Table 24.3: Abnormalities of Membranes and Amniotic Fluid
I. Abnormalities of Membranes
1. Premature rupture of membranes (PROM) / early rupture of membranes (see Chapter 34 for details)
2. Chorioamnionitis (infection of chorion and amnion)
II. Abnormalities of Amniotic Fluid (Liquor Amnii)
1. Hydramnios or polyhydramnios (excessive liquor)
2. Oligohydramnios (scanty liquor)

POLYHYDRAMNIOS (SYN. HYDRAMNIOS)

Hydramnios or polyhydramnios is defined as the presence of an excess of amniotic fluid of more than 2000 mL. For clinical diagnosis, an amniotic fluid index of 25 cm or above or single deepest pocket (SDP) > 8 cm or two diameter fluid pocket > 50 cm^2 is considered as polyhydramnios.

Severity of hydramnios are:

1. **Mild hydramnios.** Where single deepest pocket measures between 8–10 cm or AFI between 25–29.9 cm. It is seen in 80% cases.
2. **Moderate hydramnios.** Where single deepest pocket measures between 10–12 or AFI between 30–34.9 cm. It is seen in 15% cases.
3. **Severe hydramnios.** Where single deepest pocket measures ≥ 12 cm or AFI ≥ 35 cm. It is seen in 5% cases.

Incidence

Estimated incidence ranges between 0.4–1.5% of all pregnancies being more common in multiparas than primigravidas. Significant polyhydramnios causing clinical symptoms are observed in 1 out of 1000 pregnancies.

Etiology

Polyhydramnios can be due to excessive production of liquor amnii or due to defective absorption. Its various causes are as follows:

1. **Idiopathic.** In up to two-thirds (66%) of cases, the cause is unknown.
2. **Foetal causes.**
   (*i*) Anencephaly—Hydramnios is seen in up to 50% cases of anencephaly and is due to:
   (a) Excessive transudation of fluid from the

exposed meninges into the amniotic cavity. (b) Impaired foetal swallowing. (c) Increased urination due to inhibition of foetal antidiuretic hormone or due to stimulation of cerebrospinal centers deprived of their protective coverings.

(ii) Spina bifida like meningocele, meningomyelocele: Due to excessive transudation of fluid from the exposed meninges.

(iii) Esophageal (15% cases) and duodenal atresia—Due to impaired swallowing.

(iv) Facial dysmorphism and neck swelling like thyroid swelling or cystic hygroma They reduce swallowing of amniotic fluid.

(v) Congenital diaphragmatic hernia

(vi) Foetal Barter syndrome (Renal disease with thick ascending limb of loop of Henle. Only renal disease to cause polyhydramnios and salt wasting polyuria.)

(vii) Foetal muscular dystrophy

(viii) Foetal sacrococcygeal teratoma

(ix) Foetal vein of Galen aneurysm

(x) Foetal infections

(xi) Erythroblastosis fetalis (11.5%)

(xii) Non-immune hydrops

(xiii) **Multiple pregnancy:** Due to large placenta. It is seen in 12% multiple pregnancies. It is more common in monochorionic twins and is associated with twin-twin transfusion syndrome (TTTS).

3. **Placental causes.** Placental chorioangioma can cause hydramnios from excessive transudation of fluid from it.

4. **Maternal causes.**

(i) Diabetes (30% cases) due to foetal hyperglycemia causing foetal diuresis and hydramnios.

(ii) Cardiac or renal disease due to excessive transudation of fluid from edematous and large placenta (left heart failure).

(iii) Maternal substance abuse

Types

Depending upon how quickly it develops, hydramnios can be chronic or acute.

Chronic hydramnios

Chronic hydramnios is the more common variety where there is a gradual increase in fluid over few weeks. It usually occurs after 32 weeks. In chronic hydramnios, symptoms are not so marked and patient is not so sick.

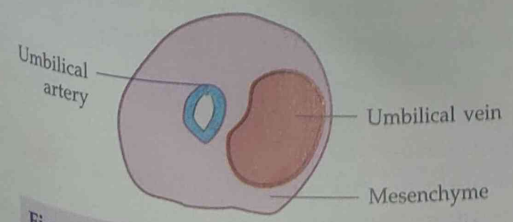


Fig. 24.8: Cross-section of umbilical cord showing single umbilical artery

Diagnosis

Symptoms

The symptoms are due to mechanical compression of adjacent organs.

