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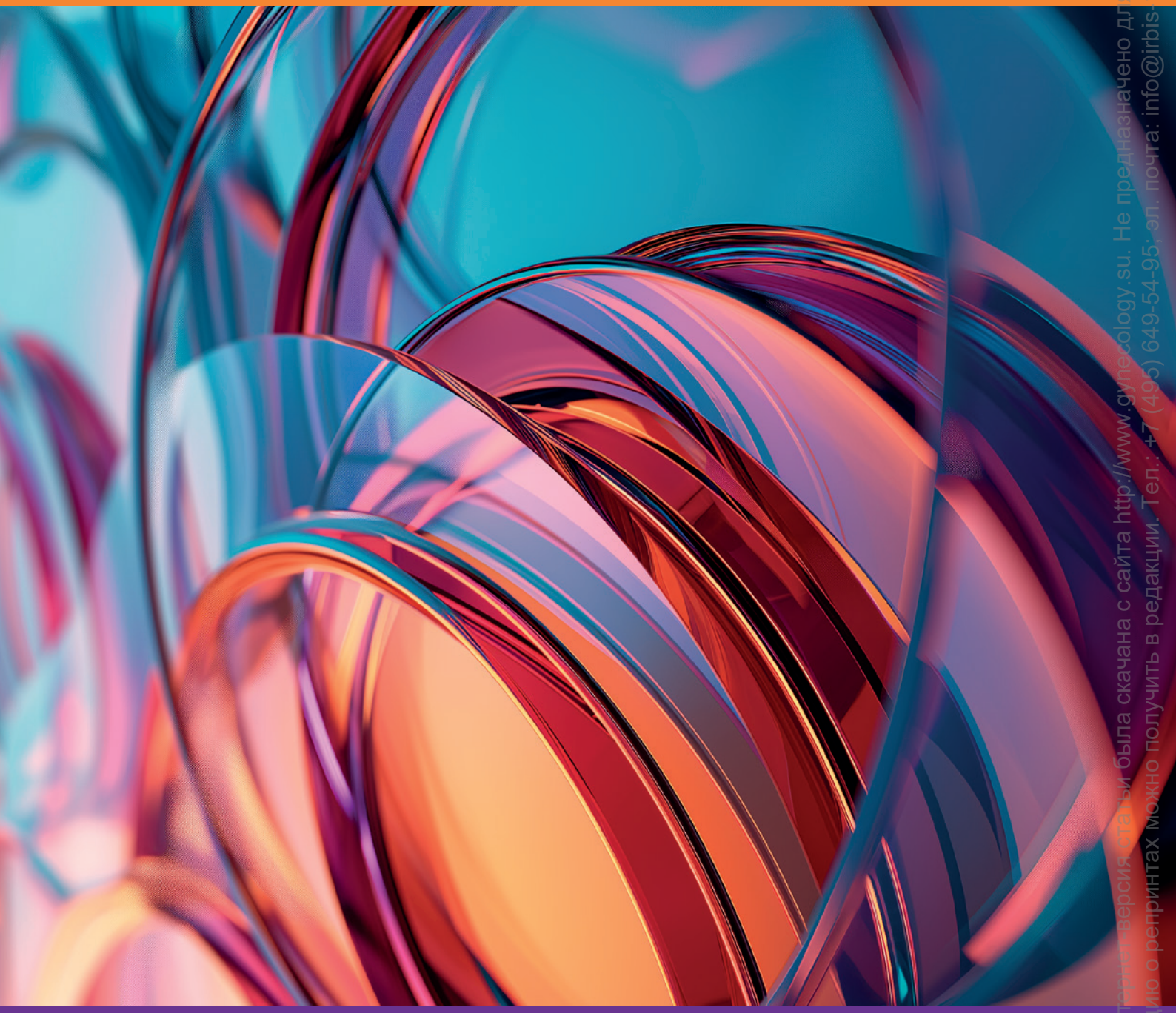

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Maternal tachycardia in pregnancy: a masked presentation of hyperthyroidism?

