

CASE REPORT

Fetal Mediastinal Mass Associated with Arrhythmia: Artifact and Casual Finding in Ultrasound Diagnosis

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ABSTRACT

Aim: We aim to report a case of an enlarged fetal thymus causing arrhythmia.

Background: Fetal mediastinal masses may be clinically asymptomatic or cause hemodynamically significant alterations, heart failure, arrhythmias, and sudden cardiac death.

Case description: We present a case of fetal mediastinal mass associated with an arrhythmia. A 29-year-old primigravida, with no previous medical history, was referred to our center due to suspicion of fetal arrhythmia detected in a routine control in week 34. A thymus of hyperplastic characteristics was suspected in the ultrasound evaluation. Pregnancy concluded uneventfully with favorable neonatal outcome.

Conclusion: The fetal thymus is a structure that usually goes unnoticed during the process of prenatal diagnosis, and when it presents alterations in its morphology, can lead to confusion.

Clinical significance: The fetal thymus can be physiologically enlarged and cause fetal arrhythmias without an adverse clinical outcome.

Keywords: Arrhythmia, Echocardiography, Mediastinum, Prenatal diagnosis, Thymus.

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BACKGROUND

The thymus originates bilaterally from the third and fourth branchial arches.¹ Its development begins in the sixth week of gestation until weeks 14–16; after that, the

thymus grows rapidly.² In fetal ultrasound, the thymus is better visualized in the axial view, ventral to the great vessels and dorsal to the sternum or clavicles.³ It presents as a homogeneous structure in the anterior mediastinum with an ovoid or pyramidal shape, but it can be difficult to visualize in its entirety due to its position behind the sternum and the ribs.³

Fetal mediastinal masses may be clinically asymptomatic or cause hemodynamically significant alterations, heart failure, arrhythmias, and sudden cardiac death,⁴ however, most arrhythmias caused by mediastinal masses are attributed to the presence of cardiac rhabdomyomas. There is no certainty about the presence of thymic hyperplasia leading to autoimmune diseases during intra-uterine development.⁵ On the contrary, it is well known that, over the years, hypoplasia or fetal thymic aplasia has been related as one of the forms of manifestation of various clinical scenarios, such as the deletion of chromosome 22q11.2, chondrodysplasia punctata, Ellis-van Creveld syndrome and after prenatal exposure to agents such as ethanol and the human immunodeficiency virus; however, there is little reported in the literature about the increase in the size of said gland during fetal development,⁶ and currently published studies emphasize the need for additional functional analysis.⁷

The normal size of the fetal thymus has been tabulated with different variants for its measurement: for example, by using the anteroposterior thickness by Felker et al.⁸ and by the perimeter of Zalel et al.³ The transverse thymic diameter progressively increases as the gestational age progresses,⁹ without finding statistically significant differences between the size of the fetal thymus in female or male fetuses.¹⁰ To make the correct diagnosis of a fetal anomaly, careful evaluation of the location and sonographic characteristics of the thymus is essential. In our review, we present a case of fetal mediastinal mass associated with an arrhythmia with favorable neonatal outcome. To the best of our knowledge, there are no publications on arrhythmias concurrent with masses originated by the fetal thymus.

CASE DESCRIPTION

We present a case report of a 29-year-old primigravida, with no previous medical history. The patient was

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referred to our center for ultrasound evaluation due to suspicion of fetal arrhythmia detected in a routine control in week 34. The pregnancy had been of physiological course and showed a combined first-trimester screening risk of 1/14649 and a nuchal translucency of 1.20 mm. The patient had no family history of medical interest nor consanguinity and also denied the use of toxics or drugs.

During the abdominal ultrasound, the fetus had a cephalic position, biometrics in the 70th percentile, normally inserted placenta, normal amount of amniotic fluid, and physiological Doppler pulsatility index of the umbilical artery.

