

## A STUDY OF FETAL OUTCOME IN OLIGOHYDRAMNIOS (AFI BETWEEN 0-7)

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**ABSTRACT: OBJECTIVES:** Amniotic fluid Volume (AFV) is an important indicator of fetal well-being Oligohydramnios affects 0.5 to 5% of the pregnancy. In presence of Oligohydramnios if the AFI is 0-7 the fetal outcome is not good. If the AFI <5 which needs immediate delivery irrespective of the NST results. So the cases selected between AFI 0-7 are directly taken to LSCS. To know the fetal outcome associated with Oligohydramnios (AFI 0-7). **MATERIALS AND METHODS:** This is a prospective study. The study group consisted of 67 pregnant cases selected from Vanivilas Hospital attached to Bangalore Medical College and Research Institute, Bangalore. The cases were studied between the periods 15<sup>th</sup> November 2014 to 1<sup>st</sup> March 2015. These 67 in patients were selected for emergency OT directly because of variable AFI (0-7). Based on this fetal outcome is assessed. The AFI was totally based on USG report on admission and these cases were referred from outside to Vanivilas Hospital because this hospital is a tertiary care center where emergency OT is working round the clock. **RESULTS:** Out of 67 cases in the present study group there was not even one fetal mortality. The birth weight was varying from 1.4 kg to 3.2 kg out of these two babies needed stimulation after extraction in the OT their birth weight was 1.4 kg and 1.6 kg. There was meconium in 17 cases (thick meconium 12 cases, thin meconium 5 cases). Anhydramnios (nil liquor) 3 cases, NICU admissions (16). **CONCLUSION:** Oligohydramnios (AFI) between 0-7 is an important indication for emergency LSCS without depending on NST which can result in good fetal outcome in a tertiary center like VVH. So the mortality and morbidity of the fetus can be avoided if we decide for emergency LSCS.

**KEYWORDS:** AFI - Amniotic fluid Index, AFV- Amniotic fluid Volume, LSCS- Lower segment caesarean section, Meconium (Thick & Thin), Oligohydramnios, Anhydramnios, NST- Non stress test, OT- Operation Theater, VVH- Vanivilas Hospital, USG- Ultrasonograph, SDP- Single deepest Pocket, FGR- Fetal Growth Retardation, IUGR- Intrauterine Growth Retardation, NICU- Neonatal Intensive Care Unit, TDP – Two Diameter Pocket.

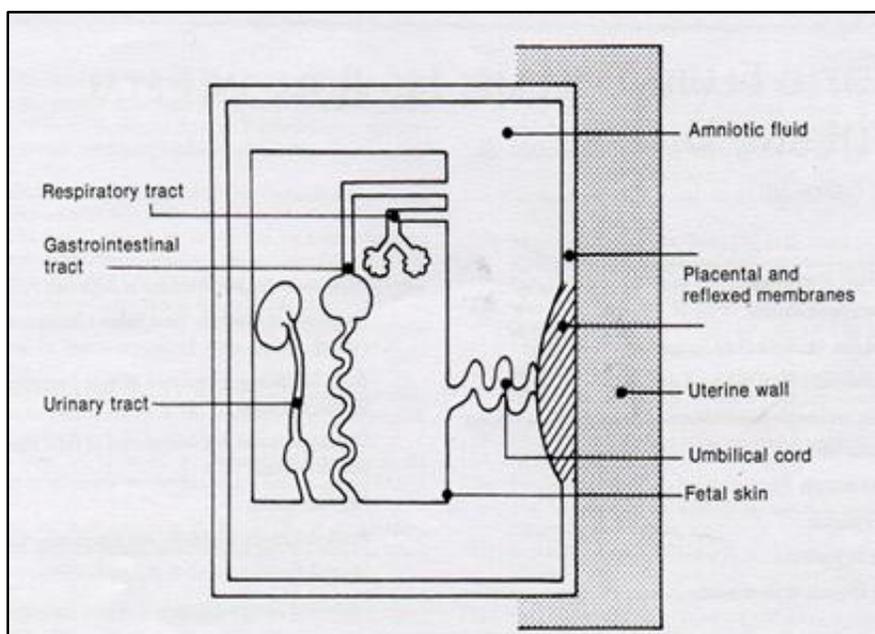
**INTRODUCTION:** The definition of Oligohydramnios has varied with different techniques of measuring amniotic fluid volume and different investigators. Manning et al<sup>1</sup> defined Oligohydramnios when the largest pocket on ultrasound in its largest diameter measured less than 1cm. subsequently they revised this criterion to a single pocket measuring 2 cm in both vertical and horizontal planes. Phelan who described amniotic fluid index defined Oligohydramnios as an AFI less than 5 cm.<sup>2</sup> Quantitatively, Oligohydramnios is defined as an AFV <300-500 ml after the midtrimester. Hence this study is conducted to find out the perinatal outcome and operative intervention in pregnancy at 34 weeks and onwards in Oligohydramnios (AFI 0-7).

