Pregnant women with TSH levels higher than 2.5 IU/L during the end of gestation are at risk for breech presentation, and obstetrical complications.


**SUMMARY**

**BACKGROUND**

Breech presentation at term is the most common abnormal fetal presentation, and it is associated with neonatal and maternal morbidity and mortality. There are many factors associated with breech presentation, including, among other causes, prematurity, low birth rate, primiparity, and smoking during pregnancy. The objective of this study was to evaluate the relationship between suboptimal maternal thyroid function during gestation and breech presentation at term.

**METHODS AND STUDY PATIENTS**

Over a 2-year period, 1507 pregnant white Dutch women in five community midwifery practices, living in and around the city of Eindhoven, The Netherlands, were invited to participate in the study at the time of their first antenatal visit at 12 weeks of gestation. A total of 1190 women (79%) agreed to participate in the study. Nonresponders did not differ from the responders in age, parity, and educational level. Excluded from the study were 8 women who were taking thyroid medications for known clinical hyperthyroidism, 2 with hypothyroidism at screening, 8 who became pregnant after hormonal stimulation, and 5 with type 1 diabetes, leaving 1149 women who were eligible for further participation and had follow-up at 24 and 36 weeks of gestation. Because spontaneous change of fetal position at term was an outcome measure, four women with successful external cephalic version were excluded. Also excluded were 11 women with incomplete data and 4 whose babies were born with severe congenital abnormalities that were a possible determinant of fetal position.

Of the remaining 1130 women, 72 (6%) delivered prior to 37 weeks of gestation, but because breech position before term is...
not regarded as an abnormal fetal position, these women were also excluded from the study. The final sample comprised 1058 women who delivered at term (≥37 weeks of gestation) and in whom thyroid function was assessed in all three trimesters. None of the women in this group were treated for thyroid disease during gestation, but gestational diabetes developed in 8 of the 1058 women (0.8%).

ASSESSMENTS
Obstetric parametersTerm was described in two ways: first from the date of the last menstrual period, and second from an ultrasound scan (US) in the first trimester. A second US was performed within 2 weeks to reassess gestational age if there was a discrepancy of more than 7 days in the two initial assessments. Gestational age was expressed as weeks and days. Fetal positions at birth were classified as cephalic or breech (i.e., complete or incomplete, or frank breech). During follow-up, possible confounders such as previous obstetrical history such as parity, previous cesarean section, demographic features, body-mass index, and lifestyle habits such as smoking and alcohol intake were assessed. The findings are shown in Figures 1 to 3.

Thyroid parameters (Figure 4)
Thyrotropin (TSH), free thyroxine (FT₄), and autoantibodies to thyroid peroxidase (TPO-Ab) were assessed at 12, 24, and 36 weeks of gestation. Women with serum TPO-Ab concentrations higher than 35 IU/ml at 12 weeks of gestation were regarded as TPO-Ab-positive.

RESULTS
During gestation, a decrease in mean FT₄ was accompanied by an increase in mean serum TSH. The number of women with elevated TPO-Ab concentrations decreased toward term. Figure 5 shows the differences in thyroid parameters between 58 women (5.5%) who presented with breech position at term versus the 100 remaining women who presented with a fetal cephalic position. At 36 weeks of gestation, women with breech fetuses had significantly higher serum TSH concentrations, as compared with those who had fetuses in a cephalic position (P = 0.007), whereas there no differences in TSH at 12 and 24 weeks of gestation. The FT₄ was not significantly related to breech presentation in any trimester. Likewise, the prevalence rates of TPO-Ab did not differ among the groups (Figure 5).

The 5th, 10th and 95th percentile cutoff points for serum TSH at 36 weeks were as follows: <5th percentile, <0.51 mIU/L (n = 54); 5th to 10th percentiles, 0.51 to 0.71 mIU/L (n = 54); 90th to 95th percentile, 2.50 to 2.89 mIU/L (n = 49); and 95th percentile, >2.89 mIU/L (n = 59). Figure 5 shows the percentage of women who presented with a breech presentation at delivery for each of the four percentile groups. The 90th and 95th percentile TSH groups at 36 weeks of gestation were 11% and 14% among the women who presented in fetal breech position at delivery, whereas there were no breech presentations in the lowest 5th percentile TSH group (P = 0.02).

Figure 4. This figure shows the thyroid tests, FT₄ (in pmol/L), and TSH (in mIU/L) results at 12, 25, and 36 weeks of gestation.

Figure 5. This figure shows the thyroid FT₄ and TSH levels during 12, 24, and 36 weeks of gestation in women who had cephalic presentation or breech presentation. The data for this figure were derived from Table 2 of Kuppens et.al.

Figure 6. This figure shows the results of logistic-regression analysis in which the dependent variable is breech presentation at term. The figure shows the odds ratio and 95% and 5% confidence intervals (CI). The data for this figure were derived from Table 3 in Kuppens et al.
The prevalence of breech presentation in the subgroup of women with a TSH ≥2.5 mIU/L (≥90th percentile) was 11% (12 of 108), as compared with 4.8% in the women with TSH <2.5 mIU/L (P = 0.006). When similar categories for FT₄ were assessed, there was no relationship between FT₄ and breech presentation.

**Odds Ratios (Figure 6)**

Figure 6 shows the unadjusted odds ratios (ORs) using logistic-regression analysis (OR 95% confidence interval [95thCI]). Breech position at birth is the dependent, and nulliparity, birth weight, and high TSH (≥2.5 mIU/L) at 36 weeks of gestation, were all significantly related to breech presentation.

Figure 6 also shows the results of adjusted OR using multiple-logistic-regression analysis. Breach presentation at birth, is the dependent variable. High TSH levels at 36 weeks of gestation, nulliparity, birth weight, and smoking status were all significantly related to breech presentation. Elevated TPO-Ab levels were not related to breech presentation.

**COMMENTARY**

This is one of the first studies to identify a relationship between maternal thyroid function and fetal position at birth. The authors of this study published a previous prospective cohort study of pregnant women aimed at evaluating the relation between maternal thyroid function and fetal position at birth. The authors suggest that research is needed to detect the most appropriate tool for screening of maternal thyroid function during gestation.

The present study, which is much larger, found that breech position at birth is related to maternal thyroid hormone status during pregnancy. Indeed, not only was breech delivery almost 2.5-fold more common in women with TSH levels ≥2.5 mIU/L, regression analysis confirmed that elevated maternal TSH at 36 weeks of gestation is a key predictor for breech presentation. In addition, high TSH levels were significantly associated with increased TPO-Ab levels and a parental history of thyroid disease. In sharp contrast, none of the women with TSH levels below the 5th percentile presented with breech position at term. The study also found no group differences for FT₄ levels at 12, 24, and 36 months of gestation.

This is a remarkably important study, as breech presentation at term is the most common abnormal fetal presentation and is associated with neonatal and maternal morbidity and mortality (2). There is considerable evidence of a relationship between subclinical thyroid dysfunction and impaired obstetrical outcome (3,4).

The authors of this study suggest that research is needed to detect the most appropriate tool for screening of maternal thyroid function during gestation.

This is a timely study that complements that of Yassa et al. (5), which precedes this study in this issue of CT. Together, they underscore the importance of carefully screening women at the time of pregnancy and meticulously performing follow-up and adjusting levothyroxine in pregnant women known to have hypothyroidism.

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**References**


