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Original Article

Histopathologic Changes in Aborted Placenta

A. R. Guheina Ashour, Nabeia Ali Gheryani, Tunis M. Meidan[1]

Departments of Pathology and [1]Family and Community Medicine, Faculty of Medicine, University of Benghazi, Benghazi, Libya

Abstract

Introduction: Histopathological examination of the placenta with clinical implications helps to make the diagnosis and deduce the cause of abortion, fetal mortality, morbidity, and pregnancy complications. **Aim:** This study aims to determine the frequencies and types of abnormalities of the chorionic villi in the aborted placentae. **Materials and Methods:** All specimens of products of conception submitted to a private histopathology laboratory in Benghazi during the period (from January 01, 2016 to December 31, 2018) were formalin-fixed, paraffin-embedded, and histopathology reviewed using hematoxylin and eosin stain under light microscopy. The data collected and statistically analyzed using SPSS version 22. **Results:** The study involved 92 specimens, of which 86 were abnormal and the pathological changes include partial mole (48%), hydropic changes (19%), increased vascularity (chorioangiosis) (13%), fibrosis (10%), numerous Hofbauer macrophages (8%), and abnormal premature calcification (2%). The rest of the specimens (6.5%) were normal placentae. Most of the cases of partial mole (73%) were at the age group of ≥30 years, and cases of abnormal premature calcification were at the age of >40 years. **Conclusion:** The histopathologic examination is an important tool for diagnosing the placental abnormalities. Most cases of abortion have abnormalities in chorionic villi; the most common abnormality is the partial mole, followed by hydropic change, then increased vascularity (chorioangiosis), fibrosis, and numerous Hofbauer macrophages. Abnormal premature calcification is the least finding. Partial mole occurs at an older age group of ≥30 years.

Keywords: Calcification, chorioangiosis, chorionic villi, fibrosis, Hofbauer macrophages, hydropic change, partial mole

Introduction

The placenta is an organ that aids nutrient and gas exchange between the maternal based and fetal-related compartments, produces hormones that help the fetus to grow and develop, and gives some protection against infection.[1] The chorionic villi are the efficient unit of the placenta, their histological appearance varies with the gestational age, but the basic villous structure is the same regardless stage of development and maturation of the villous tree.[2] Maternal diseases and disorders such as diabetes, hypertension, anemias, and infections in pregnancy can contribute to fetal morbidity and mortality through the affection of the placenta structure and function.[3]

Gestational trophoblastic disease characterized by the proliferation of trophoblastic tissue of the placenta, of which hydatidiform moles are the premalignant and most common form. Malignant lesions (invasive moles and choriocarcinoma) can occur as well.[4]

Fifteen percent of recognized pregnancies terminate in spontaneous abortion and maybe many more in early pregnancies.[5] A blighted ovum is the leading cause of spontaneous abortion in 50% of cases.[6]

Therefore, the histopathological examination of the placentae may give an idea about the type and frequency of pathologic changes, and hence a clue to the cause of abortion, fetal death, and pregnancy complications.[7]

Materials and Methods

A retrospective study of 92 specimens of products of conception that were collected from a private histopathology laboratory in Benghazi. The samples, which submitted to the pathology laboratory over the period from January 01, 2016 to December 31, 2018, reviewed. All specimens received

Address for correspondence: Dr. A. R. Guheina Ashour, Department of Pathology, Faculty of Medicine, University of Benghazi, Benghazi, Libya.
E-mail: guheina.ashour@uob.edu.ly

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in formalin were routinely fixed, paraffin-embedded, and stained with h and e (H and E) stain. The histopathological examination carried out using light microscope Nikon 50*i* to obtain information about different abnormal histological changes in chorionic villi.[8] Normal placentae were taken as a control group. The study was descriptive.

Statistical analysis

Statistical analysis was carried out using the IBM SPSS Statistics for Windows, version 22 (IBM Corp., Armonk, N.Y., USA). Continuous variables were expressed as mean ± standard deviation, whereas categorical variables expressed as numbers and percentages.

