

Introduction

Fetal goiter is rare and causes complications including oligohydramnios secondary to dysphagia and malpresentation. Therefore, prenatal diagnosis and appropriate therapeutic intervention are crucial in such cases. We report a case of fetal goiter diagnosed and treated during pregnancy complicated by Graves’ disease.

Case

A 27-year-old woman, gravida 3 para 1, was diagnosed with Graves’ disease at age 26 and was treated with propylthiouracil (PTU) and potassium iodide. At 17 weeks, fetal goiter and maternal tachycardia were observed, and the patient was referred to endocrinology department in our hospital. Due to poor control of Graves’ disease, her PTU dose was increased to 300 mg/day and potassium iodide was discontinued. By 20 weeks, her PTU dose was further increased to 600 mg/day. At 32 weeks, fetal polyhydramnios and cardiomegaly were detected. At 33 weeks, even though maternal thyroid-stimulating antibody was high, ultrasound findings raised suspicion of fetal hypothyroidism. Therefore, cord blood sampling was performed, revealing TSH levels of 445 mIU/L, fT3 2.2 pg/ml, and fT4 0.3 ng/dL, confirming fetal hypothyroidism. The PTU dose was subsequently reduced. Over time, polyhydramnios and fetal cardiomegaly improved. Labor was induced at 38 weeks and 4 days, and vaginal delivery occurred the following day. The neonate experienced transient hyperthyroidism but quickly stabilized with normal thyroid function.

Conclusion

This case highlights the importance of accurate diagnosis and timely intervention through umbilical cord blood sampling and adjustment of antithyroid medication.

【Background】

- Fetal goiter is an exceptionally rare condition, affecting approximately 1 in 40,000 pregnancies, and is most often linked to maternal Graves’ disease.
- This condition can be accompanied by significant fetal thyroid dysfunction, which may have serious perinatal consequences.
- Importantly, when the mother is receiving antithyroid therapy, maternal and fetal thyroid function may diverge, making fetal monitoring crucial.
- Here, we present a rare and instructive case of fetal goiter with concomitant fetal hypothyroidism in a pregnant woman with Graves’ disease.

【Case Presentation】

- Patient Profile
 - 27-year-old woman, Gravida 3 Para 1
 - Medical history : Graves’ disease at the age of 26
- 13 weeks
 - Referred to our department
 - Taking propylthiouracil (PTU) 150 mg/day and potassium iodide
- 17 weeks
 - Fetal goiter and maternal tachycardia were observed.
 - Poor control of Graves’ disease and fetal hyperthyroidism was suspected because maternal thyroid-stimulation antibody (TSAb) was high. (Table 1)
 - Therefore the PTU dose was increased to 300 mg/day and potassium iodide was discontinued.
- 20 weeks (Figure 1)
 - The PTU dose was continuously increased to 600 mg/day but fetal goiter persisted and worsened.
- 32 weeks (Figure 2)
 - The PTU dose was reduced to 450 mg/day due to suspected maternal hypothyroidism.
- 33 weeks (Figure 3)
 - TSH, FT3, and FT4 levels were well controlled, while TSAb levels remained persistently elevated. Fetal hypothyroidism was suspected, and cordocentesis was performed. The results showed elevated fetal TSH levels, suggesting fetal hypothyroidism (Table2) . Therefore, the PTU dose was subsequently reduced.
- 38 weeks
 - Labor induction was initiated at 38 + 4 weeks.
 - Vaginal delivery was achieved at 38 + 5 weeks.
 - 3,139g male Apgar score 8 (1 min)/9 (5 min)
 - The newborn was admitted to the NICU for observation. Although no clinical signs of hypothyroidism were present, transient hyperthyroidism was detected. The infant was discharged on the 15th day of life and continued under outpatient follow-up.

