

# Prolonged pregnancy

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## Abstract

Prolonged pregnancy is defined by duration greater than 294 days from the last menstrual period, or equivalent gestational age calculated by ultrasonic fetal biometry. The latter is a more accurate method for establishing the diagnosis. The specific causes of prolonged pregnancy are unknown, but identified risk factors are nulliparity, increased maternal weight, and previous history of prolonged pregnancy. Prolonged pregnancy is associated with obstetrical and neonatal adverse outcomes, and the risks appear to increase along a spectrum with the degree of prolongation. Prolonged pregnancy may be avoided by interventions to cause delivery prior to 294 days gestation, including complementary therapies, labour induction, or caesarean section.

The risks of these interventions must be considered in the context of the low absolute risks of prolonged pregnancy. There remains no clear evidence of benefit in these strategies from well-designed prospective studies. However, retrospective studies have shown reduced perinatal problems when methods to avoid prolonged pregnancy have been utilized. In addition to consideration of risks, decision-making in cases of prolonged pregnancy must also take into account healthcare resources and maternal wishes.

**Keywords** fetal surveillance; induction of labour; post-maturity syndrome; post-term pregnancy; prolonged pregnancy

## Definition

The frequently-used terms ‘post-term’, ‘post-dates’ and ‘prolonged’ pregnancy are not universally understood to have the same meaning. The general concept underlying these terms is to denote a pregnancy that has passed a point in time beyond which is considered too long. In actual terms, this point is thought by various authorities to range from 41 to 43 weeks (287–301 days). As one example, the International Federation of Gynaecology and Obstetrics (FIGO) defines it as more than 42 completed weeks (294 days) from the last menstrual period. The original idea that 42 weeks was a point of significance appears to have originated in a Swedish study published in 1956, which demonstrated sharp increases in perinatal mortality after this length of gestation. In the modern and more practical context, most studies examining interventions for managing prolonged pregnancy use 41–42 weeks. >From an epidemiological perspective, it is recognized that around five to ten percent of pregnancies will be of 42 weeks’ duration. Thus, prolonged

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pregnancy defined as >42 weeks has merit, in that it represents a statistically outlying phenomenon (by the same logic that small for gestational age fetuses are defined as those below the 10th centile of the range of distribution).

Post-maturity syndrome, by contrast, describes a neonatal clinical syndrome of features identified at delivery. Such features include little or absent vernix and lanugo, wasting of intra-abdominal fat, skin changes such as wrinkling or peeling, and meconium staining of the cutis and nails. Post-maturity syndrome may rarely be seen in apparently term neonates, and has been observed to occur in around 10% of gestations between 41 and 42 weeks, steadily increasing to around 33% at 43 weeks.

## Incidence

Prolonged pregnancy has reported incidences ranging from 4 to 18%, depending on the definition used. A useful benchmark figure is an incidence rate of 10%, which equally fits into the notion that prolonged pregnancy represents, in most cases, a statistical deviation of a range of gestation length. The incidence of prolonged pregnancy appears to be reducing over time, which is likely to be in part due to increased obstetric intervention rates in healthcare systems where such data are collected. These increased intervention rates are themselves due to increasing rates of advanced maternal age among nulliparous women, with the attendant increased risks of hypertensive disorders, diabetes and fetal growth abnormalities. More widespread use of early pregnancy ultrasound has also probably contributed to the reducing rates of prolonged pregnancy.

## Calculation of gestational age

In order to correctly diagnose prolonged pregnancy, it is critical to have an established estimated due date (EDD). It is now well established that first trimester ultrasound is the most accurate method for determining gestational age and therefore the EDD. Ultrasound is widely available in most developed countries and the techniques to assess gestational age by either gestational sac diameter, fetal crown rump length (CRL) or biparietal diameter (BPD) are easily learned. Even when the date of the last menstrual period is known, an ultrasound may demonstrate a significantly different EDD because of inherent variations in the follicular phase of the ovarian cycle, even in women with regular menses. Another potential confounding factor is the occurrence of first trimester bleeding, which may be mistaken for menstruation, thus underestimating the EDD when pregnancy is subsequently diagnosed. Ultrasound is also the only reasonable way of calculating the EDD of a pregnancy when the last menstrual period is unsure or unknown. Since up to half of all pregnancies may be unplanned and unexpected, ultrasound is an important investigation for both the accurate diagnosis of prolonged pregnancy, and the avoidance of unnecessary interventions. This is reflected in the National Institute of Clinical Excellence (NICE) recommendations, which state that all pregnant patients should be offered an ultrasound between 10 and 13 weeks’ gestation.

## Risk factors

The most consistently observed risk factors for prolonged pregnancy include nulliparity, maternal body mass index (BMI) >25

kg/m<sup>2</sup>, male fetal gender, and previous history of prolonged pregnancy. In relation to the final factor, it is noteworthy and biologically interesting that if a woman experiences a prolonged pregnancy with one partner, the recurrence rate is 20%, but in the case of a new partner, the recurrence risk falls to 15%. The same study also found that if the first birth is term, only 7.7% of subsequent pregnancies were post-term. In addition, if the woman's first pregnancy was not prolonged, changing paternity did not change the risk that subsequent pregnancy would be prolonged also. This observation may indicate a paternally derived genetic influence on gestational length that should be of interest for further research.