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**INCIDENCE:** The reported incidence of Oligohydramnios varies between 0.5 to 5% this complicates 2.3 to 3.9% of pregnancies.

Oligohydramnios may be due to a variety of conditions, including urinary tract abnormalities such as renal agenesis, bilateral renal obstruction, bilateral renal dysplasia, and posterior urethral valves or atresia; and prerenal abnormalities, including utero placental insufficiency leading to IUGR, preterm premature rupture of the membranes (PROM), and post-term pregnancy. Regardless of the cause, many investigators have noted increased perinatal morbidity and occasionally fetal or neonatal death in the presence of Oligohydramnios. Severe Oligohydramnios may result in adhesions between the amnion may entrap fetal parts and cause serious deformities, including amputation, pulmonary hypoplasia (incidence 1/1000 infants at birth) as a result of fetal reduced movements, decreased lung flow.

**AMNIOTIC FLUID PHYSIOLOGY:** Amniotic Fluid serves a number of important functions in the normal development of the embryo and fetus. It cushions the fetus against physical trauma, allows for growth of the fetus, free from restriction or distraction by adjacent structures, provides for a thermally stable environment, allows the respiratory and gastrointestinal tract and musculoskeletal system to develop normally, and helps to prevent infection.

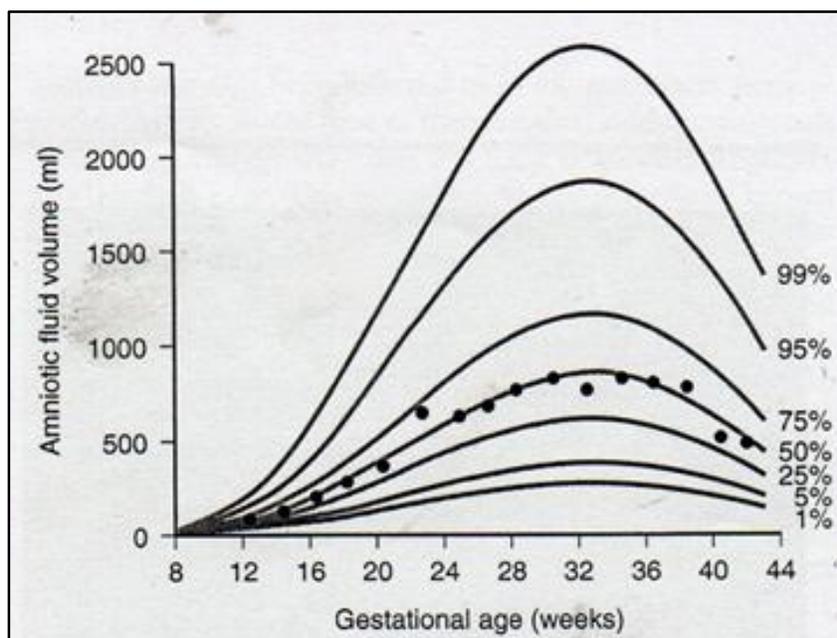


**Fig. 1: The major fetal and maternal amniotic structures involved in the formation and re-absorption of amniotic fluid**

The number of anatomic sites is involved in the regulation of amniotic fluid in early pregnancy the chorioamnion acts as a molecular sieve in the latter half of the gestation, the two primary sources of amniotic fluid are the fetal kidneys and lungs. The primary sources of amniotic fluid removal are the gastrointestinal tract (swallowing) and absorption into the fetal blood

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perfusing the surface of the placenta. In the second and third trimesters, fetal urination plays an important role in the production of amniotic fluid.



