- If no complaints from the patient, she is allowed to go home with the following advice:
 - Avoid overstraining/lifting heavy weights for a week
 - Report to the hospital immediately if there is substantial leaking, bleeding, pain, generalized feeling of unwellness, or fever
- A detailed procedure report and follow-up plan are generated and one copy is handed over to the patient at the time of discharge.

N. INVASIVE REPORT TEMPLATE

Date
 Patient name
 Age
 Hospital ID
 Contact number
 Obstetric history: G P A L; Type of conception: Consanguineous
 Family history (including pedigree analysis)
 Gestational age at diagnosis
 Gestational age at procedure
 Indication
 Procedure name
 Number of attempts: Single/double/multiple
 Number of samples obtained
 Investigations advised
 Intraoperative complications
 Post-procedure cardiac activity (immediately)
 Post-op advice

Conflict of Interest
 None declared.

Suggested reading

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