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Induction of Labour

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Abstract:

Induction of labour is defined as use of external means for artificially stimulating the uterus before the spontaneous onset of labour pains. Labour induction ensures delivery of the fetus at an optimum time when delivery is more beneficial for the fetus, than the risks involved in continuing the pregnancy. Almost 25 % of labours are induced for some reason or another.

Post term pregnancy - NICE guidelines recommend that IOL should be considered for women beyond 41weeks of pregnancy.

Hypertensive disorders in pregnancy - Evidence indicates that IOL can lower the risk of poor maternal and neonatal outcomes in women having severe gestational hypertension/eclampsia.

Foetal growth restriction - Induction of labour may help prevent stillbirths and improve neonatal outcomes in FGR.

Diabetes in pregnancy - There is lot of debate about the timing of IOL in women with uncomplicated diabetes and those with severe diabetes.

PROM - Inducing labour in cases of PROM reduces the rate of endometritis and of chorioamnionitis and admissions to a NICU.

Intrauterine Fetal Demise - immediate induction of labor is advisable for preventing psychological trauma and related complications.

Twin pregnancy - IOL is not recommended routinely in uncomplicated twin pregnancies.

Elective induction/IOL on maternal request - There is no advantage of elective induction in absence of definite maternal and fetal indications.

Whether labour can be induced depends on the status of the uterine cervix. Assessment of the cervix is traditionally done with the help of Bishop's Score and the modified Bishop's Score. Also correct selection of patients is necessary for labour induction. Labour should not be induced in situations where vaginal delivery is contraindicated. Common methods used for IOL are Foley's catheter, amniotomy, oxytocin and prostaglandins in various forms. Risks associated with labour induction can be hyper-stimulation of the uterus and the associated risk of fetal heart rate abnormalities. IOL should be

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done judiciously with the best available options to ensure a reasonable chance of success of induction.

Key words - Induction of labour, Bishop's Score, oxytocin, prostaglandins, Post term pregnancy, FGR, PROM

INTRODUCTION

When labor is induced artificially with the help of external methods, it is called induction of labor IOL. This is done to stimulate the uterus before the spontaneous onset of labour pains. Labour induction ensures delivery of the fetus at an optimum time when delivery is more beneficial for the fetus, than the risks involved in continuing the pregnancy. Labour is induced when the health care provider evaluates and decides that the outcome for the mother and fetus, will be better with early induction rather than waiting for spontaneous labour. (1) (2) (3) (4). The difference between induction of labor and augmentation of labour should always be kept in mind. Induction of labour aims to start labour pains, while augmentation of labour tries to increase the uterine contractions after spontaneous labour has begun.

Pregnant women look forward to onset of spontaneous onset of labour pains with a lot of mixed emotions and anticipation. However almost 25 % of women worldwide have their labours induced for some reason or another. The rates of induced labours have continuously risen and have almost doubled in the last few decades. There is a wide variation in rates of IOL within regions and countries. (5) (6) (7). According to recent data available the percentage of induction was up to 25 % in developed countries like the United States and Europe. (8) (9) (10). The rates of induction of labour were low in African countries as compared to rates of induction in Asia and Latin America. The rates vary from a high of 35.5 % in Sri Lanka to a low of 1.4 % in Niger. (8) Incidence of induction of labour is approximately about 10% in India. ("Textbook Of Obstetrics 2nd Edition 2019 by JB Sharma," n.d.). (11)

Risks associated with labour induction can be higher rates of caesarean births and operative vaginal deliveries. IOL can also lead to hyper-stimulation of the uterus and the associated risk of fetal heart rate abnormalities. Hence labour induction should be done only when it is clear that the benefits of induction will be more than the risks. The aim of IOL is to lessen associated morbidity and mortality, for the mother and fetus ("Brief_6_per-80.pdf.pdf," n.d.) (13). Labor induction can be done for both maternal and fetal conditions. However strict guidelines need to be followed while inducing labours. Factors that need to be considered are the underlying medical condition of the patient, choice and consent of the woman and the facilities available at the place of induction. Women having their labours induced should never be left unattended. All facilities must be available for monitoring maternal and fetal condition throughout the process of induction.