### Aetiology, pathophysiology, and clinical risks

A useful way of considering prolonged pregnancy is to question why labour has not yet begun. Prolonged pregnancies are likely to represent a final point arrived at by several different aetiological mechanisms. The foremost to consider is that the pregnancy may be falsely prolonged due to an error of miscalculation of the EDD, due to an absence of an ultrasound scan or perhaps a human error in calculation. In the case of a certain EDD, it is thought likely by many experts that prolonged pregnancy simply represents an expected statistical phenomenon inherent in the variability exhibited by biological systems in general. Potential examples of such biologic variability could include any number of unknown or known processes that are involved in the onset and establishment of spontaneous labour. The number and sensitivity of myometrial oxytocin receptors is known to increase during the final stages of pregnancy, and these may differ in prolonged pregnancy. Cervical prostaglandin production may be delayed also in prolonged pregnancy. The development of intermyometrial neurochemical and physical connections, necessary for efficient uterine contractility, is known to be relatively immature in nulliparous women when compared to parous women, which may in part explain the increased risk of prolonged pregnancy observed in nulliparae.

More specifically, a failure of labour initiation may be due to known pathological states affecting the maternal fetal unit. X-linked ichthyosis is a condition characterized by deficiency in placental steroid sulfatase enzymes, which has the effect of causing abnormally low levels of oestrogen in affected male fetuses. As the onset of labour is initiated in part by the fetus, this steroid hormone imbalance can cause pregnancy prolongation. Major abnormalities of the fetal central nervous or endocrine systems, such as anencephaly and adrenal hypoplasia, are also associated with prolonged pregnancy, probably by a similar but as yet unknown underlying mechanism. It is suspected that more minor, undefined fetal genetic variations may also influence the onset of labour, though these have also not yet been elucidated. Related to this is the observation that in the setting of prolonged or post-term pregnancy, male fetal gender confers a higher risk of unsuccessful labour induction.

Prolonged pregnancy is also noted to be associated with cephalopelvic disproportion. It may be that this association is causative, since if the fetal head does not engage and enter the maternal pelvis, there is reduced physical pressure and distention of the lower uterine segment and cervix, with a resultant reduction in cervical dilation, prostaglandin formation, and other

numerous and incompletely understood chemical and mechanical changes necessary for the initiation of labour. Evidence supporting this theory may be inferred from the fact that successful labour induction in post-term pregnancies is strongly linked with the cervical Bishops score, a composite measure of cervical characteristics and the relationship of the fetal head to the maternal pelvis.

Risks associated with prolonged pregnancy can be divided into complications for the mother and baby. The fetal complications are well described, but the pathophysiological mechanisms underlying them remain obscure. Consistent increases in risk are seen for the following conditions, along a spectrum that increases as the gestational age increases:

- Macrosomia with traumatic injury
- Stillbirth
- Intrapartum asphyxia with sequelae
- Meconium aspiration
- Neonatal death

Macrosomia occurs when fetal growth continues unchecked by the normal timing of labour and delivery. Stillbirth may be due to placental insufficiency or dysfunction, with resultant impaired gas exchange to the fetus. Stillbirth may also simply be a matter of statistical probability, as a prolonged pregnancy allows a longer timeframe for the events leading to stillbirth to occur. Both placental insufficiency and macrosomia are linked to intrapartum asphyxia, with the common sequelae being meconium aspiration, hypoxic neonatal encephalopathy, neonatal seizures, and in the most severe forms of the aforementioned, neonatal death.

The maternal complications of prolonged pregnancy are linked closely with the fetal risks:

- Labour dystocia
- Genital tract trauma
- Caesarean section
- Post-partum haemorrhage
- Anxiety

The first two points follow from fetuses who are either macrosomic or have failed to properly negotiate the maternal pelvis, or both. The risk of caesarean section is increased due to these reasons, in addition to the possible co-existent fetal problems outlined above.

### Management

In the management of a prolonged pregnancy, the first and foremost step is to ensure the correct diagnosis by establishing and double-checking the EDD, and the method by which it was derived. The established margins of error for any ultrasound scans should be used to interpret the supposed EDD, that is:  $\pm 7$  days for scans prior to 20 weeks' gestation;  $\pm 14$  days for scans between 20 and 30 weeks;  $\pm 21$  days for scans  $> 30$  weeks.

If prolonged pregnancy is confirmed, the next step is to rule out any obstetric complications that would indicate planned delivery. Examples of this situation can be divided along the lines of maternal conditions and fetal conditions. Such maternal conditions would commonly include hypertensive disorders and diabetes. Fetal indications for delivery include prelabour amniorrhexis, and suspected fetal compromise. This may be evidenced by oligohydramnios, reduced fetal movements, growth restriction or abnormal fetal cardiocography.

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