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CASE REPORT

Subclinical Hypothyroidism and Placenta Abruption: A Dangerous Relationship During Pregnancy

Nadirah binti Zainoren*, Abdul Hadi bin Said

Department of Family Medicine, International Islamic University Malaysia (IIUM), Bandar Indera Mahkota, 25200 Kuantan, Pahang, Malaysia

*Corresponding author's email: nadirahzainoren@gmail.com

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ABSTRACT

This case report explores the intricate link between subclinical hypothyroidism and placenta abruption during pregnancy, emphasising the potential risks and clinical implications, through a detailed case study of a 28-year-old woman with a history of hyperthyroidism, non-compliance, and subsequent subclinical hypothyroidism, causing placenta abruption leading to intrauterine death. The report highlights the challenges in managing thyroid disorders during pregnancy. Limited Malaysian data on this association prompts a broader discussion of international findings, suggesting a correlation between subclinical hypothyroidism and adverse pregnancy outcomes. The study delves into potential mechanisms, including thyroid hormone impact on placental vascular function and the complexity added by autoimmune thyroiditis. Personalised treatments, thyroid function monitoring, and comprehensive antenatal care are emphasised for optimal pregnancy outcomes. This case underscores the need for increased awareness, proactive management, and preconception counselling to safeguard maternal and foetal well-being.

Keywords: *Hypothyroidism, Pregnancy, Placenta abruption, Pregnancy outcomes*

INTRODUCTION

The occurrence of thyroid dysfunction during pregnancy is a matter of great concern due to its potential to cause harmful effects on both the mother and the developing foetus. Subclinical hypothyroidism, a medical condition marked by normal amounts of thyroxine hormone (T4)

in the blood but increased levels of thyroid-stimulating hormone (TSH), has been linked to adverse outcomes during pregnancy, such as placenta abruption (CPG Management of Thyroid Disorders, 2019). Thyroid hormones are crucial for developing and maintaining a healthy pregnancy and foetus, as they regulate various metabolic processes and hormones during pregnancy. Thyroid hormones play an essential role in the growth and development of the placenta, ensuring optimal communication and nutrient exchange between the mother and foetus (Adu-Gyamfi et al., 2019; Alemu et al., 2016). The placenta is a vital conduit for nutrition and oxygen from the mother to the foetus and waste removal. As demonstrated by placental abruption, any interference with its regular operation might have severe consequences for the mother and the foetus (Schmidt, 2022). Placenta abruption is defined as early separation of the placenta from the lining of the uterus, occurring any time after 20 weeks of gestation and before the delivery of the foetus. It usually presents with sudden onset of vaginal bleeding, abdominal pain, uterine contractions and tenderness, and nonreassuring fetal well-being. (Schmidt, 2022).

This case report aims to provide a comprehensive analysis of the intricate association between subclinical hypothyroidism and placental abruption. It seeks to elucidate the underlying mechanisms and explore the potential consequences of clinical therapy.

CASE PRESENTATION

A 28-year-old Gravida 3 Para 2 came for booking at ten weeks of gestation. She is a non-smoker and denies recreational drug use. Her previous pregnancy was uneventful, and she delivered her baby via spontaneous vaginal delivery (SVD). She has no history of hypertensive disorder, and her blood pressure (BP) throughout pregnancy was normotensive. Further history revealed that she was diagnosed with hyperthyroidism in 2019 due to Grave's disease with positive thyroid stimulating hormone receptor antibody (TRAb) but defaulted to treatment and follow-up due to the COVID-19 pandemic. During booking, her body mass index (BMI) was 21kg/m^2, with initial investigation showing normal results, including a haemoglobin (Hb) level of 13g/dL. Clinically, she was euthyroid with no neck swelling. However, a thyroid function test (TFT) revealed an elevated thyroid-stimulating hormone (TSH) level of 6.1mIU/L alongside a normal thyroxine (T4) level of 12.6pmol/L. She was diagnosed with subclinical hypothyroidism attributed to Hashimoto's thyroiditis, as evidenced by elevated thyroid peroxidase (TPO) antibody levels (527 IU/ml). Other autoimmune screening was not performed. Treatment commenced with L-thyroxine 50mcg daily, and she was compliant with the medication. The dosage of L-thyroxine remained unchanged throughout her pregnancy. Her thyroid function was monitored monthly, and as her pregnancy advanced, her TFT was not normalized with a TSH level of 5.06mIU/L despite being on medication (Table 1).