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Abstract

Introduction. Hyperthyroidism occurs in 35–50 per 100,000 women aged 20–29 years annually. Pregnancy outcomes in hyperthyroid mothers depend heavily on metabolic control. This case report discusses a pregnant patient with Graves' disease who presented without the typical symptoms of hyperthyroidism or thyrotoxicosis.

Case report. A 31-year-old multiparous woman (gravida 3, para 2) at 38 weeks of gestation was admitted to a tertiary care center in labor. She had previously visited the emergency room due to severe diarrhea, dehydration, and hyperthyroidism. The patient received regular antenatal care at an endocrine clinic, where she was treated with propylthiouracil and propranolol until her seventh month of pregnancy. Subsequent evaluations revealed normalized thyroxine (T4) and thyroid-stimulating hormone (TSH) levels; thus, the treatment was concluded. The patient underwent an uncomplicated vaginal delivery and was safely discharged.

Discussion. The patient had no prior history of thyroid disorders. Her initial symptoms emerged at two months of gestation, presenting as vomiting, dehydration, tachycardia, and weight loss. While an initial diagnosis of dehydration seemed to explain the tachycardia, laboratory tests revealed low TSH and increased free T4 (fT4) levels, confirming hyperthyroidism despite the absence of classic physical signs. Implementing maternal thyroid disorder screening to prevent such complications align with similar initiatives in Indonesia, such as the Congenital Hypothyroidism Screening program. However, expert guidelines from the American Thyroid Association and the Endocrine Society do not currently recommend universal thyroid screening in the absence of specific risk factors.

Conclusion. Optimal pregnancy outcomes in hyperthyroid patients require early diagnosis and adequate treatment. Tachycardia presenting during early pregnancy should be investigated for underlying causes other than dehydration. Although universal thyroid screening in early pregnancy is not recommended without risk factors, strong clinical suspicion remains a clear indication for further laboratory examination.

Keywords: Graves' disease, hyperthyroidism, pregnancy, screening, tachycardia

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Материнская тахикардия во время беременности: замаскированное проявление гипертиреоза?

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Резюме

Введение. Гипертиреоз встречается с частотой 35–50 случаев на 100 тыс. женщин в год у женщин в возрасте 20–29 лет. У матерей с гипертиреозом исходы беременности зависят от контроля метаболизма. В данном случае рассматривается пациентка с болезнью Грейвса (Базедова болезнь) без специфических жалоб на гипертиреоз или тиреотоксикоз.

Клинический случай. Беременная, 31 год, с двумя предыдущими беременностями и двумя родами в анамнезе, срок гестации 38 недель, была госпитализирована в родильное отделение с анамнезом обращения в отделение неотложной помощи в связи с тяжелой диареей, обезвоживанием и гипертиреозом. Пациентка регулярно наблюдалась в эндокринологической клинике и получала пропилтиоурацил и пропранолол до 7 месяцев беременности. Повторное обследование показало нормальные уровни тироксина (Т4) и тиреотропного гормона (ТТГ), поэтому лечение было завершено. Роды прошли через естественные родовые пути без осложнений, пациентка была выписана.

Обсуждение. Пациентка – многорожавшая мать без заболеваний щитовидной железы в анамнезе. Первые жалобы возникли на втором месяце беременности и сопровождались рвотой, обезвоживанием, тахикардией и потерей массы тела. Первоначальный диагноз обезвоживания объяснял тахикардию, но лабораторные исследования выявили низкий уровень ТТГ и повышенный уровень свободного Т4 (свТ4), что соответствует гипертиреозу без типичных клинических симптомов. Скрининг заболеваний щитовидной железы для профилактики этого заболевания осуществляется в соответствии с аналогичными программами, проводимыми в Индонезии, такими как скрининг врожденного гипотиреоза. Однако экспертные группы, такие как Американская ассоциация щитовидной железы и Общество эндокринологии, не рекомендуют проводить всеобщий скрининг заболеваний щитовидной железы при отсутствии факторов риска.

