Title: Evidence of inducing labor early in women of advanced maternal age and those using assisted reproductive technology

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Abstract:

Worldwide, there has been a trend towards later motherhood. Concurrently, subfertility has been on the rise, necessitating conception using Assisted Reproductive Technology (ARTs).
These pregnancies are considered high risk due to fetal complications such as antepartum stillbith and growth restriction, and maternal complications such as increase in maternal morbidity and mortality. Induction of labour early can help to mitigate these risks. However, this has to been balanced against the iatrogenic harm of earlier delivery to both the baby, including respiratory distress and NICU stay as well as to the mother who might experience longer labour and other complications such as uterine hyperstimulation. Induction of labour at 39 weeks is the optimal timing between preventing antepartum stillbirth and avoiding iatrogenic harm. Delivery by elective cesarean section is not advocated as the benefits of it in these patients are unclear compared to the short and longterm complications of a major abdominal surgery.

Key Words:

Advanced Maternal Age; “Reproductive Techniques, Assisted”; “Labor, Induced”; “Cervical Ripening”; Stillbirth; Cesarean Section

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Introduction

Pregnancy in women of advanced maternal age

The average age at childbirth has been increasing worldwide, with more women giving birth past the age of 35 [1]. Advanced maternal age is defined as age of 35 or above at the time of childbirth [1]. In 1996, only 12% of live births in the UK were to women of 35 and above [2]. However, in just over a decade in 2017, this figure had risen to 20% [2]. Globally, both high and middle-income countries, have illustrated a similar trend towards later motherhood [3].

The reasons for this include a complex interplay of social, economical and lifestyle factors [4]. Additional to an increasing emphasis on women's career and personal goals as well as financial stability before starting a family, there is also an increase in women suffering from the effects of subfertility and it is important for clinicians to be sensitive to this. [4].

Women over the age of 35 are at a higher risk of maternal, fetal and obstetric complications during pregnancy including that of higher maternal mortality and morbidity, antepartum stillbirth, severe fetal growth restrcition and placental dysfunction. [4]. Hence, the age of a mother plays an important factor in determining treatment options, especially surrounding timing and mode of delivery [5].

Pregnancy in women conceived following the use of assisted reproductive technology (ART)

Similar to the trend of later motherhood seen worldwide, there has also been a rise in subfertility prevalent amongst both men and women, often necessitating conception using ART [6]. The World Health Organisation (WHO) estimates that upto 10% of women are affected by subfertlity, with subfertility defined as a woman of reproductive age not being able to conceive despite unprotected vaginal sexual intercouse with a stable partner for over 1 year [6].

There are a myriad of reasons for this disturbing trend, with a combination of female, male and unexplained causes [7]. Fortunately, increase in subfertility

came in the same period as the rise in the effectiveness of assisted reproductive technology [8]. Up to 5.9% of babies in Denmark, 4.2% in Israel, 3.3% in Australia, 1.9% in the United States are conceived using ARTs [8].

Most common ARTs include intrauterine insemination (IUI), intracytoplasmic sperm injection (ICSI) and in-vitro fertilisation (IVF) with the type of treatment dependent on the underlying aetiology of subfertility [8]. ARTs have indeed allowed patients with subfertility to realise their dreams of parenthood.

Even with continual improvements in these technologies, unfortunately it still carries risks with it. Perinatal morbidity and mortality are higher in ARTs pregnancies compared to natural ones, with multiple gestation being a leading contributary factor [9]. Maternal morbidity and mortality are also higher [9]. Hence, ART pregnancies are considered high risk [9].

Risks of prolongation of pregnancy

In pregnancies in women of advanced maternal age

Risks to the baby:

1. Increased risk of antepartum stillbirth

Perinatal deaths is defined as death occurring during the perinatal period, from 24 weeks of gestation to the completion of one week following birth (i.e. stillbirth and early neonatal death) [10]. Stillbirth (both antepartum and intrapartum) accounts for 67% of perinatal deaths, while the remaining 33% occurs during the early neonatal period [11]. Of the stillbirths, only 8.8% are caused by intrapartum causes [11]. Hence, the largest contributor to perinatal deaths is antepartum stillbirth.

Several studies have demonstrated that advanced maternal age is a risk factor for antepartum stillbirth. A large retrospective study conducted by *Reddy et al* in the US showed not only that women over the age of 35 years are at a higher risk of antepartum stillbirth, but also that this risk increases dramatically after 39 weeks [12].