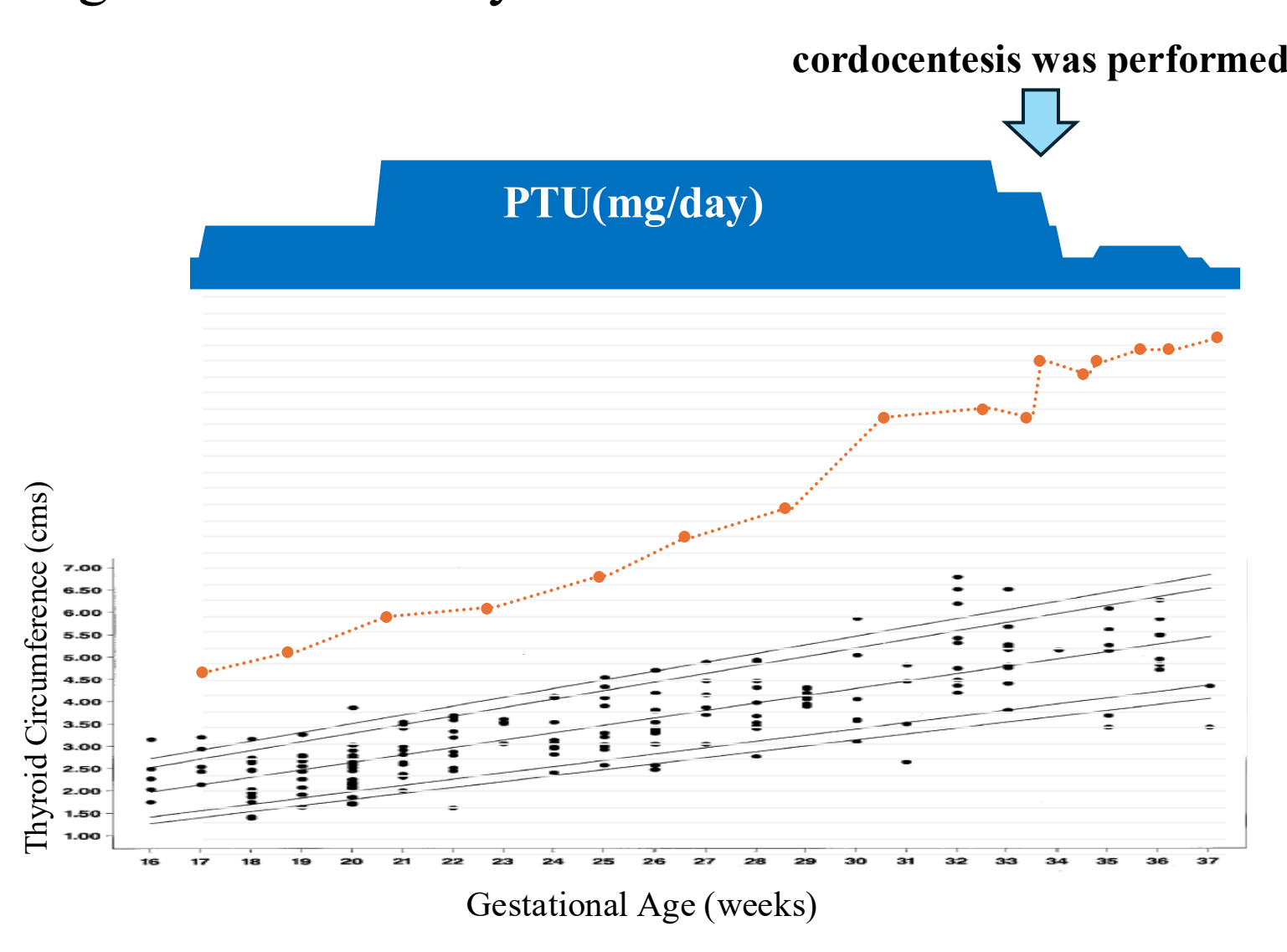
【Table 1】 Maternal thyroid function test

	reference	17 weeks	33 weeks
TSH (μIU/mL)	0.5～5.0	0.01	0.06
FT3 (pg/mL)	2.3～4.0	3.7	4.2
FT4 (ng/mL)	0.9～1.7	0.8	1.0
TRAb (IU/L)	～1.9	22.6	21.0
TSAb (%)	～120	1388	1000