Заключение. Оптимальные результаты достигаются при ранней диагностике и адекватном лечении. При тахикардии, возникшей на ранних сроках беременности, пациентка должна быть обследована для выявления других причин развития тахикардии, помимо обезвоживания. В настоящее время универсальный скрининг функции щитовидной железы на ранних сроках беременности не рекомендуется при отсутствии факторов риска, однако клиническое подозрение является показанием к дополнительному обследованию.

Ключевые слова: болезнь Грейвса, гипертиреоз, беременность, скрининг, тахикардия

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Highlights

What is already known about this subject?

- Hyperthyroidism affects approximately 0.05 % of women of reproductive age, most commonly due to Graves' disease.
- Physiological tachycardia is common during pregnancy and may mask underlying pathological conditions.
- Delayed detection and treatment of maternal hyperthyroidism significantly increase the risk of adverse maternal and fetal outcomes.

What are the new findings?

- Tachycardia during early pregnancy should not be solely attributed to common complications like hyperemesis gravidarum; hyperthyroidism must also be considered.
- A poor response to initial treatment for dehydration warrants a broader differential diagnosis beyond hypovolemia, specifically including Graves' disease.
- Rapid diagnosis via TSH and fT4 evaluations enables prompt treatment and promotes favorable clinical outcomes.

How might it impact on clinical practice in the foreseeable future?

- It strongly encourages early thyroid function screening in pregnant women who present with unexplained tachycardia.
- This clinical case raises clinical awareness that tachycardia may indicate hyperthyroidism, even in the absence of classic symptoms such as goiter or ophthalmopathy.

Основные моменты

Что уже известно об этой теме?

- Гипертиреоз встречается у 0,05 % женщин репродуктивного возраста, часто вследствие болезни Грейвса.
- Физиологическая тахикардия часто встречается во время беременности и может маскировать патологические изменения.
- Задержка выявления или лечения гипертиреоза у матери может увеличить риск неблагоприятного исхода для матери и плода.

Что нового дает статья?

- Тахикардия на ранних сроках беременности может быть обусловлена не только несколькими распространенными причинами (например, неукротимой рвотой беременных), но и гипертиреозом.
- Неудовлетворительный ответ на первоначальное лечение требует проведения дополнительной дифференциальной диагностики, помимо гиповолемии или обезвоживания, включая болезнь Грейвса.
- Быстрая диагностика по уровню ТТГ/свТ4 (тиреотропный гормон/свободный тироксин) привела к своевременному лечению и благоприятному исходу.

Как это может повлиять на клиническую практику в обозримом будущем?

- Поощряется раннее обследование функции щитовидной железы у беременных с необъяснимой тахикардией.
- Приведенный клинический случай повышает осведомленность о том, что тахикардия может быть признаком гипертиреоза даже без наличия классических симптомов (зоб, офтальмопатия).

Introduction / Введение

Hyperthyroidism is a common endocrine disorder among women of reproductive age, occurring in an estimated 35–50 per 100,000 women aged 20–29 years (approximately 0.05 %) [1]. During pregnancy, fetal demands drive an increase in maternal metabolism and hormone production, including thyroid hormones. Biochemically, hyperthyroidism in pregnancy is characterized by elevated free thyroxine (fT4) and reduced thyroid-stimulating hormone (TSH) concentrations, often occurring without thyroid receptor antibodies (TRAb) [2]. Physiologically, the maternal thyroid gland mass increases by 10–40 %, accompanied by a corresponding 50 % increase in the production of thyroxine (T4) and triiodothyronine (T3) [2].

