# Expectant Management Versus Induction of Labour for Intrauterine Fetal Death

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*Objective:* To compare the delivery outcome of patients managed with induction of labour versus spontaneous onset of labour following intrauterine fetal death.
*Methods:* Women who had an intrauterine fetal death from 1 January 2000 to 31 December 2015 in a regional hospital in Hong Kong were analysed to compare their delivery outcome following expectant management for spontaneous onset or induction of labour. The outcomes studied included the duration of labour, rate of infection, rate of coagulopathy, psychological stress, and other morbidities.
*Results:* A total of 193 patients fulfilled the inclusion criteria of whom 116 underwent labour induction and 51 elected spontaneous onset of labour; 26 patients were excluded from the analysis because 12 were already in active labour on admission, 13 changed their decision during the process, and one opted for Caesarean section. Patients with more advanced gestational age (p=0.004) and larger cervical dilatation (p<0.001) were more likely to opt for expectant management. The expectant group had a significantly shorter hospitalisation stay (4.8 days vs. 6.3 days; p<0.001) and shorter time from admission to delivery (4.6 days vs. 5.2 days; p=0.002) than the induction group. On the other hand, the induction group had a significantly shorter first stage of labour (4:05 hours vs. 4:52 hours; p=0.033) and less total blood loss (133.9 ml vs. 169.0 ml; p=0.013). Two cases in the induction group required emergency Caesarean section. There were no significant differences in the rate of infection, coagulopathy, or postnatal depression.
*Conclusion:* Both expectant management and induction of labour were safe options for intrauterine fetal death. Patients should be managed according to their preference and clinical condition.
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*Keywords: Delivery, obstetric; Labor, obstetric; Perinatal death*

## Introduction

Intrauterine fetal death is defined as a fetus with no signs of life when the fetal weight is more than 500 g or over 24 weeks of gestation in utero as charted by the parturient[1]. In 2015 there were 2.6 million stillbirths globally, with more than 7178 deaths a day. Worldwide, the number of stillbirths has declined by 19.4% from the year 2000 to 2015, representing an annual reduction rate of 2%[2].

Intrauterine fetal death is a tragic event both for mother and her family. More than 85% of women go into labour spontaneously within 3 weeks of diagnosis[3-5]. Nonetheless there is the concern about development of complications following an intrauterine death such as disseminated intravascular coagulopathy and intrauterine infection[6,7]. The emotional burden on the mother and her family is also considerable[8]. Furthermore, postmortem and genetic assessments may be jeopardised after prolonged periods of expectant management[3]. On the other hand, inducing labour may pose risks of induction failure as well as other morbidities associated with induction[9-13].

The objective of this study was to analyse the delivery outcome of women who delivered a stillbirth following spontaneous versus induced labour.

## Methods

A retrospective study was conducted of women who delivered between 1 January 2000 and 31 December 2015 at Tuen Mun Hospital, which is a regional hospital in Hong Kong. Ethics approval was obtained from the New Territories West Cluster Clinical Research Ethics Committee before commencement of the study. All women who had an intrauterine death during the study period were identified through the electronic patient records in the Clinical Management System. The case notes were retrieved and data were input into a database for thorough analysis.

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A single reviewer conducted a detailed manual review of data. Exclusion criteria included intrapartum death, multiple pregnancy, major placental abruption, placenta praevia, previous multiple Caesarean deliveries, previous classical Caesarean section, termination of pregnancy, and pre-eclampsia. Cases with either maternal or obstetric conditions that required urgent or early management and did not permit a choice of expectant management or induction were excluded. Gestational age was based on the best-estimated due date from prenatal records or ultrasound biometry at the time of intrauterine death diagnosis. The data collected included patient demographics, obstetric history, gestational age, ultrasound findings on diagnosis, cervical examination at the time of diagnosis, fetal and placental delivery time, adverse outcomes, total length of hospital stay, and the Edinburgh Postnatal Depression Scale (EPDS) score at postnatal follow-up.