The study demonstrated that the overall cumulative risks of antepartum stillbirth throughout gestation for women younger than 35 years, 35-39 years and older than 40 years to be 6.2, 7.9 and 12.8 per 1000 pregnancies respectively [12]. It also showed that the largest risks of stillbirth in all age groups of women occurs at 39 weeks of gestation and peaks at 41 weeks [12]. The increased risk of stillbirth in women of advanced maternal age persisted when the data was adjusted for pre-existing comorbidites [12]. Likewise, a meta-analysis examining 37 studies also showed a statistically significant increase in the risk of stillbirth among mothers of advanced maternal age [13].

Overall 28% of all antepartum stillbirths are unexplained [11]. However, a widely accepted cause for stillbirth is placental dysfunction, which is more

prevalent in women of advanced maternal age [14]. The exact pathophysiology of abnormal placentation in women of advanced maternal age is not known [14]. Nevertheless, studies have illustrated that the risk is not only independent of maternal co-morbidities in mothers of advanced maternal age, but also other protective factors such as higher socio-economic standing, non-smoking and better antenatal care [14].

2. Fetal growth restriction

Several studies have demonstrated that there is a linear association between advanced maternal age and the risk for fetal grwth restriction (FGR) resulting in small for gestation (SGA) babies [15]. A large retrospective study conducted by Lee *et al* of almost 190 000 women showed that mothers of age 35 and above were at the highest risk of having a growth-restricted baby [16]. Even after adjusting for other confounding factors of IUGR, advanced maternal age remained as an independent risk factor, possibly reflecting maternal ageing of biologic tissues and the cumulative effects of diseases associated with increasing age [16].

Placental insufficiency is a known to be a leading cause for FGR [17]. The association with disease states affecting the placenta such as hypertensive disorders, diabetes and renal conditions is well known [17]. Mothers of advanced age are at a higher risk of having not only pre-pregnancy chronic conditions, but also at a higher risk of developing pregnancy-induced complications that cause placental insufficiency [18].

Additionally, in the absence of any diseases that cause placental insufficiency, mothers of advanced maternal age suffer from age-related deterioration of uterine vasculature, placental perfusion and trans placental transport of nutrition hence reducing the growth potential of the fetus [16].

FGR leads to significant short term complications during the neonatal period such as hypoglycemia, hypothermia, meconium aspiration and perinatal asphyxia [17]. Additionally, SGA infants also have an increased risk of long-term issues such as abnormal physical growth and neurodevelopmental delay [17]. However, only 25% of SGA babies are diagnosed antenatally [17].

Risks to the mother:

1. Maternal mortality and severe maternal morbidity

A large retrospective population-based study conducted by Lisonkova *et al*, looked at over 800 000 live births over a 10 year period from 2003 to 2013 in Washington State [19]. The study demonstrated the overall rate of maternal mortality and severe morbidity was 1.6 per 100 births, and that the risk showed a J- shaped increase with age, with mothers over 35 years old having the most risks [19]. The study also illustrated that barring puerperal sepsis which had its highest incidence in teen mothers, patients of advanced

maternal age were at the greatest risks of suffering from complications of pregnancy in almost all organ systems [19].

Mothers of advanced maternal age were at a higher risk of suffering from pulmonary embolism and deep vein thrombosis [19]. Additionally, age is also an independent risk factor for antepartum and postpartum hemorrhage as well as uterine rupture [19]. Mothers of advanced maternal age are not only at a higher risks of these conditions, but they also suffer increased severity. The study showed the incidence of requirement of life saving treatments such as emergency hysterectomy, blood product transfusion and ICU admission with intubation increases with maternal age [19].

Advanced maternal age is a risk factor for pregnancy-related conditions such as pre-eclampsia and gestational diabetes [20]. In addition, a higher proportion of these mothers would also have pre-pregnancy chronic conditions such as hypertension, diabetes and renal impairment [20]. Cumulatively, these put mothers of advanced maternal age at a higher risk of suffering from acute myocardial infarct, sudden cardiac arrest, renal failure and cerebrovascular incidents [19].

Studies have shown that patients of advanced maternal age are of greater risk of having a late-onset (over 34 weeks) of the abovementioned conditions such as as pre-eclampsia, renal failure and cerebrovascular insults [21].