Maternal and fetal outcomes depend significantly on achieving adequate metabolic control; untreated or refractory hyperthyroidism is associated with poorer outcomes. Adverse maternal outcomes include hypertension, preeclampsia, and heart failure, while fetal risks involve prematurity, intrauterine growth restriction (IUGR), stillbirth, thyrotoxicosis, and goiter [3]. This case reports on a pregnant woman whose early-detected hyperthyroidism initially presented as severe vomiting and tachycardia, without classic physical signs of hyperthyroidism. Her atypical presentation underscores the potential value of reconsidering universal thyroid function screening to prevent adverse maternal and fetal outcomes.

Case report / Клинический случай

A 31-year-old multiparous woman (gravida 3, para 2) at 15–16 weeks of gestation was referred to a tertiary healthcare center for persistent nausea and vomiting for the past two months that had worsened over the preceding two weeks. She reported vomiting more than 10 times per day and a significant reduction in food intake, resulting in a 9 kg weight loss over the previous two months. Despite having been hospitalized four times previously for these same complaints and receiving standard management for hyperemesis gravidarum (HEG), her symptoms had not improved.

On physical examination, her vital signs were within normal limits except for marked tachycardia: blood pressure (BP) was 107/68 mmHg, heart rate (HR) was 126 beats per minute (bpm), respiratory rate (RR) was 20 breaths/min, temperature was 36.3 °C, and oxygen saturation (SpO_2) was 99 % on room air. Although she reported mild palpitations, she denied heat intolerance and exhibited no physical signs of ophthalmopathy or goiter.

Obstetric ultrasonography revealed a single viable fetus in a breech presentation. The transverse cerebellar diameter (TCD) corresponded to 17 weeks and 0 days of gestation. The fetal heart rate was regular, the placenta was located posteriorly, the estimated fetal weight (EFW) was 175 g, and the single deepest pocket (SDP) of amniotic fluid measured 3.25 cm.

Initially, the maternal tachycardia was attributed to dehydration secondary to HEG. However, laboratory tests revealed an increased free thyroxine (fT4) of 4.5 ng/dL and a lowered thyroid-stimulating hormone (TSH) of < 0.02 μIU/mL. These findings suggested biochemical hyperthyroidism despite the absence of classic clinical signs. A diagnosis of HEG complicated by hyperthyroidism, malnutrition, and moderate dehydration was established. The patient was referred to the Internal Medicine department and commenced on oral propylthiouracil (100 mg three times daily), potassium chloride (1200 mg once daily), and propranolol (10 mg twice daily). This medical regimen was maintained until her seventh month of pregnancy.

Later, at 38 weeks of gestation, the patient presented to the hospital with abdominal pain, uterine contractions, and fluid leakage from the birth canal, indicating the onset of labor. Her vital signs were stable and within normal limits. Her current weight was 50 kg (up from a pre-pregnancy weight of 45 kg), yielding a body mass index (BMI) of 20.3 kg/m^2 at a height of 157 cm. Obstetric examination revealed a soft, convex abdomen with a fundal height of 28 cm and an abdominal circumference of 80 cm. The fetus was now in a cephalic presentation with an estimated weight of 2600 g and a baseline HR of 140–144 bpm. Follow-up thyroid function tests demonstrated a normalized fT4 (1.7 ng/dL) alongside persistently suppressed TSH (< 0.02 μIU/mL).

A review of her obstetric history noted no relevant personal or family medical conditions, collagen vascular diseases, or teratogenic exposures. Her previous pregnancy, seven years prior, had resulted in the spontaneous, premature vaginal delivery of a 2500 g infant in cephalic presentation. During the current pregnancy, she had received regular antenatal care from both a midwife and an obstetrician.

Fetal echocardiography performed prior to delivery showed no structural abnormalities, demonstrating a normal four-chamber view, a cardiothoracic area ratio (CTAR) of 20 %, and a cardiac axis of 39.9°. Doppler indices were within acceptable ranges: the umbilical artery pulsatility index (PI) ranged from 1.52 to 4.74, the middle cerebral artery PI was 1.9 to 5.38, and the right uterine artery PI was 0.65 with no diastolic notching.