Patients were stratified into the expectant management or induction group based on whether the delivery occurred after spontaneous onset of labour or induction of labour.

In Tuen Mun Hospital, all patients with suspected intrauterine death are assessed immediately by the on-duty medical officer. The diagnosis of intrauterine fetal death is confirmed by real-time ultrasonography. Patients are then counselled about the management options according to their clinical condition and delivery history. Unless the patient has an urgent need for delivery or has some exclusion criteria, they will be counselled about expectant management or induction of labour.

Patients who opt for expectant management are discharged home and followed up in the obstetric outpatient specialist clinic weekly. Blood investigations twice per week include a complete blood count, clotting profile, and serum fibrinogen. Those patients who opt for induction of labour are stratified to different induction methods according to the cervical ripening status. Prostaglandin is used for cervical ripening in patients with an unfavourable cervix. Those with a favourable cervix are given an oxytocin infusion. Amniotomy is avoided in all cases. All patients are visited by a bereavement nurse prior to discharge and all have postnatal follow-up in the postnatal clinic at Tuen Mun Hospital. At follow-up, both the medical officer and bereavement nurse assess the patient's physical and psychological health. If appropriate, referral will be made to a psychologist or psychiatrist.

Postpartum depression was assessed using the Chinese version of the EPDS. The original EPDS is a 10-item self-report scale widely used to screen for postpartum depression, with items on the scale corresponding to various clinical depression symptoms[14]. The Chinese version of the EPDS has been validated among Hong Kong Chinese women and its psychometric performance is comparable with the original scale. It has satisfactory sensitivity and specificity for detecting depression in Chinese women at 6 weeks' postpartum[15]. Mothers who score above 13 are likely to be suffering from a depressive illness of varying severity. Careful clinical assessment is carried out by an experienced specialist nurse to confirm the diagnosis.

Data were analysed using the SPSS (Windows version 21.0; IBM Corp, Armonk [NY], US). Mann-Whitney $U$ test was used for continuous variables. Chi-square test and Fisher's exact test were used for discrete variables. A p value of <0.05 was considered statistically significant.

## Results

During the study period, there were a total of 90,240 deliveries, including 273 cases of intrauterine death in Tuen Mun Hospital, i.e. one in 330 deliveries was an intrauterine fetal death. Of 273 cases, 80 (29.3%) were excluded based on the exclusion criteria mentioned above. Among the remaining 193 cases, 63 (23.1%) women opted for expectant management and 116 (42.5%) opted for induction of labour (Figure 1).

One 29-year-old nulliparous patient requested Caesarean section due to great maternal anxiety after the ultrasound diagnosis of intrauterine death at 37 weeks of gestation. The estimated fetal weight on ultrasound examination was 4.58 kg and the liquor volume was normal. The operation was uneventful and birth weight was 5.1 kg. Postnatal oral glucose tolerance test was normal.

One primipara patient with intrauterine death at 29 weeks of gestation originally opted for induction of labour after counselling. After 6 days of prostaglandin induction, her cervix remained unfavourable. She then switched to expectant management and refused further induction. She finally went into spontaneous labour 4 days after the last dose of prostaglandin.