**Fig. 2: The amniotic fluid volume between 8-44 weeks of Gestational age**

## ASSESSMENT OF AMNIOTIC FLUID VOLUME:

### Various methods include:

- 1. Clinical Assessment:** Measurement of symphysis fundus height and palpation of the pregnant Uterus (Full of Fetus)
- 2. Quantitative Assessment:** Amniocentesis with instillation of inert chemical marker like para amino hippurate followed by determination of the marker is the most accurate method of AFV assessment.
- 3. Semi Quantitative Assessment:**
  - a) Subjective Assessment:** In this method the relative amount of echo free fluid areas are subjectively compared with the space occupied by the fetus and placenta. It is simple and rapid method.
  - b) Maximum Vertical Pocket (MVP):** This technique has evolved from the studies of Chamberlain et al. in which the single deepest uninterrupted pocket (< 1 cm) of amniotic fluid is measured.<sup>[3]</sup>
  - c) Amniotic fluid index:** In 1987, Phelan et al <sup>[2]</sup> developed a semi quantitative sonographic assessment of the Amniotic fluid volume that has come to be known as the Amniotic fluid index. This measurement is based on the division of the gravid uterus into four quadrants using the external maternal landmarks of the umbilicus and linea nigra.

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The deepest amniotic fluid pocket in each quadrant, in a similar manner to the maximum vertical pocket, is measured. These four measurements are added together, and the sum is referred to as the Amniotic fluid index.

- d) TDP – Two Diameter Pocket:** This method which consists of identifying the deepest amniotic fluid pocket by ultrasound, measuring its vertical and horizontal dimensions, and then multiplying these values together.

## Definition of Oligohydramnios:

Technique	Definition	Reference
USG	Single vertical pocket < 0.5cm	Mercer et al.
USG	Single vertical pocket < 1.0 cm	Manning et al. <sup>[1]</sup>
USG	Single vertical pocket < 2 cm	Manning et al. <sup>[1]</sup>
USG	Single vertical pocket < 3 cm	Halperin et al.
USG	AFI < 5 <sup>th</sup> percentile for gestational age	Moore <sup>[4]</sup>
USG	AFI < 5 cm	Phelan <sup>[2]</sup>
USG	AFI < 7 cm	Dizon Townson
USG	AFI < 8 cm	Jeng et al
USG	Two diameter pocket < 15 cm	Magann et al <sup>[5]</sup>

At term approximately 800 ml per day is the amniotic fluid volume in addition to the fetal kidneys, the lungs also contribute to the total Amniotic fluid volume it is presumed that the respiratory tract amniotic fluid volume range from 60-100ml/ kg/day of fetal weight near term. As mentioned previously intramembranous and transmembranous flow between the amniotic space and mother and fetus are likely to play a role in the fluctuation of amniotic fluid volume. Intramembranous flow reaches 400ml at term <sup>[6]</sup>. Normally, amniotic fluid volume reaches 1 litre by 36 weeks and decreases thereafter to less than 200 mL at 42 weeks. Diminished fluid is termed Oligohydramnios, more than 2 litre of amniotic fluid is considered excessive and is termed as polyhydramnios.

## CONDITION ASSOCIATED WITH OLIGOHYDRAMNIOS:

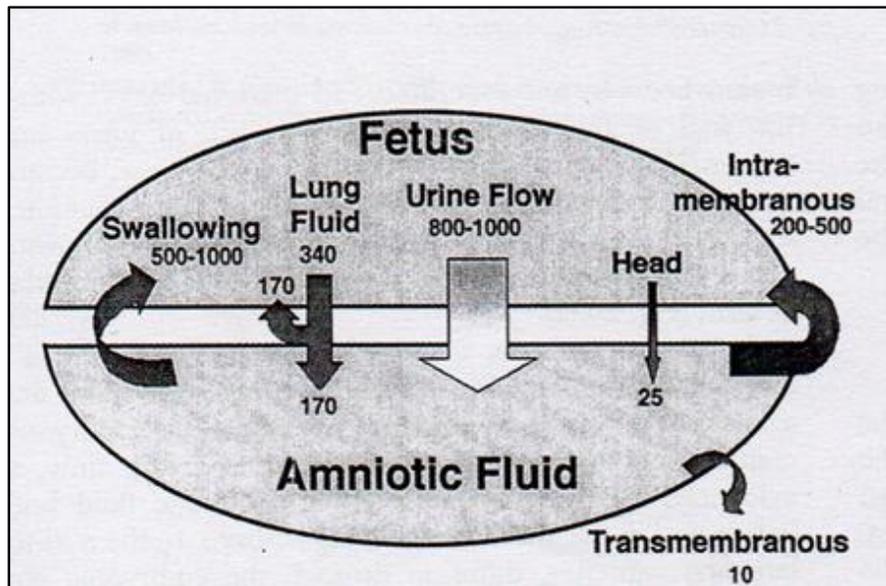
**Fetal:** Chromosomal abnormalities, Congenital anomalies, Growth restriction, Demise, Post term pregnancy, Ruptured membranes.

