

## Amnioinfusion

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### Abstract

Amniotic fluid is a dynamic medium that plays a significant role in fetal well-being. It is essential during pregnancy for normal fetal growth and organ development. About 4% of pregnancies are complicated by oligohydramnios. It is associated with an increased incidence of perinatal morbidity and mortality due to its antepartum and intrapartum complications. Gerbruch and Hansman described a technique of Amnioinfusion to overcome these difficulties to prevent the occurrence of fetal lung hypoplasia in pregnancies complicated by oligohydramnios. Amnioinfusion reduces both the frequency and depth of FHR deceleration. The mechanisms through which amnioinfusion acts include mechanical cushioning of the umbilical cord to prevent recurrent umbilical compressions that lead to fetalacidemia, predisposition to meconium aspiration Syndrome (MAS).

**Keywords:** Amnioinfusion, Amniotic fluid; Oligohydramnios; Preterm premature rupture of membrane; Meconium stained amniotic fluid (MSAF).

### Introduction

High-risk pregnancy is defined as one which is complicated by factors that adversely affect the pregnancy outcome – maternal or perinatal or both. Actually all pregnancies and deliveries are

potentially at risk. Oligohydramnios is one of the high-risk pregnancy, posing diagnostic challenge and dilemma in management. These high-risk pregnancies should be monitored, managed and delivered at a tertiary care center for good pregnancy outcome.

Amniotic fluid is essential for the continued well being of the fetus and has following functions:

- Shock absorber preventing hazardous pressure on the fetal parts
- Prevents adhesion formation between fetal parts and amnion
- Protects the fetus from ascending infection
- During labor, amniotic fluid and fetal membranes constitute the water bag containing forewaters which act as a fluid wedge, providing best natural dilator of cervix.<sup>1</sup>

Oligohydramnios is defined as reduced amniotic fluid as evidenced by an AFI <5 cm or SDP <2 cm. An AFI between 5 and 8 cm is considered borderline/low normal AFV.<sup>2</sup>

### Causes of Oligohydramnios

Oligo is more often due to decreased production of amniotic fluid. The conditions that lead to reduced

uteroplacental perfusion result in placental insufficiency. Various fetal and maternal conditions associated with oligohydramnios are following:-

#### *Fetal abnormalities*

- Chromosomal
- Anomalies: Renal agenesis

#### *Urinary tract obstruction*

- Growth restriction
- Infections

#### *Maternal*

- Placental insufficiency HP PIH, long-standing DM
- Placental infections: Malaria

#### *Drug*

- PG synthetic inhibitors
- Beta blocker or ACE inhibitors

#### *Other obstetric conditions*

- High prelabor rupture of membranes
- Post-term pregnancy<sup>1</sup>

Oligohydramnios causes adverse fetal outcome. The condition is associated with maternal problems.

#### **Fetal Effects**

##### *Early problems*

- Pulmonary hypoplasia
- Limb deformities
- Amniotic adhesions
- Potter's facies
- Fetal growth restriction

##### *Late problems*

- Cord compression in labor causing variable deceleration
- Meconium aspiration syndrome

#### **Maternal Problems**

- Prolonged labor due to uterine inertia and dysfunctional labor
- High chances of operative delivery due to malpresentations. There is higher maternal morbidity due to these factors.<sup>3</sup>

Although oligohydramnios affects only 4-5.5% of all pregnancies, the prognosis remains poor especially if oligohydramnios is severe or noted in

second trimester as prolonged decrease in amniotic fluid may cause compression sequences, such as pulmonary hypoplasia, muscle hypotrophy or joint constriction.<sup>4</sup>

Intrapartum amnioinfusion involves instillation of isotonic fluid through an intrauterine catheter into the amniotic cavity to restore the amniotic fluid volume to normal or near normal levels. The procedure is intended to relieve intermittent umbilical cord compression, variable FHR decelerations, and transient episodes of interrupted fetal oxygenation. The impact of amnioinfusion on late deceleration is not known.<sup>5</sup>

#### **Indications of Amnioinfusion**

##### *Antenatal*

- Severe oligohydramnios to prevent pulmonary hypoplasia. To achieve this it should be done serially at weekly interval before 28 weeks.
- As an aid to ultrasonography imaging in patients with severe oligohydramnios.
- Administration of antibiotic therapy in chorioamnionitis.