Throughout her pregnancy, she remained healthy and clinically euthyroid. Her modified oral glucose tolerance tests (MGTT) were normal. Her transabdominal ultrasound scan (TAS) at booking shows a singleton foetus with crown-rump length (CRL) corresponding to her gestational age. Subsequent assessments of foetal growth parameters during the second and third trimesters correspond to her gestational age with adequate liquor. The placenta was located at the posterior upper segment with normal morphology. However, at 34 weeks of gestation, she presented with contraction pain and sought medical intervention at the hospital. There were no indications of leaking liquor, vaginal discharge, or bleeding, nor was there a history of trauma or vigorous massage. The absence of reduced foetal movements was also noted. Her vital signs remained

stable, her blood pressure was within the normal range, and palpation showed a tense abdomen. A transabdominal ultrasound revealed the absence of foetal cardiac activity, with a retroplacental clot measuring approximately 6cm x 6cm, although no free fluid was observed. Subsequently, a baby boy was delivered via spontaneous vaginal delivery with clear amniotic fluid, exhibiting no signs of life. Upon external examination, he weighed 2.63kg at birth with a grossly normal structure. No further post-mortem investigation was undertaken. During placenta inspection, it was noted that there was 1 Liter of retroplacental clots. It was complicated with massive postpartum haemorrhage secondary to abruption of the placenta and uterine atony with a total of 2.5L estimated blood loss. She was transfused with two pint-packed cells and was stabilised and admitted to a high dependency unit (HDU) for close monitoring and was discharged well after four days of admission.

Table 1: Thyroid function test results of the patient in different antenatal check-ups with the pregnancy-specific normal ranges.

GESTATION (WEEKS)	12W5D	22W6D	26W4D	32W4D
TSH (mIU/L)	6.1 (0 – 5.5)	1.433 (0.5 – 3.5)	3.767 (0.5 – 3.5)	5.065 (0.5 - 4)
FT4 (pmol/L)	12.6 (10 – 16)	10.3 (9 – 15.5)	8.6 (9 – 15.5)	10 (8 – 14.5)

DISCUSSION

TIn Malaysia, there is limited data available on the prevalence of placenta abruption and its association with subclinical hypothyroidism (CPG Management of Thyroid Disorders, 2019). Nonetheless, prior research from other countries has suggested a possible link between subclinical hypothyroidism and unfavourable pregnancy outcomes, including placenta abruption. A study in India discovered a positive correlation between subclinical hypothyroidism and significant negative consequences for both the mother and the foetus, including pregnancy-induced hypertension, intrauterine growth restriction, and intrauterine death (Sahu et al., 2009). Another study done in Pakistan highlighted the problems that might arise from subclinical hypothyroidism in pregnant women, such as preterm labour, gestational hypertension, placenta previa, and intrauterine growth restriction (Khan et al., 2020). Like our case study, pregnant women with subclinical hypothyroidism were found to have a high risk of placenta abruption, which may lead to intrauterine death (Alemu et al., 2016; Bankapur et al., 2023; Singh et al., 2024; Urgatz & Poppe, 2024; Vaishnav et al., 2023).

The consistent findings and case studies prompt significant inquiries regarding this connection's mechanisms. Although the precise underlying mechanisms are not yet fully understood, various factors may contribute to the heightened risk of placental abruption in patients with subclinical hypothyroidism. A possible explanation involves the influence of a lack of thyroid hormone on the placenta's vascular function. Thyroid hormones are essential for controlling the blood vessels. Insufficient thyroid hormone levels, even if just slightly below the normal range, might cause changes in the blood flow to the placenta.

This may cause placenta vascular insufficiency, thus increasing the risk of placenta abruption (Adu-Gyamfi et al., 2019; Spinillo et al., 2021; Vanes et al., 2013).

Moreover, the existence of autoimmune thyroiditis in this patient adds a degree of intricacy. Immunological dysregulation and persistent inflammation caused by autoimmune thyroiditis may affect the placental tissues. The presence of inflammation in the placenta may lead to compromised placental structure and increase the likelihood of clot formation and bleeding, as seen in this case (Alemu et al., 2016; Amin et al., 2010; Urgatz & Poppe, 2024).