**Placenta:** Abruption, Twin-twin transfusion

**Maternal:** Uteroplacental insufficiency, Hypertension, Preeclampsia, Diabetes.

**Drug:** Prostaglandin synthase inhibitors, Angiotensin-converting enzyme inhibitors

**Idiopathic:**



**Fig. 3: Transmembranous and Intramembranous flow of Amniotic Fluid**

The amniotic fluid- fetal volume ratio increases until 30 weeks gestation and then appears to decline.

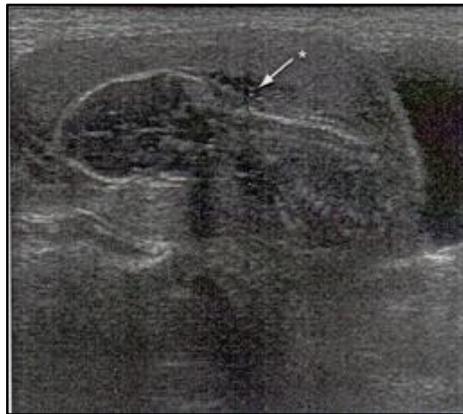
In late third trimester gestation fetus urinates and swallows a volume of amniotic fluid equal to 20-30% of its body weight per day.

**ULTRASOUND AND AMNIOTIC FLUID ESTIMATION:** The technique of subjective assessment of amniotic fluid involves comparing the echo-free fluid areas surrounding the fetus with the space occupied by the fetus and placenta.



**Fig. 4: Picture showing the normal Amniotic fluid with fetus and placenta**

When too little fluid is present, the fetus appears crowded within the uterus.



**Fig. 5: In this picture the fetus is "crowded" within the uterus with no amniotic fluid**

In 1987, Phelan et al<sup>[2]</sup> subsequently Moore and Cayle<sup>[4]</sup> developed a semi quantitative sonographic assessment of the Amniotic fluid volume that has come to be known as the Amniotic fluid index. This measurement is based on the division of the gravid uterus into four quadrants using the external maternal landmarks of the umbilicus and linea nigra. The deepest amniotic fluid pocket in each quadrant, in a similar manner to the maximum vertical pocket, is measured. These four measurements are added together, and the sum is referred to as the Amniotic fluid index.

Rutherford et al<sup>[6]</sup> used 5 cm as a threshold to define Oligohydramnios.

The two primary sources of Amniotic fluid or fetal urine and lung liquid with small contribution from the fetal oral nasal cavities. The two primary sources of fluid removal are fetal swallowing and absorption into fetal blood perfusing the fetal surface of the placenta. In the late second trimester and third trimester, AFV is largely contributed by fetal urinary production. The compromised fetus produces less urine and consequently Oligohydramnios. Reduced AFV is associated with high risk cases and resulting in poor perinatal outcome. The two most common parameters used to diagnose Oligohydramnios are the measurement of single deepest pocket (SDP) is largest vertical pocket and the AFI. The Normal values of SDP 2-8 cm, at term AFI <5 is termed as severe Oligohydramnios and AFI 5-7 is termed as moderate Oligohydramnios, AFI values between 8-25 cm are considered normal at term, the 5<sup>th</sup> percentile of AFI corresponds to 5cm and defined as Oligohydramnios however, when AFI is used for the AFV significantly greater number of pregnancies are diagnosed as Oligohydramnios. AFI is a sum of the maximum vertical depth of four pockets, free of fetal parts and cord, in each of the four uterine quadrants.