<u>In pregnancies in women conceived using ARTs</u>

Risks to the baby:

1. Increased risk of stillbirth

Multiple pregnancy is one of the major complications of assisted reproduction causing both adverse materal and fetal outcomes [22]. Data from Europe illustrates that 25.8% of assisted conception results in twins and 3.8% in triplets [22]. The use of medicated ovulation or controlled ovulation can lead to polyovulation as compared to a natural cycle [23]. In artificial sperm transfer techniques, the risk of multiple pregnancy depends proportionally on the number of embryos transfered, with the practise differing between countries [23].

The definition of perinatal mortality and stillbirths have been explained above [10].

Although multiple pregnancies only constitute 1-2% of pregnancies, they result in 9-12% of all perinatal deaths in the US [22]. The risks of stillbirths are profoundly increased in multiple pregnancies in ARTs and this risk is more pronouced as compared to naturally conceived multiples [22]. Both antepartum and intrapartum stillbirths are increased in multiples in ARTs and this increases lineraly with gestation and can be due to reasons such as chromosomal abnormalities and fetal malformations, growth restirction, and fetofetal transfusion syndromes [23]. A study conducted in Alberta, in over

600 000 twin births showed that the risk of stillbirth is 1/1000 before 38 weeks after which it jumps to 7/1000 [24]. The figure is even higher in higher order multiples [23].

While we can argue that multiple pregnancy is in itself a risk factor for stillbirth irregardless of method of conception, studies comparing the risks in singletons conceived naturally versus through ARTs illustrate the fertility treatments play a role in stillbirth [25]. In a study conducted in Denmark over a decade from 2003 to 2013, the risks of overall stillbirth in a low-risk singleton fetus was 0.1% in natural conception, versus 0.3% (odds ratio 2.1, 95% CI 1.4–3.1) in artificial conception [25]. The study demonstrated the risk increasing greatly after 37 weeks of gestation [25]. In addition, the authors also performed a subgroup analysis which showed the risks elevated in fresh embryo transfer versus frozen embryo transfer [25]. Whether the treatment modes used in ARTs are a cause for stillbirth is contentious. A study conducted by Wisbor *et al*, showed that after correcting for confounding factors, the reason for higher rates of stillbirth in ART pregnancies versus natural could relate to the treatment or to the unknown factors pertaining to the couple seeking ARTs [26].

2. Fetal growth restriction

Both singletons and multiples conceived through ARTs are at a higher risk of having FGR and SGA babies [23]. Data collected from the American College of Obstetrics and Gynecology showed that up to 25% of twins conceived through ARTs experience FGR and are SGA, with the percentage increasing to a staggering 60% in triplets [23]. The risk for fetal growth restriction is also significant in singletons. A study published by Qin *et al*, that examined 52 cohort studies of 181 741 ART pregnancies revealed that up to 7.1% of babies are growth restricted [27].

The reason for FGR in multiple pregnancies are intuitive with the risks higher in ART multiples. Although the exact pathology of ARTs causing growth restriction is not fully known, there are two plausible causes. Firstly, abnormal placentation owing to transfer techniques in ARTs could lead to inadequate oxygen and nutrirional supply to the fetus [28]. Secondly, underlying reasons for subfertility such as an unfavourable endometrial environment could be another reason [28]. For example, several studies published are in agreement that women with endometriosis are at a higher risk for pregnancy complications such as placenta previa, pre-eclampsia and unexplained FGR all causing SGA babies [28].

Risks to the mother:

1. Maternal mortality and severe maternal morbidity

A large retrospective study in Netherlands found that the rate of maternal mortality in mothers undergoing ARTs is 42.5/100 000 versus only 12.1/100 000 in the general population [29]. ARTs are also associated with more severe materal morbidities [30]. The reasons for this include placental

anomalies such as placenta praevia, abruption and adherent placenta causing hemmorhage as well as development of pregnancy-induced conditions such as pre-eclampsia, thromboembolism and intrahepatic cholestatsis [30].

The risk of developing pre-eclampsia is higher in a mother who underwent ART as compared to natural conception (7.4% vs 2.8%) and is one of the major contributors to maternal mortality and morbidity in the former patient group [30]. Additionally, these patients are of a higher chance of being of advanced maternal age, having pre-exisiting medical conditions and carrying multiple pregnancies [28]. Therefore, the summation of all these risk factors results in a ART patient to have poorer outcome from the diseases. [30]. Discontinuation of a pregnancy is the best known way to prevent the development of pre-eclampsia as well as prevent its progression and remains one of the strongest indicatiors for induction of labour in patients undergoing ARTs [31].