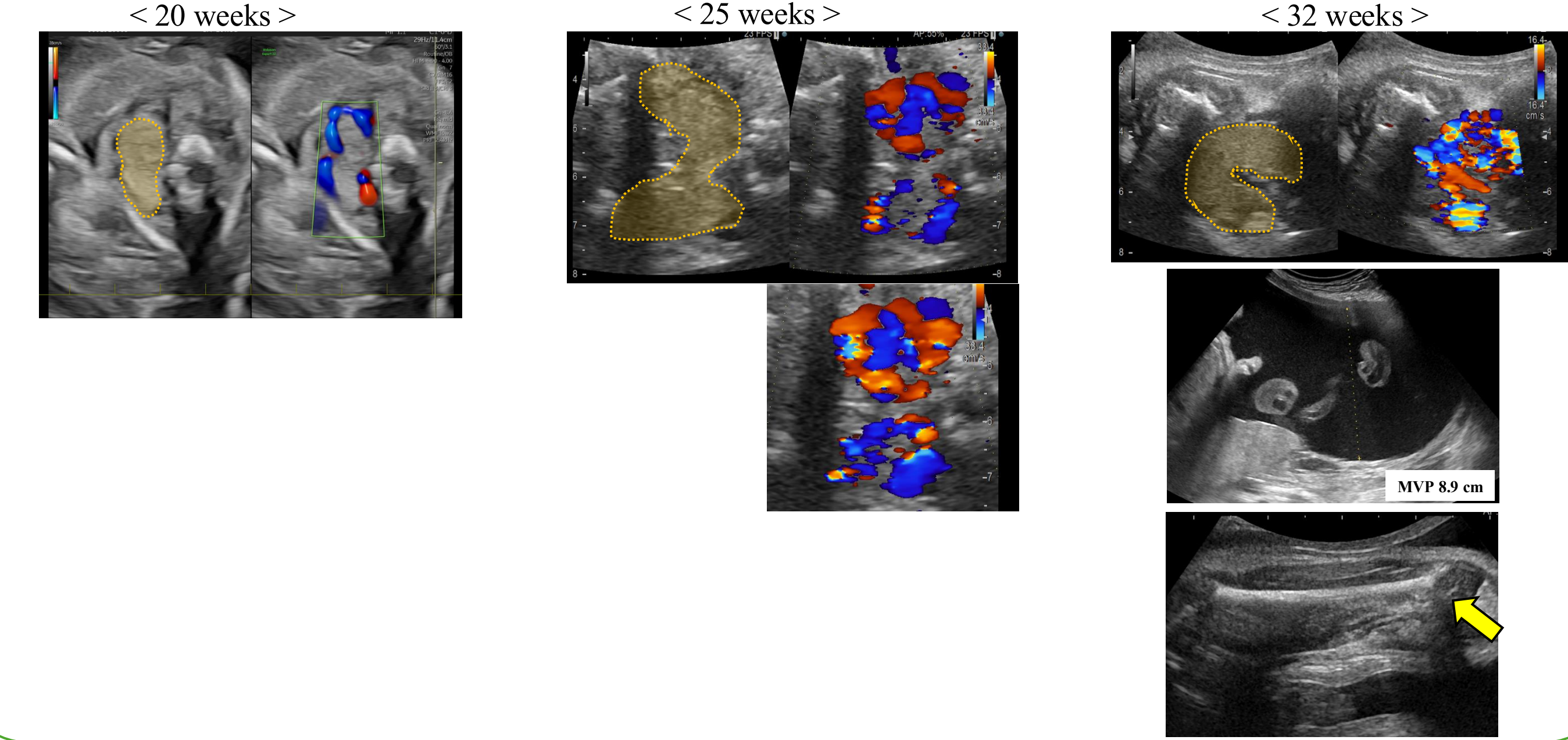
【Table 2】 Fetal thyroid function tests

	median	cordocentesis
TSH (μIU/mL)	10.2	445.1
FT3 (pg/mL)	0.7～1.9	2.2
FT4 (ng/dL)	6.0～14.3	0.3