The current evidence therefore supports single deepest vertical pocket measurement as the method of choice for the assessment of Amniotic Fluid Volume. The presence of Oligohydramnios (defined as maximum vertical pocket >2 cm) in one sac.

## **INCLUSION CRITERIA:**

1. Patients with 34 weeks gestation and beyond.
2. Intact membranes.
3. AFI (0-7).
4. Singleton pregnancy with cephalic presentation.
5. Twins pregnancy (2 cases).
6. Breech presentation (2 cases).

## **EXCLUSION CRITERIA:**

1. Rupture of Membranes.
2. Congenital anomalies of the fetus.
3. Intrauterine death of the fetus.

Maternal Outcome is not affected adversely due to Oligohydramnios per se. However, increased intervention in the form of induction of labour and caesarean deliveries due to fetal growth restriction, and preterm delivery indirectly increase maternal morbidity.

Increased perinatal morbidity and mortality has been reported in pregnancies with decreased amniotic fluid volume, particularly when it occurs remote from term. A significant contribution to this is due to associated congenital anomalies, pulmonary hypoplasia, and Oligohydramnios concurrent with early onset fetal growth restriction and hypertension. Fetal deformities with Oligohydramnios include potter facies (which includes prominent epicanthal folds, flattened nose, and low set ears) and abnormal position of hands and feet.<sup>1c</sup>

Oligohydramnios was associated with increased risk of meconium aspiration syndrome, stillbirth and neonatal death and fetal heart rate decelerations. Oligohydramnios has the most consistent association with FGR. The mechanism is probably uteroplacental insufficiency which explains the genesis of both fetal growth restriction and decreased liquor. Fetal hypoxia causes redistribution of cardiac output in favour of fetal brain diverting the blood supply away from kidney and lungs. This results in reduced fetal urinary production and decreased lung secretions, which contribute to the amniotic fluid volume. The risk of FGR increases progressively as the severity of Oligohydramnios increases. It has been reported to increase from 4.9% in women with normal amniotic fluid volume to 20% when the deepest vertical pocket of amniotic fluid on ultrasound was < 2 cm and 38.6% when it was < 1cm.<sup>3</sup>

The quantity of amniotic fluid decreases, though not always, with pregnancy progressing post-date. The risk of adverse perinatal outcome was shown to be increased even in low-risk pregnancies when Oligohydramnios was diagnosed after 40 weeks, induction of labour results in increased chances of operative vaginal delivery and caesarean section rates, which lead to increased maternal risk with no differences in neonatal outcome.

Prolonged Oligohydramnios may cause compression of the fetus by the uterine wall and limit fetal movement producing various fetal abnormalities. Oligohydramnios increases the perinatal mortality and morbidity so which in turn increases the IUGR, Umbilical cord compression, Meconium stained Amniotic fluid, Abnormal FHR tracing, increased rate of LSCS, Low birth weight, Low Apgar Score, Birth Asphyxia and admission to NICU.

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**MATERIALS AND METHODS:** This is a prospective study. The study group consisted of 67 pregnant cases selected for this study at Vanivilas hospital attached to Bangalore Medical College and Research Institute, Bangalore. The study period was selected between 15<sup>th</sup> November 2014 to 01<sup>st</sup> March 2015. All these patients were referred cases from different Hospitals with Obstetric scanning report which was done either one or two days before their reference so after admission NST was done but not given much importance to the NST results because of the last moment reference. All these 67 cases were taken to emergency OT round the clock in the above said study period. Out of this 67 cases the obstetrics index was prime gravida (31), second gravida (27), and third gravida (09). Out of this 67 singleton (62), twins (2), Breech (3). Out of the 67 the duration of pregnancy was between 34-42 weeks.