Other conditions that lead to poor maternal outcomes in ARTs pregnancies include thromboembolism which can cause sudden cardio-respiratory arrest or the need for ICU admission with ventilation [30]. Studies have shown that up to 0.07% of ART pregnancies develop thromboembolism versus 0.02% in the general population [30].

Acute fatty liver of pregnancy, which is higher in ARTs, is another complication which can cause mortality and severe morbidity in mothers warrenting another reason for induction [28].

Several studies have illustrated that the risks of placenta previa, placental abruption and morbidly adherent placenta to be almost twice as high in ART pregnancies [30]. If these women undergo natural onset of labour, they are at a high risk of massive obstetric hemmorhage, leading to severe multi-organ complications including death. Hence, in this patient group induction of labour, by elective cesarean section is usually necessary.

Iatrogenic harm of induction of labour

Harm to baby:

<u>In babies of women of advanced maternal age as well as those who have undergone ARTs to conceive</u>

1. Respiratory complications

Studies have shown that the probability of developing neonatal respiratory compromise in vaginal birth is higher at 37 weeks gestation at 0.07, compared to 0.04 at 39 weeks and remains constant thereafter [32]. Additionally, when born via elective cesarean section a baby is at 4 times higher risks of respiratory symptoms at 37 weeks gestation as compared to 40 weeks, and 3 times higher as compared to 39 weeks [32]. While conditions such as

transient tachypnea of newborn is often self-limiting, disorders such as persistent pulmonary hypertension (which has a higher incidence in advanced maternal age) can pose serious complications requiring intubation and prolonged NICU stay [33].

2. Hyperbilirubinemia

Some studies have reported an association with oxytocin utilized in the induction of labour and neonatal hyperbilirubinemia [34]. However, given the earlier gestation of babies requiring induction, it is impossible to prove a direct causual relationship between oxytocin usage and neonatal hyperbilirubinemia [35]. In contrast, the relationship between gestational age and neonatal jaundice is well-proven. Gestational age <38 weeks is an important risk factor for the development of unexplained jaundice [36]. For example, the DAME trial, a randomised controlled trial of induction of labour at 37-38 weeks for large for gestation babies versus expectant management found a larger proportion of babies induced early requiring phototherapy for jaundice [37].

3. Other adverse outcomes

Gestation of lesser than 38 weeks is also a risk factor of development of neonatal hypoglycemia, requiring treatment [38, 39].

Conversely, studies have also highlighted that babies born after 41 weeks are at a higher chance of developing encephelopathy leading to cerebral palsy [39, 40].

Therefore, induction at 39 weeks gestation can strike the perfect balance between avoiding complications from being born too early and preventing problems from continuing pregnancy past 39 weeks in both the high risk patient groups.

Harm to mother:

<u>In women of advanced maternal age as well as those conceived using ARTs</u>

1. Experience of labour

Historically studies have suggested that mothers who underwent induced labour were more likely to experience greater pain. Observational UK data on intrapartum analgesia revelaed that women who were induced were twice as likely to request for epidural analgesia as compared to women who laboured spontaneously [41]. Additionally, a study by Capogna *et al*, showed that the minimum effective dose of epidural analgesia is also higher in induced women [42]. However a randomised controlled trial conducted by Walker *et al* in Nottingham contested this data by showing no statistical difference on epidural usage and experience of pain between women induced and those who laboured naturally [43].

It is difficult to compare the duration of an induced versus natural labour. While the timing of onset in induced labour is clear (for example, inserting prostaglandin, amniotomy etc), the start of natural labour is often ambigous. However, a large retrospective trial looking at 10000 women who laboured spontaneously versus 1000 women who were induced for no medical indications found that induced mother had a longer admission to delivery time as well as an additional 0.34 days of hopital stay. [44].

Therefore, being induced might cause a woman to have a more negative experience of labour as she might experience a longer and more painful labour. However, the evidence for this is contentious and not compelling enough to make decision around induction based on it.