##### *Intranatal*

- Correcting variable decelerations because of cord compression.
- Reduced fetal distress caused by meconium staining of fluid.
- Correction of oligohydramnios.<sup>6</sup>

#### **Contraindications of Amnioinfusion**

- Amnionitis
- Polyhydramnios
- Uterine hypertonus
- Multiple gestation
- Known fetal anomaly
- Known uterine anomaly
- Severe fetal distress
- Non vertex presentation
- Fetal scalp pH <7.2
- Placental abruption or Placenta previa

#### **Two techniques used for amnioinfusion are**

1. Transabdominal
2. Transvaginal

## Method

It is done under strict aseptic precautions and local anesthesia. Ultrasonography or Doppler color flow mapping is done to identify a pool of amniotic fluid devoid of cord. The catheter or needle is guided under ultrasonography control. Position is confirmed by aspiration of amniotic fluid or by injecting 1–2 ml of infusate to visualise fluid turbulence. Continuous or intermittent infusion can be done by 50 ml syringe or infusion pump at rate of 20–30 ml per minute. Repeat infusion weekly to maintain AFI>10. Infusion of 250 ml of saline increases AFI by  $4.3 \pm 1.5$  cm. There is small risk of uterine rupture if efflux of infusate blocked.<sup>6</sup>

### Antibiotic Infusion

PPROM carries the risk of ascending infection which may result in

- Chorioamnionitis
- Preterm labor
- Neonatal infection
- Maternal morbidity

The longer the latency period, greater the risk of infection. Administration of antibiotics directly into the amniotic cavity has been proposed to treat the local infection. Antibiotic infusion ensures rapid delivery of antibiotics in desired concentration to the site of infection. Amnioinfusion by irrigating effect also dilutes the infection load.<sup>8</sup>

*Patients at increased risk of umbilical cord compression are*

- Post-term pregnancy
- Preterm labor with ruptured membranes
- Oligohydramnios<sup>7</sup>

### Complications

1. Uterine overdistention and hyperactivity
2. Amniotic fluid embolism
3. Placental abruption
4. Uterine rupture
5. Cord prolapse
6. Amnionitis
7. Maternal cardiopulmonary compromise<sup>9</sup>

*Monitoring of patients treated with amnioinfusion*

1. Measure intrauterine pressure

2. USG: Amniotic Fluid Index- 8 cm<sup>7</sup>

### Intrauterine Pressure During Amnioinfusion

Isolated reports of iatrogenic polyhydramnios and uterine hypertonicity during amnioinfusion emphasize the need of monitoring uterine pressure during the procedure. Intra amniotic pressure (IAP) in pregnancies complicated by oligohydramnios is below the normal mean for gestation and amnioinfusion results in rise in pressure to normal or high depending upon the volume infused. Increase IAP may compromise uteroplacental perfusion to result in fetal bradycardia. To avoid this adverse effects intrauterine pressure monitoring is recommended during the procedure, along with fetal monitoring.<sup>8</sup>

### Discussion

No matter whatever is the cause of oligohydramnios, the general outcome is usually poor.<sup>1</sup> Because of poor outcomes, termination of the pregnancies was the most common decision in early-onset oligohydramnios several decades ago. The current trend is different. Augmenting the amniotic fluid volume may provide diagnostic or therapeutic benefits.<sup>10</sup>

*It is effective in*

- Improving the biophysical scores.
- By prolonging the pregnancy, it has improved the perinatal outcome.
- Reducing the intrapartum complications.
- Decreasing the incidence of operative intervention and also for fetal distress with statistical significance.
- Improved 1 min and 5 min Apgar scores when compared with the control group.
- Unnecessary continuation of pregnancy with anomalies can be curtailed as it increases sonovisibility.<sup>13</sup>
- Increasing the latency period, it decreases the occurrence of fetal distress, preterm deliveries, need for cesarean or instrumental deliveries.<sup>11</sup>

### Future Prospects of Amnioinfusion

Amnioinfusion could be helpful in following conditions:

- Facilitate easy delivery of a fetus compromised with certain anomalies such

as Potter's syndrome or perhaps stuck twin fetus.

- Fetal medical therapy: Drugs as Thyroxine, digoxin, antimetabolites and immunosuppressants have been successfully administered to the fetus by this route.
- Adjunct to fetal surgical therapy potential use in video endoscopic fetal surgeries.

Although there is evidence to show that amnioinfusion is beneficial in the management of severe oligohydramnios, further research is needed to determine:

1. Which is the ideal infusate?
2. What is the ideal gestation at which to start and stop infusion?
3. What is the optimum interval between infusions?<sup>6</sup>

## Conclusion

Oligohydramnios is associated with increased incidence of perinatal morbidity and mortality due to antepartum and intrapartum complications. Antepartum amnioinfusion is a modality as diagnostic and therapeutic intervention in oligohydramnios and preterm premature rupture of membranes. Amnioinfusion is a simple, inexpensive, effective method for relief of severe heart rate abnormalities during labor with oligohydramnios and meconium stained liquor.

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