Amniotic fluid & its abnormalities

AF, or liquor amnii, is the protective fluid contained in the amniotic sac of a pregnant female and surrounded the fetus in the intrauterine life, providing the protective, low resistance space suitable for fetal growth and development.

Development of AF

The AF can be detected as early as the formation of the gestational sac. This is firstly water-like fluid originating from maternal plasma, and passes through the fetal membrane by osmotic and hydrostatic forces.

As the placental and fetal vessels develop, the fluid passes through fetal tissues. After 20\textsuperscript{th} – 25\textsuperscript{th} weeks of pregnancy, when the keratinization of skin occurs, the quantity of AF begins to depend on the factors that affect the AF circulation (swallowing and urination).

In early pregnancy, AF is only fluid (water) and electrolytes. About 12\textsuperscript{th}-14\textsuperscript{th} weeks, the liquid also contains proteins, carbohydrates, lipids, phospholipids, and urea which aid in fetal growth.

The volume of AF is positively correlated with fetal growth, from 10\textsuperscript{th} – 20\textsuperscript{th} weeks, it increases from 25-400ml and reaches a plateau of 800ml at the 34\textsuperscript{th} weeks gestational age. The amount of fluid declines to 400ml at 42 weeks gestational.

The clinical assessment of AFV is unreliable by U/S, these include:

a. Deepest vertical pocket (DVT) = 2-8cm.

b. Amniotic fluid index: it’s the sum of DVT in 4 uterine quadrants, which is empty from fetal parts or umbilical
cord. normally the AFI is 10-25cm. AFI < 10 cm decreased, below 5cm is Severe oligohydramnios.

**Amniotic fluid functions**

1. Reduced the effects of external trauma.
2. Decreases the effects of uterine contraction on fetus.
3. Forms a room in which baby swimming.
4. Maintains fetal body temperature.
5. Acts as nutrients for fetus.
6. Forms a wedge at dilated os before birth.
7. Washes the cervix & vagina by its bacteriostatic function (its PH = 7-7.5).
8. Prevents compression of umbilical cord.

The AF volume increases steadily throughout pregnancy to a maximum of 400-1200ml at 34-38 weeks & net increase of AF is only 5-10ml/day in third trimester & after 38 weeks, the volume declines by =125ml per week.

**Polyhydramnios**

Polyhydramnios or hydramnios is an excessive volume of AF relative to gestational age, which may be acute or chronic. it complicates 1-3.5% of all pregnancies. Its defined as DVT > 8cm or AFI above 95th centile for gestational age. chronic polyhydramnios is more common than acute one.

**Risk factors**

1. Idiopathic in 90% of cases.
2. Maternal causes: such as DM & Rh- isoimmunization.
3. Placental causes such as chorioangioma or circumvallate placenta.
4. Placental causes such as:
   - Multiple pregnancy (TTTS)
- Gastrointestinal (GI) eosophageal atresia , duodenal atresia , annular pancrease & amphalocele.
- CNS lesion : anencephaly ---- spina bifida
  Hydrocephaly – microcephaly
  Encephalocele – hydronecephaly
- Skeletal malformation such as osteogenesis imperfect.
- Fetal tumours : sacrococeyal teratoma.
- Cardiac disease : CHD , fetal arrhythmia .
- Genetic disorders : trisomy 13 , 18.
- Hematological : α-thalassemia, fetomaternal haemorrhage.
- Intrauterine infections : TORch infection & parvo B19 virus.2
- Others : non-immune hydrops fetalis

**Management of polyhydramnios** : is either

1. Conservative
2. Medical
3. Surgical
4. Both

Depending on etiology , severity , clinical symptoms & GA at diagnosis with any associated abnormalities.

a. Conservation Mx , by treatment of underlying causes ( infection anemia .. etc , in a gradual , mild polyhydramnios

b. Medical Mx :

- Salt restriction
- Diuretics
- Intra-amniotic vasopressin

Not proved benefit
**Indomethacin** (NSAID) is suggested as therapeutic modality to reduce AFV because it decrease fetal urinary output.

Indomethacin should be used prior to 30 weeks because of risk of premature closure of ductus arteriosus resulting in pulmonary hypertension postnatally.

c. Surgical managements by therapeutic amniocentesis or complicated in 30-45 min & volume aspirated ranging from 200-4000 ml. Extension compression results in placental separation, preterm labour & even IUFD

**Oligohydramnios**

It’s a decrease in AFV relative to gestational age or DVP < 2 cm & AFV is below 5th centile for GA its incidence = 3.9%, which is either acute or chronic.

Acute oligohydramnios results from premature rupture of fetal membrane & fetal abnormalities.

**Causes:**

1. Fetal anomalies: such as renal agenesis, multi cystic or poly cystic kidney, posterior Urethral valve.
2. NSAIDS.
3. TTTS.
4. RROM.
5. IUGR & placenta insufficiency.
7. Repetition of cord compression.

**DX:**

1. Easily palpated fetal parts
2. Small for date fundal height
3. By U/S (DVT & AFI)

Its management is by management of underlying cause accordingly.