2. Anatomical complications

Umbilical cord prolapse, a complication of labour with possible dire consequences to infant occur in 1.25-2.1/1000 deliveres [45]. Of which, amniotomy is thought to increase the risk. A retrospective trial of 57 deliveres found that 42% cases of those who underwent amniotomy had cord prolapse [45]. However, larger retrospective case-controlled trials have illustrated no association with amniotomy and umbilical cord prolapse, with one trial even showing that spontaneous rupture of membrane had an nine-fold increase in umbilical cord prolapse [46,47].

Uterine hyperstimulation is defined as more than 5 contractions in 10 minutes or contractions lasting more than 2 minutes [48]. This can be deterious, as it can cause reduction of oxygenation to the fetus [48]. Studies have shown that this complication arises in around 1-5% of patient who were induced pharamcologically [48].

Hence, while induction of labour might not increase the chance of cord prolapse, it is clear that uterine hyperstimulation is more common.

3. Cesarean Section

Historically induction of labour was believed to increase liklihood of cesarean section and remains contentious. Observational data from 2010 – 2011 in England shows cesarean rates were 11% among women who laboured spontaneously versus 23% in women who were induced [49]. Similarly, prevalence of operative vaginal delivery was also higher in women who were induced at 17% as compared to 12% in women who laboured spontaneously [49]. However, this data has to be intepreted with caution, as indication for induction is a significant confounder. Reasons for induction such as postdate, fetal growth restriction or reduced fetal movements are in itself an established risk factor for operative delivery [49].

On the contrary, over 30 randomised controlled trials and three systematic reviews of induction near term demonstrate that induction does not cause an elevated risk of cesarean section or instrumental delivery [50]. For example, in the ARRIVE trial where 6106 low risk nulliparous women were randomised to

induction at 39 weeks versus expectant management found that the rates of cesarean section were lower in the former arm (19% versus 22%) [51].

Mode of delivery

In women of advanced maternal age

Despite compelling evidence already presented that induction does not correlate with an increased likelihood of cesarean section, many obstetricians are reluctant to offer induction, especially in patients of advanced maternal age [52]. The relationship between cesarean section rates and age is linear, with 38% of women over 35 and 50% of women over 40 deliverying by cesarean [53]. Hence, some obstetricians are worried than induction will lead to an even increased liklihood in this patient group, despite believing that induction might also lead to more favorable perinatal outcomes.

A randomised controlled trial by Walker *et al* conducted in Nottingham disproves this belief [54]. In this trial 619 women 35 years or older were randomly assigned to induction between 39+0 to 39+6 weeks or expectant management, with the primary outcome being cesarean section [54]. This trial demonstrated that there was no statistically significant difference in cesarean rates between the two arms [54]. In addition, there was also no difference in short term adverse materal or neonatal outcomes including death or a women's experience of labour [54].

However, given that induction could lead to maternal complications such as cord prolapse, uterine hyperstimulation and longer and more painful labour, should women over 35 years of age be offered elective cesarean section at 39 weeks?

In addition to preventing the abovementioned complications of inducing a patient of advanced maternal age, elective cesarean section could hold other benefits to this patient group.

For example, elective cesarean can prevent perineal trauma due to vaginal delivery in women over the age of 35 years [55]. Perineal trauma including 3rd or 4th degree tears or anal sphinter trauma occurs up to 3% of all vaginal deliveres with women over the age of 35 years at an increased risk [52]. Elective cesarean section avoids this complication.

In contrast, the effectivness of elective cesarean section in preventing urogynaecological complications such as urinary and fecal incontinence and pelvic organ prolapse is unclear [52].

The Term Breach trial found a lower rate of urinary incontinence at 3 months postpartum in women who underwent elective cesarean section versus women who delivered vaginally [56]. However, at 2 years postpartum, there was no difference between the group [56]. This could be due to the fact that any protection offered by cesarean section is offset by other factors such as age, multiple cesarean sections and future vaginal births [56].

Fecal incontinence can be caused by obstetric anal sphinter tear or pudendal nerve injury [57]. Although cesarean section can prevent the former, but not the latter [57]. This could account for the reason why in a questionaire study of 1336 women aged 40-60 years, there was no difference in reports of anal dysfunction between women who delivered vaginally or through cesarean [58].

A large observation study has illustrated that the most significant risk factor for pelvic organ prolapse was parity, with the risk increasing with each baby [59]. Additionally parous women who delivered vaginally reported more symptoms of pelvic prolapse compared to those who underwent cesarean [59]. Hence, there might be a small benefit of offering cesarean to women over the age of 35 years to prevent pelvic organ prolapse, especially if they have previously undergone vaginal delivery [60].