Twelve patients switched from expectant management to induction for a variety of reasons. Time of change in decision ranged from 1 day to 73 days and was due to growing psychological stress. Among these, two
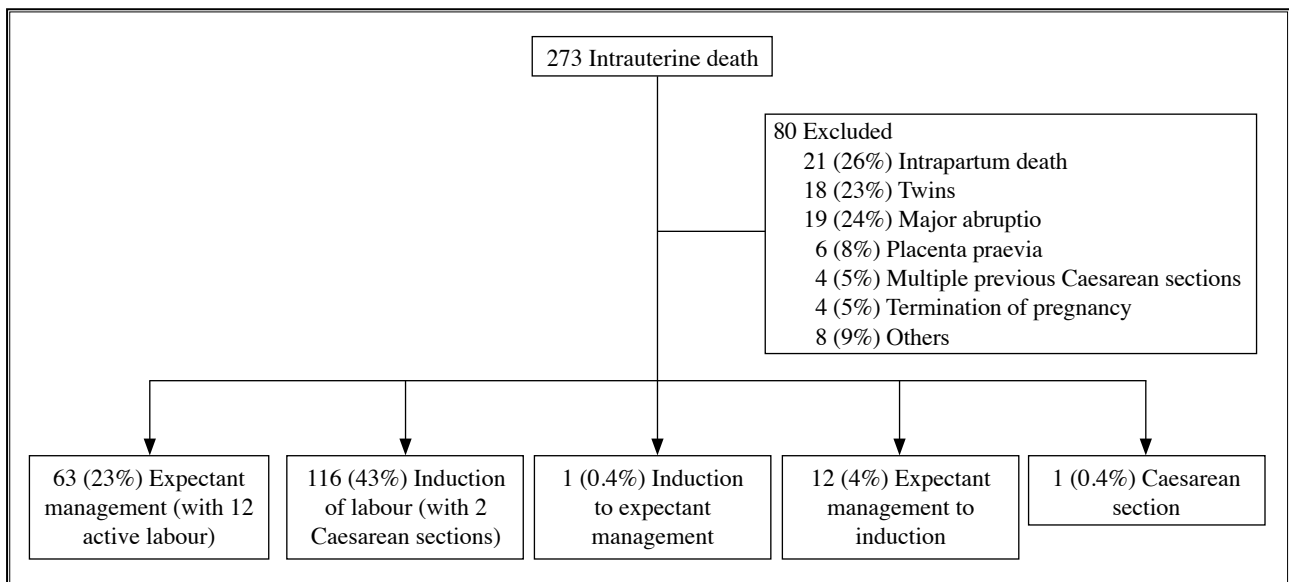
*Figure 1. Flow diagram of selected patients*

**Table 1. Demographics and obstetric characteristics***

| Demographics / characteristics | Expectant management (n=51) | Induction of labour (n=116) | p Value† |
|---|---|---|---|
| Age (years) | 30.5 ± 6.0 | 29.0 ± 5.6 | 0.137 |
| Gestational age (weeks) | 34.0 ± 5.2 | 31.3 ± 5.6 | 0.004 |
| Primiparity | 23 (45.1) | 59 (50.9) | 0.367 |
| Previous LSCS | 7 (13.7) | 7 (6.0) | 0.158 |
| Non-vertex presentation | 7 (13.7) | 30 (25.9) | 0.055 |

Abbreviation: LSCS = lower-segment Caesarean section

* Data are shown as mean ± standard deviation or No. (%) of subjects

† For continuous variables, p values were obtained from Mann-Whitney *U* test; for discrete variables, p values were obtained from Chi-square test

patients had no sign of labour after 46 and 73 days and finally decided to undergo induction of labour.

In the analysis of delivery outcomes, patients were stratified into expectant management or induction groups depending on whether delivery occurred following spontaneous onset of labour or after induction of labour. Women who changed their decision were not included in the study to ensure fair comparison of outcomes between the two groups. Twelve (4.40%) patients from the expectant group were excluded as they were already in active labour on admission. The definition of active labour used in this study was the documentation of regular uterine contractions with cervical dilatation greater than 4 cm at the time of first assessment at diagnosis of intrauterine death.

Maternal demographics and obstetric characteristics

of the expectant and induction groups are summarised in Table 1. There were no significant differences between the two groups with respect to mean age, parity, and in the history of previous Caesarean section. The mean gestational age in the expectant group was significantly greater than that in the induction group (mean ± standard deviation: 34.0 ± 5.2 vs. 31.3 ± 5.6 weeks; p=0.004) [Table 1].