The decision for inducing labour will depend on many factors like favourable

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presentation and position of the fetus, the adequacy of maternal pelvis and status of uterine cervix. Assessment of the cervix is traditionally done with the help of cervical scoring system, the Bishop's score (14). Nowadays many centres are using the modified Bishop's score. Evaluation of the cervical status can be done using various other methods like trans-vaginal ultrasonography of the cervix (15) (16) (17), or elastography of the cervix (18) or by other means like LIF light induced fluorescence (19) (20). However even as of today the Bishop's Score remains the primary technique for assessing the uterine cervix before labour induction. The Bishop's score acts as a guide and a score of more than 8 is considered as a good score, and indicates favourable cervical changes which increase the likelihood of successful vaginal birth.

Correct estimation of gestational age is the prerequisite before planning labor induction. Care should be taken to deliver the woman at an appropriate time preferably at term. Correct determination of gestational age is done from last menstrual period LMP or by a dating scan done in early pregnancy. An ultrasound scan done before 20 weeks of gestation can be used for dating of pregnancy. Other associated factors can affect success of induction of labour. These can be age and parity of the patient (21) and body mass index BMI (22).

There continues to be a lot discussion and debate about acceptable use of labour induction (23). Few studies have shown that birth experiences of women having labour induction may be less positive as compared with women having spontaneous labour pains. (Henderson and Redshaw, 2013) (Hildingsson et al., 2011). Labour induction is generally recommended after 39 weeks, in low risk pregnancies. The ARRIVE trial 2018, compared birth outcomes in nulliparous women undergoing IOL at 39 weeks with those choosing expectant line of management. There was no increase in caesarean section rates in women who were induced. (24) (25)

Indications for induction of labour –

1. Prolonged/post-term pregnancy
2. Hypertensive disorders/preeclampsia in pregnancy
3. Foetal growth restriction FGR and suspected in utero fetal compromise
4. Pre labour rupture of membranes PROM
5. Chorioamnionitis
6. Oligohydramnios
7. Polyhydramnios
8. Diabetes in pregnancy
9. Multiple pregnancy
10. Maternal request
11. History of reduced fetal movements
12. Suspected fetal macrosomia
13. Antepartum haemorrhage
14. Maternal request
15. Intrauterine fetal death
16. Cholestasis of pregnancy

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17. Maternal age
18. Body Mass Index (BMI)
19. Previous bad obstetric history (BOH)
20. Other medical conditions

Preparation for induction -

Before proceeding with the induction it is necessary to explain the procedure and discuss the pros and cons with the expecting mother and her relatives and take their consent in writing. A thorough examination is necessary to assess all the parameters and to check for labour preparedness. Examination should include assessment of the lie of the fetus, presentation & position, assessment of amniotic fluid volume and adequacy of the pelvis. Other variables like age of the woman, parity, baby size need to be considered. Most importantly assessment of ripening of the cervix is done with the help of Bishop's score. Cervical assessment is the best predictor of successful induction. Bishop in 1964 introduced a cervical scoring system to help determine the success of the labour induction. (Table 1: Bishop's score).

Contraindications for induction –

Labour should not be induced in situations where vaginal delivery is contraindicated.