The patient ultimately underwent an uncomplicated vaginal delivery, giving birth to a healthy female infant whose weight was appropriate for gestational age. Postpartum monitoring revealed no signs of hemorrhage, infection, or thyroid storm. Both mother and neonate remained in good condition and were safely discharged on postpartum day two.

Discussion / Обсуждение

Tachycardia is defined as a resting heart rate exceeding 100 beats per minute (bpm). Due to normal physiological changes, pregnant women typically have a slightly higher resting heart rate, averaging 91 bpm (68–115 bpm). To

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meet higher metabolic demands during pregnancy, maternal cardiac output increases, driven by decreased systemic and pulmonary vascular resistance. Additionally, plasma volume expansion from erythropoiesis increases cardiac output, which can present as tachycardia. However, these physiological changes usually peak later in pregnancy, around 34 weeks. When tachycardia occurs during the first trimester, pathological causes must be considered, including arrhythmias, dehydration, infection, cardiac structural abnormalities, anemia, and hyperthyroidism [4].

Hyperemesis gravidarum (HEG) is a common cause of first-trimester tachycardia secondary to dehydration. Affecting 0.3–1.0 % of all pregnancies, HEG is characterized by persistent vomiting, weight loss, electrolyte abnormalities, and dehydration.

This case report presents a patient with a classic presentation of HEG: persistent and worsening nausea and vomiting, significantly reduced dietary intake, electrolyte imbalances, weight loss, dehydration, and tachycardia. Despite receiving multiple rounds of antiemetics in accordance with HEG treatment protocols, the patient experienced no significant improvement over the two months prior to admission. Initially, her tachycardia was attributed solely to HEG [5]. The absence of fever and leukocytosis helped rule out infection, while her clinical presentation did not suggest arrhythmia. Furthermore, the patient reported no heat intolerance, nervousness, or increased appetite. The absence of a goiter or exophthalmos also initially steered the differential diagnosis away from hyperthyroidism. The following **Table 1** details the clinical differences between our report and other documented cases.

Despite the absence of classic physical signs, laboratory tests revealed an elevated free thyroxine (fT4) and suppressed thyroid-stimulating hormone (TSH), confirming biochemical hyperthyroidism. Tachycardia, mild palpitations, and weight loss were the only clinical indicators of hyperthyroidism in this patient, yet these were easily mistaken for the secondary effects of HEG-induced vomiting and malnutrition. Hypovolemia from severe vomiting triggers tachycardia as a compensatory mechanism to maintain cardiac output. This is particularly common in the first trimester, a period when both gestational transient thyrotoxicosis and HEG are most prevalent [5]. In severe cases of HEG, repeated episodes of vomiting can lead to hypovolemia, causing tachycardia and palpitations that effectively mask underlying hyperthyroidism [10].

Because HEG accounts for nearly 11.3 % of pregnancy-related hospitalizations [11], primary healthcare (PHC) providers are highly likely to diagnose isolated HEG. Limited diagnostic resources in PHC facilities, particularly the inability to readily screen for TSH and fT4 levels, further contribute to delayed hyperthyroidism diagnoses.

Hyperthyroidism is characterized by high thyroid hormone levels due to increased synthesis and secretion by the thyroid gland. It is a common endocrine disorder in women of reproductive age, occurring in an estimated 35–50 per 100,000 women [1]. Approximately 95 % of hyperthyroidism cases in pregnancy are caused by Graves' disease, an organ-specific autoimmune condition where thyroid-stimulating antibodies mimic TSH and stimulate the thyroid gland. Its signs and symptoms include goiter, palpitations, tachycardia, ophthalmopathy, weight loss, and heat intolerance [2]. If left untreated, maternal hyperthyroidism can lead to severe complications. Adverse maternal outcomes include preeclampsia and heart failure, while perinatal risks encompass premature birth, fetal growth restriction, stillbirth, thyrotoxicosis, hypothyroidism, and goiter [3].