Fetal echocardiogram showed a normal-sized fetal heart, with situs solitus and no pericardial effusion. During the examination, the presence of self-limited episodes of fetal supraventricular arrhythmia was confirmed. In the four-chamber view, the outflows of the great vessels and both vascular arches were normal; except a discrete irregularity at foramen ovale level that had no hemodynamic repercussion. Incidentally, a homogeneous hypoechoic right para cardiac image was observed,

well delimited and with regular vascularization, 22 x 37 mm in size and that remained stable during the three ultrasound tests performed between 34 weeks and 4 days and 36 weeks and 4 days of gestation. A thymus of hyperplastic characteristics was suspected (Figs 1 to 3). In addition, follow-up was carried out by means of a cardiotocographic (CTG) recording that started from the moment of diagnosis, carrying out a total of 9 controls in the fetal physiopathology unit. Fetal monitoring was performed with the presence of a reassuring fetal pattern, normal basal fetal heart rate, moderated variability, with accelerations, no decelerations, and presence of fetal arrhythmia without associated uterine dynamics registered or perceived by the patient, during 6 weeks of follow-up (Fig. 4).

Finally, labor started spontaneously at 40 weeks and four days of gestation. During the dilation, the patient received epidural analgesia and oxytocin in intravenous infusion at 0.3 mL/hour due to hypotonia. Fetal arrhythmia persisted during intrapartum monitoring. Forceps delivery was performed due to the risk of fetal distress and a male newborn of 4100 g, 93rd percentile, Apgar 9/9 was obtained.

Postnatally, thoracic radiography, echocardiography, and electrocardiogram were performed, concluding as final diagnostic finding an aneurysmal oval fossa and



Fig. 1: Right paracardiac image is visualized, hypoechoic in relation to the adjacent lung parenchyma, at 35 weeks and 2 days of gestational age

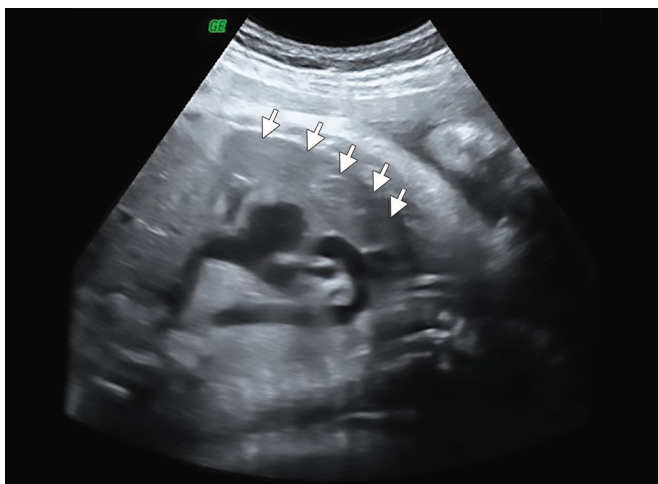


Fig. 3: Thymic image suggestive of hyperplastic characteristics

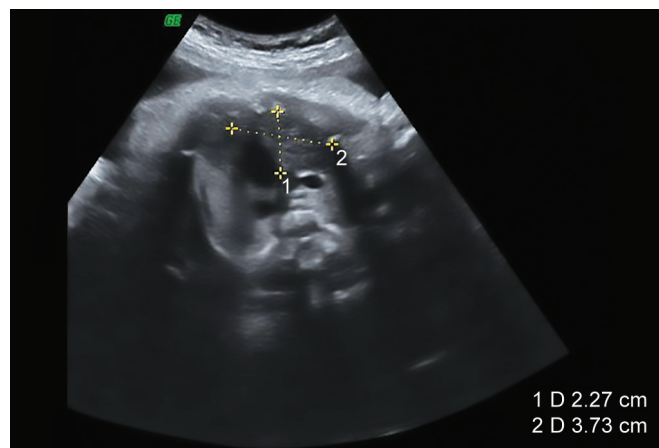


Fig. 2: 22 x 37 mm image visualized in the superior mediastinum in front of the exit of the great vessels, at 35 weeks and 2 days