There were 3 Anhydramnios cases of which one was prime gravida at 38 weeks of pregnancy with 1.4 kg male baby who needed stimulation who cried after stimulation. The 2<sup>nd</sup> Anhydramnios case was 42 weeks of pregnancy with 2<sup>nd</sup> gravida with birth weight of 2.7 kg cried immediately, the 3<sup>rd</sup> case was prime gravida at 39 weeks with birth weight of 2.5 kg female baby cried. Out of 67 babies 2 babies cried after stimulation with birth weight of 1.4 kg (male baby), 1.6 kg (male baby). Out of 67 Oligohydramnios there were 17 meconium cases in which thick meconium (12), thin meconium (5) and 47 cases of clear liquor. Out of 67 cases 31 was male babies and 38 was female babies (2 twin pregnancy). Among the duration of pregnancy 34 weeks (1), 35 weeks (2), 36 weeks (7), 37 weeks (11), 38 weeks (12), 39 weeks (11), 40 weeks (17), 41 weeks (5), 42 weeks (1).

Sl. No.	Obstetric Index	Total
1	Prime Gravida	31
2	Second Gravida	27
3	Third Gravida	09

Table 1: Obstetric Index in the study group

Sl. No.	Duration of Pregnancy	Total
1	34 Weeks	01
2	35 Weeks	02
3	36 Weeks	07
4	37 Weeks	11
5	38 Weeks	12
6	39 Weeks	11
7	40 Weeks	17
8	41 Weeks	05
9	42 Weeks	01

Table 2: Duration of Pregnancy with in the study group

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Sl. No.	AFI	Total
1	0.0	03
2	0.1-0.9	00
3	1.0-2.0	16
4	2.1-3.0	21
5	3.1-4.0	09
6	4.1-5.0	06
7	5.1-6.0	06
8	6.1-7.0	06

Table 3: Details of AFI in the study group of 67 cases from (0-7)

Sl. No.	SEX	Total
1	Female	38
2	Male	31

Table 4: Sex distribution in the study group with 2 twin Cases

Sl. No.	Fetal Weight	Total
1	1.4 - 2.0	16
2	2.1 - 2.2	08
3	2.3 - 2.5	24
4	2.6 – 3.0	17
5	Above 3.0	04

Table 5: Fetal weight in Kg. with distribution

Sl. No.	Liquor	Total No.
1	Clear Liquor	47
2	Thin Meconium	05
3	Thick Meconium	12
4	Nil Liquor	03

Table 6: Nature of Amniotic Fluid

**RESULTS:** Vanivilas hospital is a tertiary care center. All these 67 cases included in this study group was referred in the last moment with the scan report showing Oligohydrynomas (AFI 0-7) hence all these cases were selected for emergency LSCS (mode of delivery) to reduce the maternal morbidity and to prevent fetal mortality and to reduce the fetal morbidity hence there was not even one fetal mortality. The birth weight was varying from 1.4 kg to 3.2 kg out of these two babies needed stimulation after extraction in the OT. Their birth weight was 1.4 kg and 1.6 kg. There was meconium in 17 cases (thick meconium 12 cases, thin meconium 5 cases). Anhydramnios (nil liquor) 3 cases. So when the AFI was between 0-7 cases to be delivered by immediate LSCS irrespective of the NST results.

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**CONCLUSION:** Oligohydramnios (AFI) between 0-7 is an important indication for emergency LSCS without depending on NST which can result in good fetal outcome in a tertiary center like VVH. So the mortality and morbidity of the fetus can be reduced if we decide for emergency LSCS. Whenever there is FGR obstetric scan to be done and if there is Oligohydramnios decision to be taken for emergency LSCS. This can reduce the relative's anxiety, legal complications, maternal morbidity, fetal morbidity and mortality in a tertiary care center. So evaluation of amniotic fluid volume has become an important aspect of antenatal assessment. Whenever there is AFI (0-7) there is increased risk of non-reactive NST meconium stained amniotic fluid, caesarean deliveries, low apgar score and increased NICU admission. Estimation of AFI is one of the important adjuncts in antepartum fetal surveillance method.

**DISCUSSION:** If the duration of pregnancy is 34 weeks and onwards, when there is AFI (0-7), the 67 selected study group patients with their scan report at the time of admission were decided to deliver with emergency LSCS which can reduce the above fetal and maternal complications so the patients coming in the last moment with anxiety and poor fetal outcome which can be reduced with immediate LSCS so the study group shows that no time to be wasted in inducing vaginal delivery, irrespective of the FHR tracings with presence or absence of meconium. So whenever there is Oligohydramnios irrespective of the fetal weight and their Obstetrics index and duration of pregnancy beyond 34 weeks LSCS can give better fetal outcome.

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