Known risk factors for hyperthyroidism include: 1) a history of hyperthyroidism or current symptoms; 2) a goiter or a reactive thyroid antibody; 3) a history of head or neck radiation during previous thyroid surgeries; 4) age > 30 years; 5) type 1 diabetes or another autoimmune condition; 6) a history of stillbirth, prematurity, or infertility; 7) multiple pregnancies; 8) a family history of thyroid autoimmune disorders; 9) morbid obesity (> 40 kg/m^2); 10) a history of amiodarone, lithium, or iodinated contrast use; or 11) currently living in an area endemic for iodine insufficiency

Table 1. Clinical characteristics of hyperthyroidism.

Таблица 1. Клинические характеристики гипертиреоза.

Author Автор	Goiter Зоб	Palpitations Сердцебиение	Ophthalmopathy Офтальмопатия	Weight loss Потеря массы тела	Sweating Потливость	Heat intolerance Непереносимость жары	Fatigue Усталость
Ata et al. [6], n = 74	35 (47.2 %)	29 (39.1 %)	28 (37.8 %)	23 (31.0 %)	14 (18.9 %)	12 (16.2 %)	2 (2.7 %)
Ogbera et al. [7], n = 63	61 (97.0 %)	37 (58.7 %)	24 (38.0 %)	40 (63.4 %)	36 (57.0 %)	43 (68.0 %)	40 (63.4 %)
Onyenekwe et al. [8], n = 172	109 (63.4 %)	140 (81.4 %)	94 (54.7 %)	148 (86,0 %)	116 (67.4 %)	141 (82.0 %)	84 (54.7 %)
Sönmez et al. [9], n = 44	19 (40.3 %)	23 (52.3 %)	7 (15.9 %)	17 (38.6 %)	23 (52.3 %)	Not available Недоступно	Not available Недоступно
Current case Текущий случай	–	+	–	+	–	–	–

[5]. In our case, the patient was 31 years old. Insufficient clinical suspicion and a normal Wayne Index score do not warrant thyroid screening. However, hyperthyroidism was discovered only after screening for thyroid function. Currently, neither the Endocrine Society nor the American Thyroid Association recommends universal testing without risk factors [5].

Given that hyperthyroidism predominantly affects women (2.0 % vs. 0.5 % in men) [1], routine thyroid function screening could be highly beneficial in preventing adverse maternal and fetal outcomes caused by delayed diagnosis and treatment. A comparable initiative is already implemented in Indonesia to screen neonates for congenital hypothyroidism, largely due to endemic iodine deficiency across numerous regions. Early diagnosis leads to prompt treatment, which drastically lowers the rate of adverse clinical outcomes [12].

Thyrotoxicosis during pregnancy is managed with thionamides, utilizing either propylthiouracil (PTU) or methimazole [5, 13]. **Table 2** further details the management of hyperthyroidism at specific gestational stages. PTU is generally preferred because it partially inhibits the peripheral conversion of T4 to T3, crosses the placenta less readily, and, unlike methimazole, is not associated with cutaneous aplasia [2]. A meta-analysis demonstrated a significantly lower incidence of preeclampsia ($p = 0.01$), low birth weight ($p = 0.03$), spontaneous abortion ($p < 0.00001$), and premature birth ($p = 0.001$) in euthyroid patient cohorts compared to those with uncontrolled hyperthyroidism [14].

The American College of Obstetricians and Gynecologists (ACOG) recommends an initial PTU dose of 300–450 mg/day for pregnant women [15]. In our case, the patient was prescribed 100 mg of PTU three times daily, 1200 mg of potassium chloride once daily, and 10 mg of propranolol twice daily until her seventh month of pregnancy. She received routine outpatient obstetric and internal medicine care until labor at 38 weeks. At admission, re-examination showed that her fT4 levels had normalized,

Table 2. Management of hyperthyroidism in pregnancy [13].

Таблица 2. Лечение гипертиреоза во время беременности [13].

