Amniotic fluid abnormalities

Learning Objectives: Understand the causes, complications and management of oligohydramnios and polyhydramnios.

The amniotic fluid is initially secreted by the amnion, but by the 10th week it is mainly a transudate of the fetal serum via the skin and umbilical cord **,** From 16 weeks gestation the amniotic fluid is produced mainly from the fetal urine.

The function of the amniotic fluid is to:

- Protect the fetus from mechanical injury
- Permit movement of the fetus while preventing limb contracture.
- Prevent adhesions between fetus and amnion
- Permit fetal lung development and help the fetal lungs to expand and develop through breathing .

The volume depends on urine production , fetal swallowing, and absorption. Normal volume varies with gestation, and is highest between 24 and 36wks. The volume is measured by ultrasound, either by measuring the deepest vertical pool, or by adding up the deepest pools in the four quadrants of the uterus (AFI).

Polyhydroamnios

Polyhydramnios is the term given to an excess of amniotic fluid, i.e. AFI > 95th centile for gestation on ultrasound estimation.
The amniotic fluid is increased. In general a deepest pool of >8cm or an AFI >25 is abnormal.

Clinical features:

It may present as severe abdominal swelling and discomfort. On examination, increased SFH, the abdomen may be tense and tender and the fetal poles will be difficult to palpated.

Causes of polyhydramnios

Maternal

- Diabetes
- Placental (Chorioangioma)
- Arterio-venous fistula.

Fetal

- Multiple gestation (in monochorionic twins .it may be twin-to-twin transfusion syndrome)
- Idiopathic
- Oesophageal atresia / tracheo-oesophageal fistula
- . duodenal atresia
- Neuromuscular fetal condition (preventing swallowing).
- Anencephaly
- Fetal congenital infections or chromosomal abnormalities/genetic syndromes.

Complications

- Preterm delivery, probably because of uterine stretch
- Malpresentation at delivery because of increased room for fetus .
- Maternal discomfort because of abdominal distension.

Investigations

-Exclude maternal diabetes with a glucose tolerance test (GTT).

-Ultrasound examination of fetus.

Management

The management of polyhydramnios is directed towards establishing the cause (determining fetal prognosis).

-Severe polyhydramnios is usually associated with fetal abnormality, if massive (e.g. AFI >40), amnioreduction (drainage of excess fluid with a needle), or non-steroidal anti-inflammatory drugs (NSAIDs).

-If fetal abnormality, refer to fetal medicine center .

-Twin–twin transfusion syndrome is best managed in a fetal medicine center, usually with laser ablation of placental anastomoses .

-If preterm, assess risk of delivery with cervical scan and/ or fibronectin assay, and consider steroids .

-If unstable or transverse lie at term, admit to hospital , C/S if labour with an abnormal lie .

-NSAIDs cause fetal oliguria and can constrict the ductus arteriosus ,close supervision is therefore indicated.

Oligohydramnios

Too little amniotic fluid (oligohydramnios) is commonly defined as amniotic fluid index $< 5^{th}$ centile for gestation.

In oligohydramnios, the amniotic fluid volume is reduced. a deepest pool of < 2 cm or an AFI of $<$ 5cm is considered low.

Causes of oligohydramnios

Too little production	*Diagnosed by*
Renal agenesis	Ultrasound: no renal tissue, no bladder
Multicystic kidneys	Ultrasound: enlarged kidneys with multiple cysts, no visible bladder
Urinary tract abnormality/ obstruction	Ultrasound: kidneys may be present, but urinary tract dilatation
FGR and placental insufficiency	Clinical: reduced SFH, reduced fetal movements, possibly abnormal CTG, Ultrasound: FGR, abnormal fetal Doppler wave forms
Maternal drugs (e.g. NSAIDs)	Withholding NSAIDs may allow amniotic fluid to reaccumulate
Post-dates pregnancy	
Leakage	*Diagnosed by*
PPROM	Speculum examination: pool of amniotic fluid on poste-rior blade

NSAID, non-steroidal anti-inflammatory drug; SFH, symphysis–fundal height.

Clinically : the fetal poles may be very obviously felt and 'hard', with a small for dates uterus.

The fetal prognosis depends on the cause of oligohydramnios, but both pulmonary hypoplasia and limb deformities are common for severe and early-onset (<24weeks) oligohydramnnios .

Renal agenesis and bilateral multicystic kidneys carry a lethal prognosis, as life after birth is impossible without functioning kidneys. In this situation, the fetal lungs would probably be hypoplastic .

Oligohydramnios due to FGR/uteroplacental insufficiency is usually of a less severity and less commonly causes limbs and lungs problems.

Complications

Related to cause

- preterm rupture of the membranes is commonly followed by delivery and/or intrauterine infection.
- IUGR is an important cause of fetal and neonatal mortality and long-term morbidity .

Related to reduced volume

- lung hypoplasia if occurs <22wks
- limb abnormalities, e.g. talipes, if prolonged

oligohydramnios before 22wks has a very poor prognosis.

Investigations

- USS of fetus, including Doppler
- Speculum examination to look for ruptured membranes
- If suspected spontaneous rupture of membranes (SROM): CRP, FBC and vaginal swabs should be taken

Management of oligohydramnios

-If SROM at 34–36 or more weeks

Induce labour unless C/S is indicated for another reason .

-If SROM before 34–36wks

- Give prophylactic oral erythromycin
- Monitor for signs of infection (4-hourly temperature and pulse).
- Daily CTG
- Consider induction by 34–36wks

-If IUGR

Manage according to umbilical artery Doppler and CTG .

If apparently isolated oligohydramnios

- Reconsider cause

Intervention is not usual if umbilical artery Dopplers are normal

- If fetal renal tract abnormality

Refer to fetal medicine centre

-If the cause is maternal drugs (NSAIDS)

Withholding NSAID may allow amniotic fluid to re-accumulate.

Smoking in pregnancy

All women should be counseled regarding smoking cessation at their booking visit ,if they cannot stop ,reduction should be promoted.
Stoping smoking at any stage has a beneficial effect.

Effect of smoking on pregnancy

- Reduces placental perfusion.
- Overall perinatal mortality is increased.
- there is a higher risk of antepartum haemorrhage
- Preterm delivery
- Low birth weight .

Alcohol during pregnancy

There is much debate about what is a ‘safe’ dose of alcohol during pregnancy.
Massive doses, in excess of 2 g/kg of body weight (17 drinks per day), have been associated with fetal alcohol syndrome..

Features of fetal alcohol syndrome

•IUGR
• Short stature
• Developmental delay
• Micro-ophthalmia
• Short palpebral fissure
• Short nasal bridge
• Microcephaly with prominent forehead
• Thin upper lip and small philtrum
• Cleft palate

- Maxillary hypoplasia
- Gait abnormalities
- Cardiac abnormalities

Management

Management of pregnancy in women abusing alcohol

- Detailed anomaly USS .
- Serial USS to assess growth and fetal well-being .
- Multidisciplinary team management with involvement of
    - paediatric team .
    - anaesthetic team
    - social services
    - local specialist
    - alcohol support workers
- May need child protection