Absolute contraindications include –

1) Contracted pelvis
2) Severe degree of CPD cephalo-pelvic disproportion
3) Low lying placenta of major degree and
4) Mal-presentations like transverse lie

Relative contraindications can be -

1) Genital herpes infection
2) Floating fetal head having the risk of cord prolapse
3) History of prior surgery like myomectomy, septum resection
4) Prior classical caesarean section or inverted T uterine incision
5) pelvic surgeries like VVF fistula or pelvic floor repair
6) Invasive cervical carcinoma
7) Previous uterine rupture

Common indications for labour induction are -

Prolonged/ post-term pregnancy

Definition

A pregnancy is called 'term' pregnancy when the duration reaches 37 weeks. Pregnancies from 37 to 38.6 weeks are called early term, pregnancies between 39 and 40.6 weeks are described as full term pregnancies, from 41 to 41.6 weeks as late term and those more than 42 weeks as post term. (26). Pregnancy that continues beyond 42 completed weeks or 294 days is called 'post-term' or 'prolonged pregnancy', as described by WHO, FIGO & ACOG. Average incidence is 5–10% of pregnant women. Women with wrong dates are commonly mistaken as post term pregnancies. Also some women do not exactly remember their LMP last menstrual period. Hence it is advisable to do a dating scan in early pregnancy.

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Gestational age is determined by using ultrasound parameters like CRL crown rump length measured from 10 weeks to 14 weeks, and the measurement of HC head circumference if crown rump length is above 84 mm. ("Antenatal care (NICE clinical guideline 62)," n.d.).

In modern times we do not want the pregnant woman to continue her pregnancy beyond 41 weeks. This is because the risk of foetal death increases as pregnancies go beyond 41 weeks (Muglu et al., 2019.). Hence prolonged/post term pregnancy, one of the commonest indications for inducing labour. Several studies have compared labour induction with spontaneous onset of labour pains in prolonged pregnancies. (Hermus et al., 2009) (Pavicic et al., 2009) (Daskalakis et al., 2014) (Teo and Kumar, 2017). Recent studies have recommended delivery of the fetus between 41-42 weeks of gestation. Perinatal deaths were lesser in women who had induced labours, than in the expectantly managed group. (Gülmezoglu et al. 2012; McCarthy & Kenny 2013). There were fewer admissions to the NICU (Mishanina et al., 2014) and lesser caesarean sections when labour was induced, as compared with the conservatively managed group (Wood et al., 2014).

Labour induction is generally advocated at 41 weeks of pregnancy. Stripping of membranes can be done if cervix admits tip of finger. In unfavourable cervix either Foley's induction or prostaglandin PGE2 gel instillation can be done. When cervix is found to be favourable, amniotomy along with oxytocin drip is recommended. Amniotomy will help detect presence of meconium. Middleton et al compared the policy of EM expectant management with labour induction. Labour induction was associated with lesser caesarean births as compared to EM expectantly managed patients. But there was slight increase in operative deliveries in the labour induction group. There was a decrease in NICU neonatal intensive care unit admissions and very few babies had five minute Apgar scores of less than seven, in women who had their labours induced. (28).

Key takeaways -

1) Post term pregnancy is one of the more frequent indications for labour induction.
2) Inducting labour helps reduce the risk of perinatal deaths associated with advanced gestational age.
3) Rates of caesarean section are not increased with IOL, however there may be a slight increase in the rates of operative vaginal deliveries.
4) NICE guidelines recommend that IOL should be considered for women beyond 41weeks of pregnancy.

Hypertensive disorders in pregnancy

Pre-eclampsia has traditionally been defined as blood pressure BP ≥ 140/90 mm Hg on 2 occasions, 4 hours apart, and is often associated with proteinuria. Proteinuria is defined as 1) protein by dipstick method on 2 or more occasions or 2) > 300 mg of total proteins in a 24-hour sample or 3) protein: creatinine ratio > 30 mg/mmol.