Nonetheless, despite the possible benefits of an elective cesarean section, this procedure constitues major abdominal surgey and carries significant risks. A trial by Lilford *et al* found that the risk of materal mortality for cesarean versus vaginal delivery was 5:1 in emergency cesarean sections and 1.5:1 in elective cesarean section [61].

A large case control study examined the risks of cesarean delivery in women of advanced maternal age [62]. The authors in this study eliminated cases with pre-existing morbidity that could justify a need for cesarean and accounted for complications arising from the surgery [62]. They also adjusted for previous cesarean section [62]. The results of this study showed that cesarean was associated with increased risk of acute maternal morbidity and mortality and this risk is linear with age with women over 35 experiencing the greatest risks [62]. Both emergency and elective cesarean sections posed an increased risk for women over the age of 35 years [62].

In addition to immediate complications from surgey, cesarean sections also increase risks of complications in subsequent pregnancies.

Placenta previa and placenta accreta occurs when there is a failure of the placenta to move upwards as the uterus grows, with scarring in the lower uterine segment caused by previous cesarean a major risk factor. Age itself puts a woman at a higher risk of this pathology, independent of previous mode of delivery and this risk is even more profound if she has had previous cesareans. Placenta previa can cause massive obstetric hemmorhage with associated poor neonatal and maternal outcomes [63]. Similarly, placenta accreta is a serious pathology often warrenting preterm delivery, planned cesarean hysterectomies and can cause massive obstetric hemmorhage and urogynaecological complications [63].

Additionally, undergoing an elective cesarean section puts a woman at a higher risk of uterine scar rupture in future pregnancies. A trial conduced by Landom e*t al* illustrated that the risk of scar rupture in vaginal delivery after one previous cesaren section is 0.7% [64]. Scar rupture can pose dire

consequences to a mother and child as shown by a large observational trial where the rate of materal and fetal mortality is 1.3% and 12% respectively [65].

In women undergoing ARTs

One of the major indications for elective cesarean sections in ARTs is due to placental anomalies [66]. Placenta previa, placental abruption and morbidly adherent placenta are more prevalent in assisted pregnancies [66]. These contributes to reasons ART pregnancies are more likely to see complications in the 3rd stage of labor [67]. In a case control study conducted by Wertheimer *et al*, the risk of major post-partum hemorrhage was 5.45% in ARTs versus 1.79% in normal conception, manual removal of retained placenta was 11.98% in ARTs versus 7.2% in normal conception and the need for blood transfusion was 2% in ARTs versus 0.41% in normal conception [67]. Therefore, delivery by elective cesarean section can mitigate these risks. Additionally, the advantages of offering multiples elective cesarean section is well documted and beyond the scope of this review

For women who have concieved through ART cesarean section increases maternal mortality and morbidity in both the short term due to acute complications of surgery and anaesthesia and the longterm due to increased risks of abnormal placenta and scar rupture in future pregnancies. The only perceived benefit of offering elective caesarean delivery purely for this indication is the prevention of possibly catastrophic events during 3rd stage of labor in pregnancies conceived via ARTs. We do not advocate recommending delivery by elective caesarean if the only indication is that the woman has conceived via ART.

Summary:

Worldwide, there has been a trend towards later motherhood. Concurrently subfertility has been on the rise, necessitating treatments using ARTs. Pregnancies of advanced maternal age as well as ARTs are considered as high risk pregnancies.

The timing and mode of delivery in these pregnancies have to be carefully decided. In both these patient groups, there is a higher risk of stillbirth and fetal growth restriction. Additionally, these mothers are at a higher risk of mortality and severe morbidity. The risks of prolongation of pregnancy has to be balanced with the iatrogenic harm of earlier planned birth. Delivery by induction prior to 39 weeks increases the risk of neonatal respiratory distress, jaundice, hypoglycemia and a prolonged neonatal stay. Mothers might experience longer labor and complications such as uterine hyper stimulation. In our opinion, induction of labour at 39 weeks is the optimal timing between preventing antepartum stillbirth and avoiding iatrogenic harm.

Elective cesarean section in patients of advanced maternal age may offer benefits such as avoidance of perineal trauma. However, these benefits are unclear when compared to the short and longterm risks the major surgery poses to a patient of advanced maternal age. We do not advocate elective caesarean delivery simply because the woman has conceived using ART.

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