Labour characteristics and outcomes of the expectant and induction groups are summarised in Table 2. The mean cervical dilatation in the expectant group was significantly larger than that in the induction group (1.5 cm vs. 0.8 cm; p<0.001) and their mean birth weight of babies was also significantly greater (2081 g vs. 1641 g; p=0.015). The time from onset of labour to full cervical dilatation was significantly shorter in the induction group than the

Table 2. Labour characteristics and outcomes[*]

| Characteristic / outcome | Expectant management (n=51) | Induction of labour (n=116) | p Value[†] |
|---|---|---|---|
| Cervical dilatation (cm)[‡] | 1.5 ± 1.1 | 0.8 ± 0.8 | <0.001 |
| Birth weight (g) | 2081 ± 1077 | 1641 ± 1088 | 0.015 |
| Duration of first stage (hours) | 4:52 ± 4:11 | 4:05 ± 4:45 | 0.033 |
| Duration of second stage (hours) | 0:12 ± 0:14 | 0:12 ± 0:22 | 0.056 |
| Duration of third stage (hours) | 0:07 ± 0:07 | 0:14 ± 0:29 | 0.510 |
| Time from admission into hospital to delivery (days) | 4.6 ± 6.3 | 5.2 ± 7.0 | 0.002 |
| Length of hospital stay (days) | 4.8 ± 3.0 | 6.3 ± 3.9 | <0.001 |
| Mode of delivery, No. | | | - |
|    Normal vaginal delivery | 45 | 90 | |
|    Instrumental | 0 | 1 | |
|    Assisted breech | 6 | 23 | |
|    Caesarean section | 0 | 2 | |

[*] Data are shown as mean ± standard deviation, unless otherwise stated
[†] For continuous variables, p values were obtained from Mann-Whitney $U$ test
[‡] Cervical dilatation was documented at the time of diagnosis of intrauterine death in terms of width of dilatation irrespective of the thickness of cervix

Table 3. Maternal complications[*]

| Complication | Expectant management (n=51) | Induction of labour (n=116) | p Value[†] |
|---|---|---|---|
| Blood loss (ml) | 169.0 ± 104.7 | 133.9 ± 101.4 | 0.013 |
| Blood transfusion | 0 | 0 | - |
| Retained placenta | 1 (2.0) | 10 (8.6) | 0.109 |
| Major perineal injury (3rd- or 4th-degree tear) | 0 | 1 (0.9) | 0.319 |
| Shoulder dystocia | 0 | 2 (1.7) | 0.158 |
| Surgical evacuation | 0 | 2 (1.7) | 0.158 |
| Endometritis[‡] | 3 (5.9) | 10 (8.6) | 0.509 |
| Disseminated intravascular coagulopathy | 0 | 0 | - |
| Uterine rupture | 0 | 0 | - |
| Readmission after delivery | 1 (2.0) | 2 (1.7) | 0.924 |
| Side-effects | | | |
|    Vomiting | - | 1 (0.9) | - |
|    Diarrhoea | - | 2 (1.7) | - |
|    Hyperstimulation | - | 0 | - |

[*] Data are shown as mean ± standard deviation or No. (%) of subjects
[†] For continuous variables, p values were obtained from Mann-Whitney $U$ test; for discrete variables, p values were obtained from Chi-square test or Fisher's exact test
[‡] Based on clinical diagnosis and the need of antibiotics treatment

expectant group (4:05 hours vs. 4:52 hours; p=0.033), although their time from hospital admission to delivery was significantly longer (5.2 days vs. 4.6 days; p=0.002). The total length of hospital stay, meaning the total number of days spent in hospital since diagnosis, was also longer in the induction group than the expectant group (6.3 days

**Table 4. Maternal psychological impact***

| | With postnatal follow-up | | p Value† |
| | Expectant management (n=42) | Induction of labour (n=100) | |
| --- | --- | --- | --- |
| EPDS questionnaire | | | 0.707 |
| Completed questionnaire | 34 (81.0) | 50 (50.0) | |
| Score ≥13 | 12 (35.3) | 12 (24.0) | |
| Referral to psychologist or psychiatrist | 21 (50.0) | 32 (32.0) | 0.542 |