Women with uncomplicated mild hypertensive disorder, can be allowed to await spontaneous at term. If patient does no go in labour then, induction of labour can be planned at 40 weeks,

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as this leads to improved maternal and fetal outcomes. Women with controlled chronic hypertension and gestational hypertension can be induced after 37-38 weeks of gestation for better outcomes. Women with new diagnosis of pre-eclampsia after 37 weeks can be offered labour induction. (National Collaborating Centre for Women's and Children's Health (UK), 2010). If cervix is unfavourable then IOL can be done with local prostaglandins. If cervix is favourable, Bishop's score more than six then IOL can be done by amniotomy and oxytocin infusion. (Table II)

Randomised control trials have compared planned birth with expectant management. The HYPITAT-I (Hypertension and Preeclampsia Intervention Trial at Term) trial compared IOL at 36–41 weeks with conservative management in women having mild/moderate gestational hypertension or preeclampsia. Out of total of 756 patients, labour induction was done in (n=377 patients) and the rest were allocated to receive expectant management (n=379). Of the IOL group, 117 (31%) had adverse maternal outcomes as compared with 166 (44%) from the conservatively managed group (Koopmans et al., 2009).

The HYPITAT-II trial compared labour induction in pregnancies between 34–36.6 weeks, with expectant management done till 37 weeks of pregnancy. This was done in women with mild gestational hypertension/preeclampsia or uncontrolled chronic hypertension (29). The study found that IOL may help decrease the risk of poor maternal outcomes but may increase the risk of RDS in the neonates.

For early onset preeclampsia 24-34 weeks of gestation, the pregnancy should be continued until 34 weeks of gestation with help of conservative management with proper monitoring. This approach can help reduce perinatal morbidity (Churchill et al., 2013). In women having preeclampsia beyond 34 weeks, labour induction helps reduce the risk of severe hypertension and the associated complications. It also reduces the need for antihypertensive therapy (Wang et al., 2017). IOL also lowers the risk of placental abruption in women having severe preeclampsia. It can however be associated with increase in neonatal complications. (Wang et al., 2017).

For women having pre-eclampsia between 34-37 weeks of gestation, the optimum time to induce labour is not clear. Both factors like deteriorating maternal condition and the risk to the fetus need to be considered. Evidence suggests that planned IOL may reduce maternal risk of progression to severe hypertension and risk of associated maternal morbidity and mortality. There might be more admissions to NICU because of prematurity. There was however no increased risk to the neonate. (PHOENIX trial) (Chappell et al., 2019).

Key takeaways –

1) Evidence indicates that IOL can lower the risk of poor maternal and neonatal outcomes in women having severe gestational hypertension.
2) Expectant management for preeclampsia before 37 weeks increases birth weight and reduces neonatal morbidity.

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3) Induction of labour helps reduce maternal complications in women with eclampsia.

Foetal growth restriction FGR

Normal fetal growth is genetically predetermined, however it can be affected by various external factors and also maternal, fetal and placental factors. The term FGR fetal growth restriction applies to foetuses that fail to achieve their growth potential. Continued utero-placental insufficiency impairs oxygenation and nutrition of the fetus. This results in a number of alterations in the metabolic, biochemical and cardiovascular parameters of the developing fetus. The degree of fetal compromise possibly depends on maternal factors, duration of the pregnancy and the severity of placental dysfunction (Miller et al., 2008). Incidence of FGR varies between 3-10 %. Management of FGR babies should be done in well-equipped tertiary care centres where facilities for continuous fetal monitoring and NICU facilities are available.

Induction of labor is done for FGR babies for preventing stillbirths. When to time the induction is related to severity of FGR and ultrasound and Doppler findings (GRIT Study Group, 2003). The Grit study (Growth Restriction Intervention Trial) compared babies were between 24-30 weeks of gestation with those above 30 weeks. Immediate delivery within 48 hours of steroid therapy was compared with delayed delivery. There was not much difference in overall perinatal outcome in the two groups. However caesarean births were significantly increased. Another study (DIGITAT) compared IOL with expectant management for FGR and studied the rates of adverse neonatal outcome and operative delivery. The DIGITAT study included 650 women at term (321 randomised to IOL, 329 randomised to EM expectant management). No major difference was observed in the outcomes of IOL and EM group. There was not much rise in number of caesarean births (Boers et al., 2010).