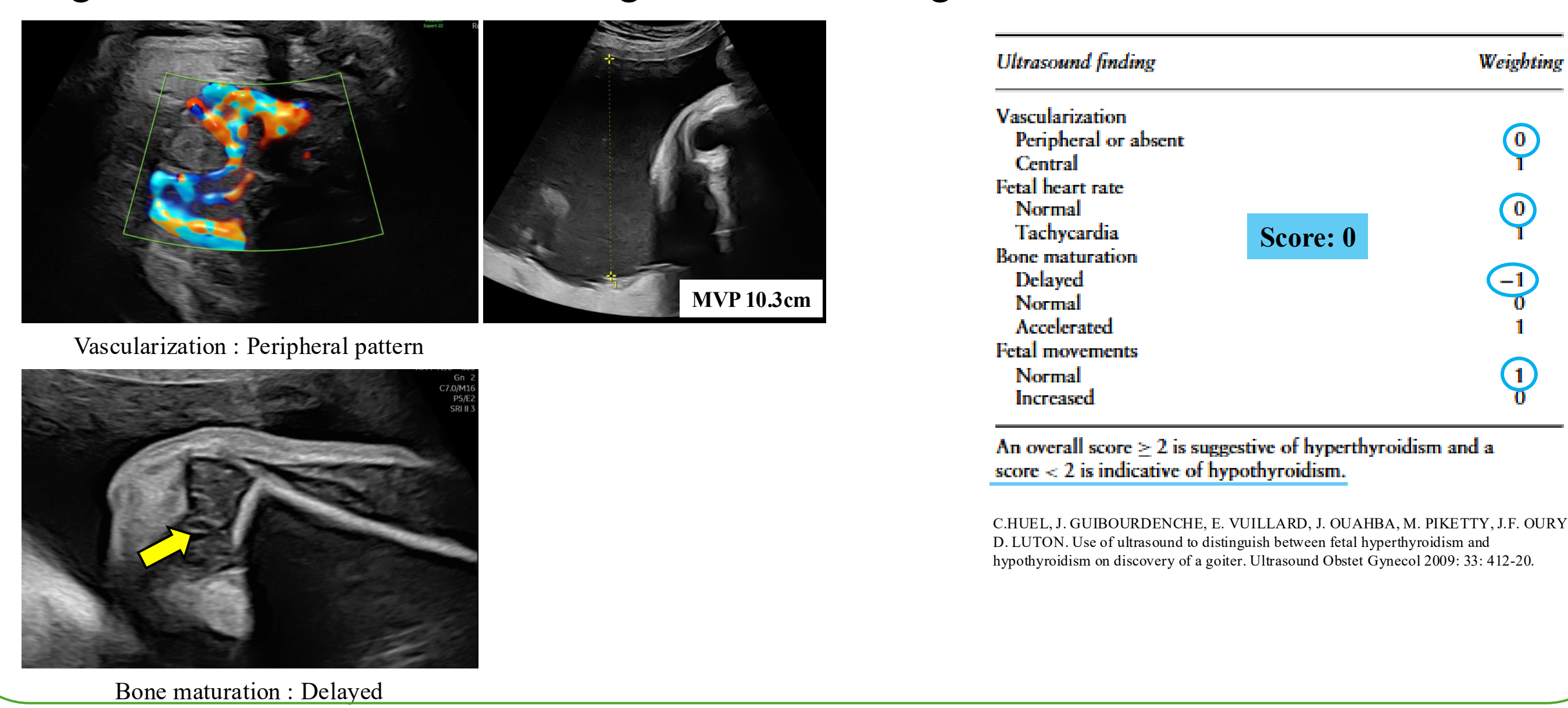
【Figure 1】 Fetal thyroid circumference and dose of PTU



【Figure 2】 Serial fetal ultrasound findings



【Figure 3】 Fetal ultrasound findings at 33 weeks of gestation



【Discussion】

Fetal Goiter and Thyroid Dysfunction

- Thyroid dysfunction may be present in the fetus or at birth (Alicia Núñez, et al., *Rev Med Chile* 2017; 145: 1579–1587).
 - **Fetal hypothyroidism** may cause intrauterine growth restriction (IUGR), fetal hydrops, preterm delivery or stillbirth, and postnatal motor and developmental delays.
 - **Fetal hyperthyroidism** may cause IUGR, fetal hydrops, fetal tachycardia, and intrauterine fetal demise.
- ⇒ **Early diagnosis and timely therapeutic intervention are essential.**
- Polyhydramnios, malpresentation, and airway obstruction at birth have been reported as possible complications (Esmer AC, et al., *J Obstet Gynaecol Res* 2013; 39(3): 720–723).
- ⇒ **Delivery planning should be considered** in such cases.

Maternal–Fetal Thyroid Interaction (Figure 4)

- Fetal thyroid function is influenced by maternal thyroid status through transplacental passage of hormones and antibodies.
- Even when indirect assessment are inconclusive (Figure 3), direct evaluation via cordocentesis enables definitive diagnosis. (Katie Groom, et al., *J Paediatr Child Health* 2013; 49(1): E102–103)
- The reported mean fetal TSH level is 10.2 ± 3.8 mU/L, which allows evaluation of thyroid function during pregnancy. (Jean Guibourdenche, et al., *Ann Clin Biochem* 2001; 38: 520–526)
- Intra-amniotic administration of levothyroxine sodium should be considered when appropriate.

【Conclusion】

Even when maternal thyroid function is within the normal range, it is important to consider the possibility that poorly controlled fetal goiter may be associated with persistent fetal thyroid dysfunction, and to perform detailed evaluation.

【Figure 4】 Maternal-fetal thyroid interaction