The complex relationship between placental abruption and subclinical hypothyroidism, in this case, the report makes it imperative to think about the clinical ramifications and treatment options for expectant patients with comparable profiles. It is essential to monitor thyroid function closely, particularly in cases of autoimmune thyroiditis, to identify those who are more vulnerable to poor pregnancy outcomes. Any deviations from the normal range should be promptly identified and managed. The risk of placenta abruption may also be reduced by personalised treatments to optimise thyroid hormone levels and reduce the inflammatory response caused by autoimmune thyroiditis (Alemu et al., 2016; Amin et al., 2010; Urgatz & Poppe, 2024; Vaishnav et al., 2023).

Aside from monitoring thyroid function, the healthcare team must offer extensive antenatal care to tackle the heightened risk of adverse consequences linked to subclinical hypothyroidism. This may entail meticulous monitoring of foetal development, frequent assessments of blood pressure to detect preeclampsia, and patient education on the disease and complications. Open and informed discussions between the healthcare staff and the patient regarding screening and therapy's potential benefits and risks are crucial. This will empower the patient to make informed decisions regarding her antenatal care (Alexander et al., 2017; Maraka et al., 2018; Negro & Mestman, 2011).

In addition, the healthcare staff should provide the patient with information regarding the signs and symptoms of placenta abruption, such as vaginal bleeding, abdominal pain, and changes in foetal movement. Timely identification and immediate intervention in placenta abruption cases can improve neonatal outcomes. If there is suspicion or diagnosis of placenta abruption, prompt intervention should be given, which may involve expediting delivery for better outcomes for both the foetus and the mother. Support and counselling regarding the possible emotional effects of subclinical hypothyroidism and the potential for adverse outcomes, such as placenta abruption leading to intrauterine death, should also be given to the patient and her family (Alexander et al., 2017; Maraka et al., 2018; Negro & Mestman, 2011; Schmidt, 2022). As the pregnancy progresses, multidisciplinary care comprising family physicians, obstetricians, endocrinologists, and maternal-foetal medicine specialists is essential to address the possible impact of subclinical hypothyroidism on pregnancy outcomes. Working together to identify the best treatment plans for thyroid dysfunction during pregnancy may eventually lead to better outcomes for both the mother and the foetus (Alexander et al., 2017; Maraka et al., 2018; Negro & Mestman, 2011).

In this case report, it is observed that there is a transition from hyperthyroidism to hypothyroidism in pregnancy due to the significant physiological demands on the thyroid gland. An influential aspect in this transition is the impact of human chorionic gonadotropin (hCG), a hormone released by the placenta. In early pregnancy, hCG prompts the thyroid gland to produce more thyroid hormones, which might potentially worsen hyperthyroidism. As pregnancy advances, hCG's effects fade, and the thyroid gland

adapts to meet metabolic needs. The thyroid gland may struggle to maintain hormone levels, especially in autoimmune thyroiditis, causing hypothyroidism (Alemu et al., 2016; Amin et al., 2010; Urgatz & Poppe, 2024).

Optimising thyroid dysfunction treatment in pregnant women requires understanding this transition. Clinicians must be aware of the potential for hyper- and hypothyroid conditions during pregnancy. This emphasises the necessity of thyroid function monitoring and personalised therapies for gestational hormonal changes. This case report presents an intriguing illustration of the intricacies of managing thyroid disorders in pregnancy. This highlights the importance of increased awareness and proactive management measures to deal with the changing thyroid function in pregnant individuals, eventually ensuring the health and well-being of both the mother and the foetus (Alexander et al., 2017; Maraka et al., 2018; Negro & Mestman, 2011).

Lastly, in this case, the patient's pre-pregnancy hyperthyroidism was not managed before conception due to non-compliance with follow-up and medication. This likely contributed to the development of subclinical hypothyroidism during pregnancy, which in turn led to placental abruption and the subsequent intrauterine death of the foetus. The adverse outcomes observed in this case highlight the importance of preconception counselling and optimisation of thyroid function before attempting to conceive (Alexander et al., 2017; Maraka et al., 2018; Negro & Mestman, 2011).

CONCLUSION

The complexities of thyroid dysfunction during pregnancy impose a holistic and careful approach to protect maternal and foetal well-being. It is crucial for healthcare providers to keep updated on the latest evidence-based guidelines and to have open discussions with pregnant women about the risks and benefits of screening as well as treating subclinical hypothyroidism. Healthcare providers can collaborate to implement a collaborative approach that includes routine thyroid function monitoring, thorough antenatal care, and prompt intervention in case of any emerging issues to enhance pregnancy outcomes.

CONFLICT OF INTEREST

The authors declared no conflicts of interest related to this article.

CONSENTS

Informed consent was obtained from the patient before preparing this case report

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