1. Respiratory—The patient may complain of breathlessness on lying down and may be in the upright position most of the time for easier breathing.
2. Palpitation
3. Swelling of the lower extremities, vulva and abdominal wall.
4. Varicose veins in legs and vulva due to compression of veins by large uterus.
5. Piles may be aggravated.

Signs

1. The woman may be breathless especially in lying down position.
2. Maternal mirror syndrome in which maternal condition mimics the fetus with signs of pre-eclampsia (edema, hypertension and proteinuria). It is seen in foetal hydrops.

Abdominal examination

1. There is excessive rounded distension of abdomen with full flanks (Fig. 24.9).
2. Abdominal skin is stretched, tense, glistening and shining.
3. Costal margins are obliterated.
4. There is uterine enlargement with increased fundal height and excessive abdominal girth round umbilicus.
5. Demonstration of fluid thrill due to excessive liquor.
6. There is difficulty in palpating small foetal parts and presentation. External ballotment is easily demonstrated.
7. There is difficulty in hearing foetal heart sound with stethoscope. Doppler ultrasound can pick up the heart rate.

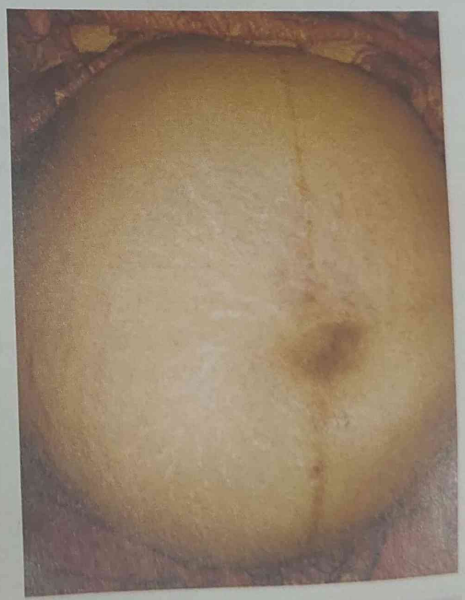


Fig. 24.9: Actual clinical photograph of a woman showing excessive abdominal distension in polyhydramnios

Vaginal examination

There may be no specific findings on vaginal examination. Cervix may be lifted up or may be slightly dilated with prominent bag of membranes.

Investigations

1. ***Ultrasound.*** Ultrasound evaluation is useful for diagnosis (Fig. 24.10)—(a) A deepest single pocket > 8 cm or amniotic fluid index of > 25 cm is diagnostic. Multiple pregnancy and foetal congenital malformations can be found or ruled out.
2. ***Radiography.*** Radiography is only done if ultrasound is not available. The X-ray may not be very clear and may show twin pregnancy or foetal congenital anomalies.
3. ***Blood.***
   (*i*) Blood group as Rhesus isoimmunization can cause hydrops fetalis and foetal hydramnios.
   (*ii*) Fasting and post prandial blood sugar or glucose tolerance test to rule out diabetes.
4. ***Amniotic fluid.*** Measurements of alpha fetoprotein in amniotic fluid is raised in foetal central nervous system defects (rarely done).

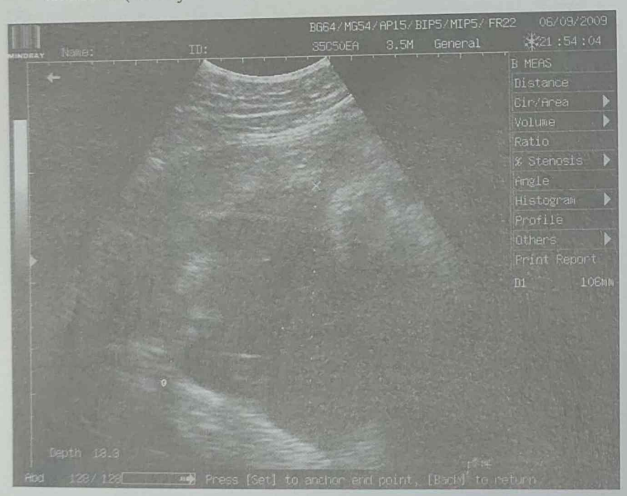


Fig. 24.10: Ultrasound picture in polyhydramnios showing large liquor pocket

Differential diagnosis

1. Multiple pregnancy

There are many foetal parts with two foetal heads and three poles on palpation with absence of fluid thrill. Ultrasound can differentiate between two conditions.