Abbreviation: EPDS = Edinburgh Postnatal Depression Scale

\* Data are shown as No. (%) of subjects

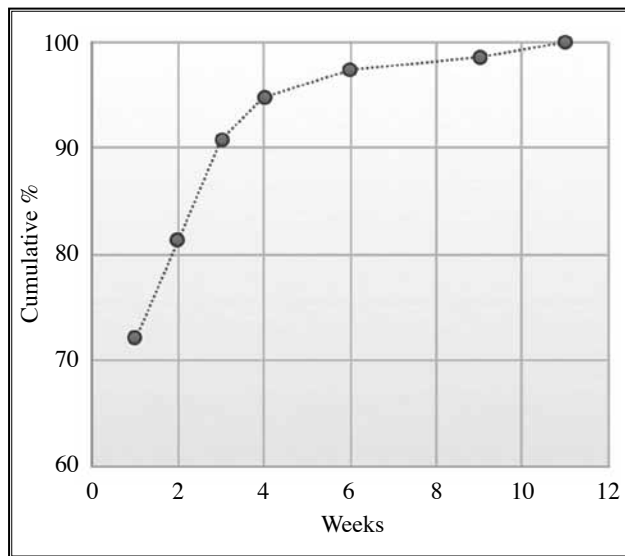† For discrete variables, p values were obtained from Chi-square test



*Figure 2. Cumulative percentage of spontaneous delivery versus number of weeks after diagnosis*

vs. 4.8 days; p<0.001). There was no significant difference in the duration of second or third stage between the two groups. Two patients in the induction group required an emergency Caesarean section. Of these, one woman who failed induction was para 1 with a favourable cervix (Bishop score of 8) at diagnosis. The cervix, however, remained unchanged despite 3 days of good regular uterine contractions with oxytocin induction during the daytime. Another patient was para 1 with intrauterine fetal death and breech presentation. The fetus moved to a transverse lie in the active phase of labour and emergency lower-segment Caesarean section was required (Table 2).

Data on maternal complications of the expectant and induction groups are listed in Table 3. There was significantly more blood loss in the expectant group than in the induction group (169.0 ml vs. 133.9 ml; p=0.013), but

no differences were found in the need for blood transfusion, the incidence of retained placenta, major perineal injury, shoulder dystocia, or uterine rupture. The occurrence of endometritis was not statistically different and there was no documented case of disseminated intravascular coagulopathy in either group during the study period. There were also no differences in the need for surgical evacuation after delivery or readmission rate in both groups. Side-effects due to the induction agent were few (Table 3).

With regard to the psychological impact on patients, choice of management did not appear to have a statistically significant effect on the incidence of postnatal depression or need for referral to a psychologist or psychiatrist (Table 4).

The cumulative percentage of patients who had a spontaneous delivery after diagnosis is plotted in Figure 2. Over 90% of patients had a spontaneous delivery within 3 weeks of diagnosis. The longest time awaiting spontaneous onset of labour was 73 days. This patient switched to induction of labour and delivered after 26 hours.

## Discussion

In our study, approximately one (0.3%) in 330 deliveries in our hospital had an intrauterine fetal death. This number is comparable with other developed countries with an estimated incidence of approximately 0.5%[16]. There is no strong evidence to dictate the choice of either management option in an otherwise uncomplicated patient. As consideration of the fetus is no longer essential, the safety of the mother is the most important issue.

The Royal College of Obstetricians and Gynaecologists recommends that labour and delivery take account of the mother's preference as well as her medical condition and previous intrapartum history. Women should

be strongly advised to take immediate steps towards delivery if there is sepsis, pre-eclampsia, placental abruption or membrane rupture, while a more flexible approach can be discussed in the absence of these factors. Physically well women with intact membranes and no laboratory evidence of disseminated intravascular coagulopathy should be advised that they are unlikely to come to physical harm if labour is delayed for a short period, but that they may develop severe medical complications and had greater anxiety if the interval is prolonged[3]. Guidelines from the National Institute for Health and Care Excellence suggest that if the woman appears to be physically well, her membranes are intact and there is no evidence of infection or bleeding, she should be offered a choice of immediate induction of labour or expectant management[17]. In our study, the management plans of our medical officers concurred with the above recommendations.