Key takeaways –

1) Correct assessment of gestational age is essential in women with FGR.
2) Severity of FGR and the degree of fetal compromise need to be assessed.
3) Induction may help improve neonatal outcomes in FGR.
4) There is no increase in caesarean section rates.

Diabetes in pregnancy

Overall diabetes complicates 2.5% of pregnancies, 87% of which are gestational diabetes with the remainder being type 1 and type 2 (National Collaborating Centre for Women's and Children's Health (UK), 2015). There is lot of debate regarding the timing of IOL, at what gestational age it should be done. However most agree that routine IOL in diabetic women may be done at 38–39 weeks of pregnancy. This may help decrease the risk of stillbirths & perinatal complications. The risk of shoulder dystocia in cases with fetal macrosomia can also be reduced without increase in caesarean section rates. ("Shoulder Dystocia (Green-top Guideline No. 42)," n.d.) Two systematic reviews done by Irion and Sanchez-Ramos found that caesarean section rates were not increased and no difference was found in occurrence of

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shoulder dystocia in cases with fetal macrosomia. (30) (31).

Euglycemic women without insulin therapy can be allowed to go into spontaneous labour. It was recommended that pregnancies can be induced at 39 weeks in women having gestational diabetes controlled with diet alone. In women taking hypoglycaemic agents, either insulin therapy or oral medications, labor can be induced earlier at 38 weeks. In women with uncontrolled diabetes the treatment should be individualized. Studies have shown that the birth outcomes in women with uncomplicated gestational diabetes did not depend on the management protocol used (IOL at 38-39 weeks as opposed to EM expectant management). (Boulvain et al., 2016) (Alberico et al., 2017) (Biesty et al., 2018).

Key takeaways –

1) Labour induction did not improve birth outcomes in women gestational diabetes.
2) There is lot of debate about the timing of induction in women with uncomplicated diabetes and those with severe diabetes.
3) In cases of in suspected fetal macrosomia, inducing labour did not improve outcomes.

Pre labour rupture of membranes PROM

When the bag of membrane ruptures, before onset of labour pains, it is defined as PROM. Incidence of PROM is 2% of all pregnancies. PROM occurs in 10 % of term pregnancies and in most of these patients labour starts within 24 hours. Hence a wait and watch policy of more than 24 hours is not advisable. Induction of labour remains the standard intervention in cases of PROM. This helps reduce the incidence of maternal and fetal infections. However in 40% cases PROM is associated with preterm deliveries (less than to 37 weeks of gestational age). Preterm PROM accounts for significant neonatal morbidity and mortality (RCOG 2010) (32)

Uncomplicated PROM at gestations less than 34 weeks can be managed expectantly, with proper monitoring for fetal wellbeing and signs of chorioamniotis. In pregnancies more than 34 weeks of gestation, with good neonatal care facilities, delivery can be expedited. IOL in cases of PROM helps lessen the risk of chorioamnionitis. Studies have observed that incidence of chorioamnionitis was much higher in the conservatively managed group as compared to labour induction. FHR Fetal heart rate variations were higher in EM expectantly managed patients as compared to IOL. Inducing labour has led to better neonatal outcomes and better Apgar scores with decreased admissions to NICU. There were more cases of sepsis and the use of antimicrobial agents was significantly higher in women managed conservatively. (33) (34). Induction can be done with oral/sublingual misoprostol or local PGE2. Oxytocin was considered as the drug of choice for inducing labours in women having PROM. Caesarean section rates were lower in women who had labour induction. The risk was less in cases where induction of labour was started within 24 hours of membrane rupture. Also when labour was induced, there was lesser admissions to a NICU. (4) (35)

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Key takeaways –

1) Inducing labour in cases of PROM at term reduces the rate of endometritis and of chorioamnionitis and admissions to a NICU.
2) The optimal gestational age at which labour should be induced is not clear.
3) Preterm PROM can be associated with increased respiratory problems, admissions to NICU and chorioamnionitis.