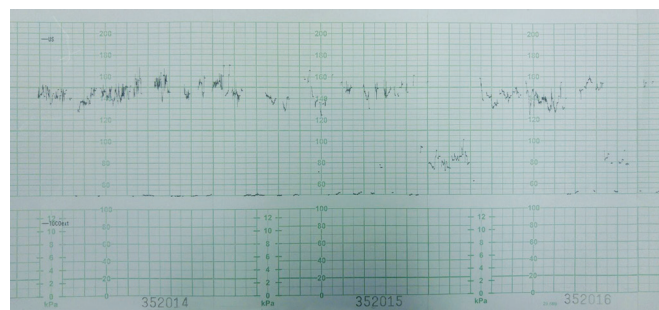


Fig. 4: Fetal arrhythmia in the electronic fetal monitor, with 40 weeks and 4 days

the absence of arrhythmia in the newborn, who did not require hospital admission. An enlarged thymic gland was observed in the postnatal ultrasound, which in later controls decreased to a normal morphology at 4 years and 11 months of life. The child thrives normally.

DISCUSSION

The fetal thymus can be the object of errors and artifacts associated with ultrasound images and lead to overdiagnosis and overtreatment. The association of physiological thymic hyperplasia with fetal arrhythmia has not previously been described.

A relationship has been found between maternal obesity and increased fetal thymic gland, which may be related to immunological abnormalities in these fetuses.¹¹ On the other hand, the decrease in the size of the fetal thymus has been described in fetuses affected with Down syndrome.¹² Also, variations in the size of the fetal thymus have been described in cases of impaired immunity or infection.⁹

There are standards that have been described in the ultrasound parameters for the correct visualization and measurement of the fetal thymus, known as Thy Box.¹³ Confirmation of the location of this structure in the anterior mediastinum can be done by turning the transducer in the sagittal plane. The echogenicity of the thymus in relation to the pulmonary fields may change during pregnancy, being hyperechogenic or isoechogenic to the lungs prior to 27 weeks of gestation and hypoechoic with respect to the lungs after 27 weeks of gestation,⁸ as shown in the images of this clinical case.

As already mentioned, ultrasound measurements of the thymus are similar in male and female fetuses and present common ultrasound measurements that vary with gestational age and fetal biometry, with no significant differences in large fetuses for gestational age.¹⁰ We believe that the enlargement of the fetal thymus is not attributable to the macrosomy in this case. We hypothesize that the mass effect on the pericardium could be the cause of the fetal arrhythmia, as previously published.¹⁴ Nevertheless, fetal arrhythmias could be concomitant with aneurysms of the oval fossa. Should that be the case, arrhythmias usually persist in childhood and postnatal life until an aneurysm resolves,¹⁵ unlike our clinical case.

Fetal arrhythmias should be evaluated by heart Doppler as well as cardiotocography, as an adjunct to biophysical profiles for fetal assessment.¹⁶

Special attention should be paid to trying to differentiate the outline of the thymus, to ensure an adequate delimitation between its echogenicity and that of the adjacent lung fields; this helps avoid confusion with anterior masses of the neck, such as goiter, cardiac masses such as rhabdomyoma, and pulmonary masses, such

as cystic pulmonary airway malformation of the lung (CPAM).¹⁷ Should these differential diagnoses be ruled out, the patient can be reassured on physiological thymus hyperplasia.

CONCLUSION

The fetal thymus is a structure that usually goes unnoticed during the process of prenatal diagnosis, and when it presents alterations in its morphology, can lead to confusion.

CLINICAL SIGNIFICANCE

It is especially important to know the anatomical reference points and the regulated method for its measurement and thus be able to avoid, as far as possible, diagnostic errors that can lead to an increase in the state of anxiety to the patient and to the repetition or request of surplus diagnostic tests, with the consequent burden of unnecessary sanitary expense and patient's anxiety.

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