2. Pregnancy with large ovarian cyst

The uterus is felt separate from the cyst. There is a groove between ovarian cyst and pregnant uterus (Hingorani's sign) while it is absent in hydramnios. In ovarian cyst, the cervix is pushed down while in hydramnios, the cervix is pulled up. Ultrasound is useful in diagnosis.

3. Maternal ascites

There is central dullness in hydramnios while there is central resonance in ovarian cyst due to floating bowels. Vaginal examination shows normal-sized uterus in ascites. Ultrasound abdomen can help to make the diagnosis of ascites and to rule out pregnancy.

4. Concealed abruption

In abruption there will be pallor and other signs of intra-abdominal haemorrhage. Ultrasound is useful in diagnosis. There may be foetal distress or foetal death in abruption.

5. Retroverted gravid uterus with full bladder

Vaginal examination and ultrasound are useful in diagnosis.

6. Hydatidiform mole

Hydatidiform mole (doughly feel of the uterus, absence of fluid thrill, negative foetal shadow on radiography and 'snow storm' appearance on ultrasonography) are diagnostic of a molar pregnancy.

Complications

The prognosis is unfavourable for both mother and fetus especially in acute hydramnios. The following complications may be seen in hydramnios.

Maternal complications

During pregnancy

There is increased incidence of:

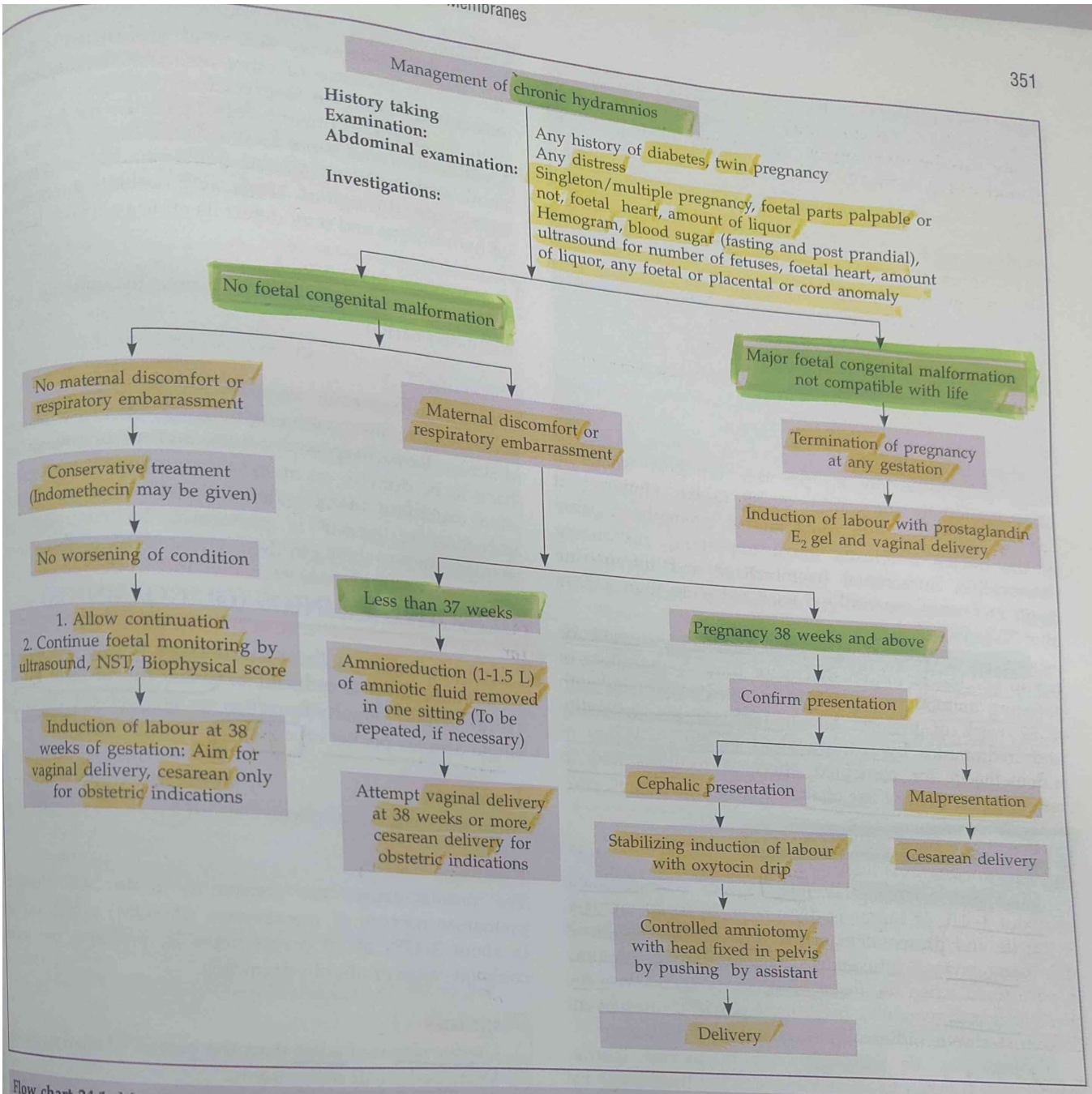
1. Maternal mirror syndrome due to hypertension, proteinuria and edema (pre-eclampsia) may be seen especially with hydrops fetalis.
2. Abnormal foetal presentations, malpositions and floating head due to excessive liquor in pregnancy.
3. Preterm rupture of the membranes due to excessive liquor.
4. Premature labour
5. Abruptio placentae due to rapid decompression of uterus on rupture of membranes is a serious and common complication.
6. Cardiorespiratory embarrassment especially with severe hydramnios.