Intrauterine Fetal Demise IUFD

It is known that women with intrauterine fetal demise can start spontaneous labour pains, within 24-48 hours. However women with IUFD should be counselled regarding immediate induction of labor to prevent psychological trauma and to prevent the related complications. It is best to avoid surgical methods like ARM artificial rupture of membranes considering the risk of infection. Labour is generally induced with help of medications like oxytocin if Bishop's score is more than six (favourable cervix), or with the help of intra-cervical or intra-vaginal prostaglandins when the Bishop's score is less than six (unfavourable cervix) ("gtg_55.pdf," n.d.) ("Management-Intra-Uterine-Death-SLCOG.pdf," n.d.).

There is a 25 % risk of DIC when the fetus is retained in utero for more than 4 weeks. Hence if IOL gets delayed for more than 48 hours, woman should be tested for coagulation failure at least biweekly. In women with IUFD or fetal anomaly labour induction can be done with prostaglandin preparations or oxytocin. This was evaluated in systematic review (Dodd and Crowther, 2010). The conclusion was that, vaginal misoprostol was equally effective as other prostaglandin preparations like cerviprime gel PGE2 and PF2 alpha. However vaginal misoprostol was more effective than oral administration of misoprostol.

Key takeaways –

1) Labour induction should be advised in cases of intrauterine felt demise.
2) Vaginal misoprostol is better than oral misoprostol, prostaglandin E2 and PGF2 alpha

Twin pregnancy

Evidence does not support or show any advantage of IOL before term in women with multiple pregnancy. Hence WHO does not recommend inducing labour in women with uncomplicated twin pregnancy (36). There was no statistically significant difference between Labour induction done at 37 weeks and continuing the pregnancy with expectant management, both the groups did not show any significant difference. (37). Jonsson in a retrospective study compared the outcomes in women who had IOL with women having spontaneous labour. Findings suggested that labour induction in multiple pregnancies resulted in rise in caesarean section rates. CS were more with Foley's induction than with use of prostaglandins to induce labours (38).

The current recommendations by NICE guidelines on multiple pregnancy suggest the following. Women having uncomplicated mono-chorionic twins, should be advised IOL from 36 weeks of gestation and uncomplicated di-chorionic twins, should have IOL beyond 37 weeks of gestation (39). This strategy lead to better perinatal outcomes. These findings are

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seconded by one of the largest systematic reviews till date (40).

Key takeaways –

1) IOL is not recommended routinely in uncomplicated twin pregnancies.
2) IOL in twin pregnancies after 37 weeks, did not improve neonatal outcomes.

Induction of labour for reduced fetal movements

Many maternity units advice inducing labour for reduced fetal movement RFM. This is recommended as per the AFFIRM study which was a large, multicentre trial done in UK. The study found that interventions did not lessen the risk of stillbirths in women complaining of reduced fetal movements (41)

RCOG green top guidelines suggest that, in women who present with RFM, the decision of inducing labour should be made on an individual basis. Sometimes women present with RFM despite the presence of normal Liquor volume, normal fetal growth and normal fetal heart tracing. It is necessary to discuss with the patient and let her take an informed decision. (42).

Key takeaways –

1) The decision of inducing labour should be made on an individual basis.
2) IOL did not reduce the risk of stillbirths in women presenting with RFM.

Previous caesarean section –

More and more women are undergoing caesarean sections for various indications. In the next pregnancy many of these women can deliver normally for nonrecurring indications. The management decision in women having previous CS, can be a difficult one. The decision of awaiting spontaneous onset of labour pains, or planning labour induction or elective caesarean section can be quite tricky. It is needed that risks and benefits are carefully considered. Also methods used for induction can be a matter of debate. Methods should provide effective labour induction without causing serious harm. Today we do not have much evidence about which method is ideal for labour induction in women with a previous CS. RCTs are difficult to conduct in women with previous scar. Hence it can difficult to find an acceptable way of inducing labours in women with a prior caesarean birth.