In our study, patients in both groups had comparable demographics and obstetric characteristics except for gestational age. Women with more advanced gestation tended to opt for expectant management. This might be because these mothers were more psychologically attached to the dead fetus at a more advanced gestation and might need more time to accept the fact of intrauterine death. They might not be psychologically prepared to be separated immediately from the dead baby.

For labour characteristics, patients in the expectant group had greater mean cervical dilatation than the induction group at the time of diagnosis. They were generally at a more advanced gestation and thus their cervical status was better at the time of diagnosis. This also explained the larger mean birth weight of babies in the expectant group. As expected, the first stage of labour was short in the induction group but the time from admission to delivery was shorter in the expectant group. It is because those patients who were not in active labour were discharged home and managed in the outpatient setting. They were admitted to hospital only when signs or symptoms of labour were present or they were in active labour. Thus, their mean length of hospital stay was shorter. These results are comparable with those obtained in other studies[18].

In the induction group, two women required Caesarean section, with one of them due to a failed induction. This is one of the most feared risks that leads to emergency Caesarean section. Caesarean section is known to bear anaesthetic and surgical risks and may affect future pregnancies. The chance of placenta praevia, accreta, or even percreta is higher in patients with previous Caesarean section[19,20]. Moreover, the chance of postpartum haemorrhage with consequent need for hysterectomy is higher during Caesarean section[21]. Such important information should be included in counselling the couple. Another patient had lower-segment Caesarean section due to malpresentation, which is quite uncommon. One may consider the role of internal podalic version in managing transverse lie in labour but this requires an experienced obstetrician and poses a risk of uterine rupture. Apart from failed induction of labour, there is also the concern of possible side-effects from the induction agent including vomiting and diarrhoea[9-12]. In our study, the side-effects noted from labour induction were minimal.

The total blood loss in the induction group was less than that in the expectant group. The mean gestation in the expectant group was greater in this study and may explain the greater blood loss. The shorter mean duration of labour in the induction group may also explain the smaller blood loss.

In our hospital, all patients who opt for expectant management are closely monitored twice weekly. There was no case of disseminated intravascular coagulopathy noted throughout the study period (the longest duration of expectant management was >10 weeks). And the incidence of endometritis and postnatal depression was not statistically significant when compared with the induction group.

In our study, over 90% of patients achieved a spontaneous delivery within 3 weeks of diagnosis, comparable with other studies in which more than 85% of patients delivered in 3 weeks[3-5]. This is helpful in the counselling of patients as most couples who opt for expectant management are frustrated and obviously eager to know the approximate time of spontaneous delivery. However, it may also cause more anxiety for the already-stressed mother and her family. Although no statistical significance was evident in our study with regard to psychological impact, induction of labour may be a better option for the really desperate couples[8].

### Strengths and Limitations

To the best of our knowledge, this is the first study in Hong Kong to compare the delivery outcome following expectant and induction management of intrauterine fetal death. Its strength lies in the relatively long study period and large sample size.

This study is limited by its retrospective design, dependent on retrospective review of medical records.

However, it may be unethical to perform a prospective randomised study for this type of cases. In addition, 18% of patients in the expectant group and 14% in the induction group defaulted from postnatal follow-up so the assessment was incomplete. Long-term follow-up of patients with regard to the psychological and psychiatric impact was also lacking in this study.

Further study is required to evaluate not only the delivery outcomes between induction and expectant management, but also the different induction regimens, including their effectiveness and safety.

## Conclusion

In our study, both management options appeared safe. Practitioners should counsel patients with clear and adequate information about the pros and cons of each option. Full support should also be provided for patients and their partner, irrespective of their choice.

## Declaration

The authors have disclosed no conflicts of interest.

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