During labour

1. Preterm rupture of the membranes in early labour.
2. Increased chance of cord prolapse due to sudden gush of fluid.
3. Increased operative intervention like cesarean delivery
4. Dysfunctional labour
5. Retained placenta
6. Postpartum haemorrhage due to uterine atony due to uterine overdistension.
7. Shock

Postpartum period

1. Subinvolution and non-involution of uterus due to uterine overdistension.
2. Puerperal sepsis due to operative interference and postpartum haemorrhage.



Flow chart 24.1: Management of Chronic Hydramnios

Foetal complications

There is adverse perinatal outcome in hydramnios especially in foetal growth restriction. There is 40% perinatal mortality rate in presence of hydramnios and foetal anomalies further compounded by prematurity. In idiopathic hydramnios, there is 2–5 fold increased perinatal mortality. Other associated conditions associated with poor perinatal outcome are hydrops fetalis, maternal diabetes and cord prolapse.

Management

Management of chronic hydramnios is given in Flow Chart 24.1.

(*i*) **Supportive therapy.** Woman should rest in left lateral position with adequate back rest. Pain killers like paracetamol can be given for discomfort and pain. Any associated condition like pre-eclampsia or diabetes should be treated energetically. The role of diuretics is of doubtful value.

(*ii*) **Investigations.** Ultrasound is done to exclude congenital foetal malformations. Blood test to detect diabetes or Rhesus isoimmunization.

(*iii*) **Treatment** varies depending upon the response to supportive treatment, foetal maturity, any congenital malformation and any associated condition like diabetes mellitus.

With major congenital foetal abnormality: not compatible with life (e.g. anencephaly), termination of

pregnancy is to be performed irrespective of the duration of pregnancy by using vaginal PGE_2 gel insertion followed by low rupture of membranes or by using oxytocin infusion after checking lie and presentation.

(A) Pregnancy less than 37 weeks

Amniocentesis (amnioreduction) is performed by slow decompression removing 1–1.5 L of amniotic fluid over 3 hours to relieve maternal distress and for continuation of pregnancy (see Chapter 14 for details).

Indomethacin therapy

Indomethacin has been successfully used as it impairs lung fluid production and enhances absorption of amniotic fluid, decreases foetal urine production and increases fluid movement across foetal membranes. Doses employed range from 1.5–3 mg/kg per day for 2–11 weeks in idiopathic hydramnios from 24–35 weeks. However, it can be associated with renal failure, premature closure of the ductus arteriosus (most important), necrotizing enterocolitis, intracranial haemorrhage and intrauterine death in fetuses especially if used for more than 3 days after 30 weeks.

Society of Maternal and Foetal Medicine, recommends not to administer indomethacin for the sole indication of reducing amniotic fluid. It can be used in women with < 32 week of preterm labour with uterine irritability and hydramnios by using a short course of 48 hrs of indomethacin for combined effect of tocolysis and to reduce liquor (do not use after 32 weeks).