Induction of labor in a woman with prior CS should be done in well-equipped centres having all facilities for continuous cardio-tocography and emergency caesarean sections. A detailed examination of patient, laboratory investigations and ultrasonography should be done. Mechanical methods like Foley's catheter is the preferred mode for IOL for women with an unfavourable cervix. ARM followed by oxytocin infusion is advisable women with favourable cervix. It is better to avoid use of prostaglandins because of a high risk of uterine rupture. Almost 60% of the inductions in women with previous CS can result in vaginal delivery, especially when the cervix is favourable. (43).

Key takeaways –

1) The decision of IOL in women with prior caesarean birth can be taken on an individual basis.
2) It is necessary to weigh benefits versus risks in all women willing for IOL.

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Oligohydramnios –

Induction of labour for oligohydramnios is done for improving fetal outcomes and reducing perinatal deaths. However oligohydramnios is often associated with IUGR and suspected anomalies. One study compared outcomes in pregnancies with oligohydramnios at 41 weeks. There was no difference in birth weights, the mode of delivery, the Apgar scores and admissions to NICU (44). There is insufficient evidence for oligohydramnios at other gestational ages because there are no studies.

Key takeaways –

1) Induction of labour for oligohydramnios should not be routinely recommended.
2) There is not enough evidence that IOL improves birth outcomes.

Maternal cardiac disease –

All women with diagnosed cardiac disease should be counselled preferably prior to conception. Antenatal and intra-partum management should be planned on individual basis. Management depends upon the cardiac diagnosis, the need for medications and the presence of associated complications like arrhythmias and heart failure. Management of women with significant cardiac disease should be done in tertiary care centres having high-dependency and intensive care units. (45)

It is generally agreed that vaginal delivery is the safest mode of delivery for women with cardiac disease. IOL is best avoided and it is best to await spontaneous labour. IOL is advised for strict obstetric indications. This can be done with prostaglandin gel locally or oxytocin drip. As regards IOL in women with cardiac disease, Dogra et al concluded that IOL with oxytocin can be a safe option for women having low-risk cardiac disease. In their study, IOL did not result in any major complications related to heart disease and neonatal outcomes were comparable to women undergoing spontaneous labor. (46) (Dogra et al., 2019). Another study compared women having labour induction at term (37-40 weeks), with those undergoing expectant management. There was no significant difference in outcomes and complications between the two groups. (47)

Key takeaways –

1) Vaginal delivery is the safest and preferred method in women with heart disease.
2) IOL in pregnant women having low risk cardiac disease does not have any harmful or beneficial effects.
3) Decision for IOL, needs to be individualized depending on the risks involved.

Elective induction/IOL on maternal request –

Increasingly IOL induction of labour is being done for maternal request. The frequent reason is timing the birth, when it is advantageous of for the mother or health-care provider or both. It can also be considered for logistic reasons (patient staying away from the hospital). However there are no guidelines to recommend this. (Mozurkewich et al., 2009)

The concept of elective induction is not new. It means labour induction in the absence of clear cut indications (The Society of Obstetricians and Gynaecologists of Canada SOGC). Elective labour induction means IOL done without any acceptable medical reasons (Leduc et al., 2013a) (Leduc et al., 2013b) ("brief_6_per-80.pdf.pdf," n.d.). Recently available

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systematic reviews and met analysis have shown that caesarean section rates were not affected (Saccone et al., 2019). Also there was no evidence to show any advantage of the policy of elective induction between 39-41 weeks, in low-risk women (Sotiriadis et al., 2019) (Saccone and Berghella, 2015).

Key takeaways –

1) Induction of labour on patients request is not advisable.
2) There is no advantage of elective induction in absence of definite maternal and fetal indications.