Timing of diagnosis Сроки постановки диагноза	Specific circumstances Особые обстоятельства	Recommendations Рекомендации
Graves' disease diagnosed during pregnancy Болезнь Грейвса, диагностированная во время беременности	Diagnosed during the first trimester Диагноз поставлен в I триместре	Begin propylthiouracil. Measure TRAb (TSH receptor antibodies) at diagnosis. If elevated, repeat at 18–22 weeks and again at 30–34 weeks of gestation. Начать лечение пропилтиоурацилом. Измерить уровень TRAb (антитела к рецепторам ТТГ) при постановке диагноза, и если он повышен, повторить измерение на 18–22-й неделе и снова на 30–34-й неделе беременности.
	Diagnosed after the first trimester Диагноз поставлен после I триместра	Begin methimazole. Measure TRAb at diagnosis, and if elevated, repeat at 18–22 weeks and again at 30–34 weeks of gestation. If thyroidectomy is required, perform it during the second trimester. Начать лечение метимазолом. Измерить уровень TRAb при постановке диагноза, и если он повышен, повторить измерение на 18–22-й неделе и снова на 30–34-й неделе беременности. Если необходима тиреоидэктомия, ее оптимально проводить во II триместре.
Graves' disease diagnosed and treated prior to pregnancy Болезнь Грейвса диагностирована и лечится до беременности	Currently taking methimazole В настоящее время пациент принимает метимазол	Switch to propylthiouracil or withdraw antithyroid drug therapy as soon as pregnancy is confirmed by early testing. Measure TRAb at diagnosis and, if elevated, again at 18–22 weeks and 30–34 weeks of gestation. Следует перейти на пропилтиоурацил или отменить терапию антитиреоидными препаратами, как только беременность будет подтверждена с помощью раннего тестирования. Измерить уровень TRAb (антитела к рецепторам ТТГ) первоначально, и если он повышен, измерить повторно на 18–22 неделе и 30–34 неделе беременности.
	In remission after stopping antithyroid medication При наступлении ремиссии после прекращения приема антитиреоидных препаратов	Perform thyroid function testing to confirm euthyroidism. TRAb measurement is not necessary. Необходимо провести анализ функции щитовидной железы для подтверждения эутиреоза. Измерение уровня TRAb не требуется.
	Previous treatment with radioactive iodine or surgery Предшествующее лечение радиоактивным йодом или хирургическое вмешательство	Measure TRAb initially in the first trimester and, if elevated, again at 18–22 weeks of gestation. Первоначально следует измерить уровень TRAb в I триместре, и если он повышен, повторить измерение на 18–22 неделе беременности.

although her TSH remained suppressed. She ultimately underwent an uncomplicated vaginal delivery with no fetal or maternal complications and was safely discharged on her second inpatient day.

Conclusion / Заключение

Hyperthyroidism in pregnancy necessitates a comprehensive clinical evaluation. Tachycardia presenting during early pregnancy should be investigated for underlying causes other than dehydration. Pregnant patients with untreated hyperthyroidism face an elevated risk of miscarriage, preeclampsia, premature labor, and heart failure. While early detection and prompt treatment are critical to preventing both maternal and fetal complications, current expert guidelines do not recommend universal thyroid function screening. In this case, thyroid screening was initiated only after the patient proved refractory to standard antiemetic therapy. She was treated with propylthiouracil (PTU) from her second to her seventh month of gestation, at which point euthyroidism was achieved, and the therapy was discontinued. Ultimately, she experienced an uncomplicated, full-term vaginal delivery and was discharged in good health. This case highlights that while universal screening is not mandated, strong clinical suspicion and periodic thyroid monitoring remain essential to maintain euthyroidism and appropriately adjust therapeutic regimens.

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Ethics declarations	**Этические аспекты**
The patient was managed in full accordance with ethical principles, including the provisions of the Declaration of Helsinki of the World Medical Association (2013 revision).	Ведение пациента осуществлялось в полном соответствии с этическими принципами, включая положения Хельсинкской декларации Всемирной медицинской ассоциации (пересмотр 2013 г.).
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