(B) Pregnancy more than 37 weeks

Induction of labour is done.

Slow amniocentesis (amnioreduction) with drainage of about 1–2 L of liquor is done over 20 to 30 minutes. If the lie and presentation of the fetus are favourable, a stabilizing oxytocin infusion is started and low amniotomy is performed when the foetal lie becomes stable with the presenting part remaining fixed in the pelvis. It can prevent decompression avoiding abruption and cord prolapse.

Labour may be prolonged due to uterine inertia. Special care is taken to actively manage the third stage by giving prophylactic oxytocin injection. Blood should also be arranged.

Neonatal care. The neonatologist should carefully evaluate the baby for the presence of foetal anomalies. Esophageal atresia is to be excluded by passing a soft rubber catheter into the stomach.

Acute Polyhydramnios

Acute polyhydramnios is a rare condition with sudden onset and collection of amniotic fluid in a short period. It may be caused by monozygotic twin pregnancy or chorioangioma of the placenta. It can occur in early pregnancy.

Symptoms

Patients present with acute abdomen such as abdominal pain, nausea, vomiting and is in agony.

Signs

The patient looks very sick with generalized edema of the legs or presence of other associated features of pre-eclampsia. Abdomen is excessively enlarged with shiny skin. Fluid thrill is present. Foetal parts are not felt and the foetal heart sound is not audible. Vaginal examination may show effacement and dilatation of cervix and even bulging membranes through os. Ultrasound confirms the diagnosis of hydramnios and may detect its etiology.

Differential diagnosis

Differential diagnosis is like chronic hydramnios and is discussed earlier.

Treatment

Usually spontaneous abortion occurs in cases of early hydramnios. Slow amnioreduction is done for maternal distress. Rarely repeated abdominal amniocentesis may have to be done in an attempt to continue the pregnancy after excluding foetal congenital malformations. Usually induction of labour is performed by controlled low amniotomy and oxytocin drip. There is risk of abruption.

OLIGOHYDRAMNIOS (OLIGOAMNIOS)

Oligohydramnios is the condition in which the amount of amniotic fluid is reduced to < 200 mL at term. ACOG (2016) defines oligohydramnios as an AFI of < 5 cm or single deepest pocket of < 2 cm.

Incidence

Oligohydramnios complicates about 4% of all pregnancies.

Etiology

The various causes are shown in Table 24.4. Preterm premature rupture of membranes (PPROM) which occurs in about 3–17% of all pregnancies is, perhaps, the most common cause of oligohydramnios.

Diagnosis

1. Uterine size is smaller than the period of amenorrhoea.
2. Decreased foetal movements.
3. The uterus appears **'full of fetus'** due to much less liquor amnii.
4. Higher prevalence of malpresentations like breech.
5. Evidence of foetal growth restriction.
6. Ultrasound (Fig. 24.11). Very little or no fluid is seen around the fetus. It may be very difficult to rule out structural anomalies due to the reduced fluid. AFI will be < 5 cm, SDP < 2 cm and two diameter fluid pocket < 15 cm^2. There may be evidence of foetal growth restriction. Visualizing normal filling and emptying of the foetal bladder usually rules out urinary tract abnormality.

Foetal Effects

Early Problems

In severe early onset oligohydramnios as in renal agenesis, there are several problems.

Table 24.4: Conditions Associated with Oligohydramnios

1. Foetal causes
   - (i) Chromosomal abnormalities
     Triploidy, Trisomy 18, Turner syndrome
   - (ii) Foetal growth restriction
   - (iii) Intrauterine death
   - (iv) Post term pregnancy
   - (v) Ruptured membranes
   - (vi) Foetal infections
   - (vii) Congenital anomalies
     - (a) Amniotic band syndrome
     - (b) Cardiac defects like Fallot tetralogy, septal defects
     - (c) Central nervous system—Holoprosencephaly, microcephaly
     - (d) Diaphragmatic hernia
     - (e) Genitourinary defects (33–57% cases)—Renal agenesis, renal dysplasia, urethral obstruction, bladder exstrophy
     - Twin reversed-arterial-perfusion (TRAP) sequence
     - Vacter—(vertebral, anal, cardiac, tracheo-esophageal and renal abnormalities) anomalies
2. Maternal causes
   - (i) Preterm premature rupture of membranes (PPROM) (most common)
   - (ii) Uteroplacental insufficiency
   - (iii) Hypertension
   - (iv) Pre-eclampsia
   - (v) Right heart failure
3. Placental and membrane causes
   - (i) Abruption
   - (ii) Twin-to-twin transfusion
4. Drugs
   - (i) Prostaglandin synthase inhibitors (e.g. indomethacin)
   - (ii) Angiotensin-converting enzyme inhibitors (e.g. captopril)
   - (iii) NSAIDS
5. Idiopathic
   - (i) Amnion nodosum (failure of secretion by cells of amnion covering placenta)
6. Iatrogenic
   - (i) Invasive procedures like amniocentesis, chorion villus sampling, etc.