Intra-hepatic cholestasis -

Induction of labour in intra-hepatic cholestasis of pregnancy, can be advised between 37-38 weeks, for improving the perinatal outcome. If there are severe biochemical abnormalities, then an early induction at 36 weeks of pregnancy can be considered. Studies have compared expectant management versus planned birth at 36-37 weeks of pregnancy. (Puljic et al., 2015) (48). When dealing with intrahepatic cholestasis of pregnancy, IOL was associated with less chances of stillbirth. However no difference was noted in caesarean section rates or NICU admissions.

Key takeaways -

1) Induction of labour or planned birth at 37 weeks of pregnancy, may help reduce the risks of stillbirths.
2) Caesarean section rates were not increased in women with intra-hepatic cholestasis of pregnancy.

Maternal age –

Meta-analysis done by Walker in 2016 suggested that inducing labours in elderly women, did not have any statistically significant effect on caesarean section rates. (49). When IOL and EM groups were compared, there was not much difference in terms of CS rates and neonatal outcomes.

Key takeaways -

1) IOL in women with advanced maternal age does not have much effect on CS rates or neonatal outcomes.

Increased BMI maternal body mass index –

Studies have tried to compare outcomes for both the mother and new-born in obese women with BMI ≥ 30.0 kg/m2. Comparison was done between elective IOL between 39 and 41 weeks and expectant management beyond 39 weeks. The study found that inducing labours in obese women increased the rates of CS and also there were higher admissions to NICU (50)

Other studies found lower rates of caesarean section and decreased risk of fetal macrosomia and decreased admissions to NICU. (Lee et al., 2016) (51)

Key takeaways -

1) Few studies have shown reduction in CS rates and improved neonatal outcomes in women with high BMI.
2) However this was contradicted by other studies.

3) Hence there is a need for prospective studies to validate the findings.

A number of studies related to induction of labour from this region were reviewed. Nair et. al. reported on Induction of labour with oral misoprostol and its maternal and perinatal outcome (52). Singh et. al. compared mifepristone vs misoprostol as pre-induction cervical ripening agent in term pregnancy(53). Toshniwal et. al. discussed on comparison of Foley's Catheter and Vaginal Misoprostol versus Vaginal Misoprostol alone for labour induction(54). Wanjari et. al. discussed on elastography of the cervix for prediction of induction of labour(55). Agrawal et. al. assessed effectiveness of isosorbide mononitrate in cervical ripening before induction of labor in full-term antenatal patients (56). Chouhan and Shrivastava discussed on role of cervical length assessment by transvaginal sonography in predicting the success of labour induction in near term women (57). Deshmukh et. al. reported about use of Pg-e 2 gel for cervical ripening in labour induction (58).

CONCLUSION

Induction of labour is a powerful tool in the hands of the obstetrician. Induction should be based on sound indications, so that there is a reasonable chance that it will succeed. IOL should be done judiciously with the best available options like Foley's induction, amniotomy, oxytocin and prostaglandins in various forms. The methods chosen will depend on the availability, the inducibility of the cervix according to Bishop's score, the indication for labour induction, the gestational age of the pregnancy and the age and parity of the pregnant woman.

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Tables -

Table I - Bishop's score

Cervix	Score			
	0	1	2	3
Position	Posterior	Mid-position	Anterior	-
Consistency	Firm	Medium	Soft	-
Effacement	0-30%	40-50%	60-70%	>80%
Dilation	Closed	1-2 cm	3-4 cm	>5cm
Baby's station	-3	-2	-1	+1, +2

Table II - Oxytocin titration table

Calculation of dose delivered in milli-units (mU) & its correlation with drop rate per minute

Units of oxytocin mixed in 500 ml ringer solution 1 unit = 1000 mili units (mU)	Drops per minute (15 drops = 1ml) 15 30 60 In terms of mU /min	
1	2 4 8	
2	4 8 (16)	
8	16 32 64	

NOTE: In majority of cases, max, response is seen with 16 mU /min i. e. 2 U in 500ml RL at 60 drops per min.