1. Pulmonary hypoplasia is the main risk, especially if oligohydramnios develops before 24 weeks with high perinatal mortality.
2. Limb deformities like talipes
3. Amniotic adhesions or bands causing deformities like amputation of digits.
4. **Potter's facies—Low set ears, epicanthic folds, receding mandible and flattened nose are the sequelae of oligohydramnios.**
5. Foetal growth restriction

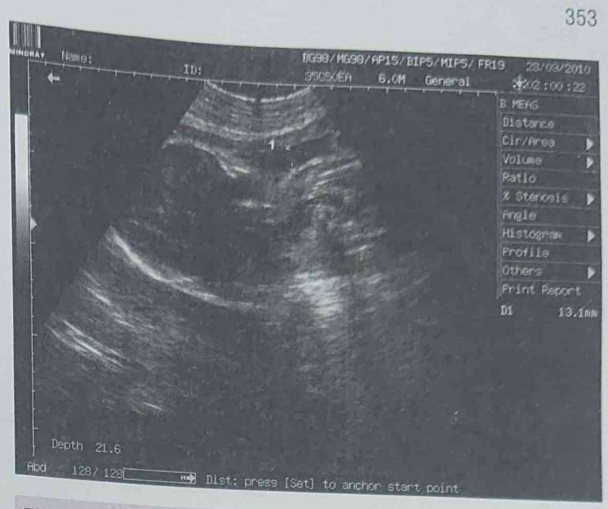


Fig. 24.11: Ultrasound picture in oligohydramnios with scanty liquor amnii

6. Association with aneuploidy and structural anomalies.
7. Abnormal umbilical artery waveform velocimetry.
8. **Potter's syndrome:** Oligohydramnios with pulmonary hypoplasia with dysplastic both kidneys is called Potter's syndrome.
9. **Amnion nodosum:** Amniotic fluid, looks like yellow nodules in severe oligohydramnios.

Late Problems

1. Cord compression in labour causing variable decelerations.
2. Meconium aspiration syndrome occurs in the second trimester.

Maternal Problems

1. Prolonged labour due to uterine inertia and dysfunctional labour.
2. Higher chances of operative delivery due to malpresentations. There is higher maternal morbidity due to these factors.

There are very few maternal risks, unless foetal therapy is considered (i.e. the placement of a vesicoamniotic shunt or amnioinfusion). These procedures carry the risk of abruptio placentae and chorioamnionitis.

Management

Antepartum

There is no specific treatment for oligohydramnios. In early severe oligohydramnios, a careful search for renal anomalies has to be made. If lethal anomaly like bilateral renal agenesis is diagnosed, the woman must be counselled and the option of termination given. In case of correctable anomalies like posterior urethral valves, the options of in utero therapy or early neonatal correction are to be discussed. In case of oligohydramnios accompanying foetal growth restriction, antepartum foetal surveillance and Doppler and proper timing of delivery are essential. Amnioinfusion is an option only in selected cases but is

not the standard of care in most cases and is not generally recommended.

Intrapartum

ACOG recommends termination of pregnancy in isolated uncomplicated oligohydramnios between 36^{+0} to 37^{+6} weeks.

Cesarean section may have to be done in many situations especially when the fetus is compromised. If vaginal delivery is possible, electronic foetal monitoring is essential. The presence of meconium staining of the amniotic fluid may be an indication for amnioinfusion with warmed normal saline to prevent meconium aspiration syndrome by diluting the meconium. Pediatrician must be present in labour room to attend to the baby who may require transfer to nursery.

Borderline oligohydramnios

In this condition AFI is between 5–8 cm. There is slight increased risk of maternal hypertension, foetal growth restriction, preterm delivery, non-reassuring foetal heart rates, still birth or neonatal deaths in them. However, evidence is still insufficient.