Results

During the study period, a total number of cases of abortions were 92; their clinicopathological findings as follows:

Histopathological findings

In the present work, Chart 1 revealed that six cases (6.5%) of specimens showed no histological lesions in chorionic villi (normal placentae) [Figure 1a], whereas 86 cases (93.5%) of specimens showed one of the abnormality listed in Table 1. Two percent of chorionic villi showed abnormal premature calcification [Figure 1b], 8% had numerous Hofbauer macrophages [Figure 1c], 10% showed fibrosis and 13% of the chorionic villi had increased vascularity (chorioangiosis) [Figure 2a-d] compared to a normal control [Figure 1a]. Nineteen percent of chorionic villi showed hydropic changes [Figure 1d], and 48% showed partial mole [Figure 1e and f]; in form of nonpolar trophoblastic proliferation with central cisterna and trophoblast inclusions in the stroma.

Clinical findings

Patients' ages range between 20 and 45 years in cases of partial mole with mean age 33.5 ± 6.26 years. Most of the cases (73%) of partial mole found at an older age group ≥30 years as shown in Chart 2. The two cases of immature calcification were seen at the age of 43 and 45 years, whereas (50%) of the histopathological findings had no specific age limits.

Discussion

Mindful pathologic examinations of villi and the intervillous space in the placental specimens provide definitive diagnosis or confirm the clinical diagnosis, and help to understand the etiology and pathogenesis of the abortions.

In the present study, 92 placentae examined, of which 6.5% were histologically normal placentae. A 2% of cases recorded to have calcification in this study; they were at an older age group (>40 years) compared to a study by Hassan *et al*.[2] that revealed deposits of calcification in 12.5% of cases. The presence of these deposits is common in abortion specimens, explained by poor transport through the trophoblasts; which not utilized by the fetus due to termination of capillary flow in villi.[9]

Hofbauer cells are tissue-resident immune cells present in placental villi throughout pregnancy. They have a role in regulating pregnancy and placental development[10] and reveals an association with complications of pregnancy, as in cases of abortions, chorioamnionitis, and villitis.[11] However, the exact role of these cells and functions still unclear.[11] The present study showed an increased number of Hofbauer macrophages in 8% of cases, while a study done by Ul Haque *et al*.[12]

Table 1: The number, percentage, and types of histological changes in chorionic villi

Types of histological changes in chorionic villi	*n* (%)
Calcification	2 (2)
Hofbauer macrophages	7 (8)
Fibrosis	9 (10)
Increase vascularity (chorioangiosis)	11 (13)
Hydropic changes	16 (19)
Partial mole	41 (48)
Total	86 (100)

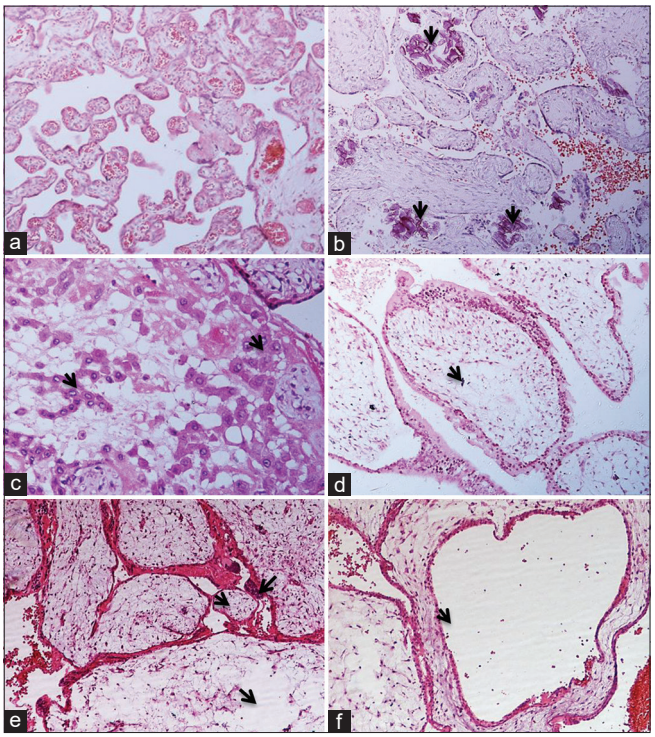

Figure 1: (a) Light microscopic appearance of chorionic villi - normal product of conception with syncytiotrophoblast and cytotrophoblast layers (H and E, original magnification ×100) (b) Light microscopic appearance of an irregular calcification (dark violet) in placenta (H and E, original magnifications ×100) (c) Light microscopic appearance of a chorionic villus with prominent Hofbauer cells (H and E, original magnification ×200) (d) Light microscopic appearance of villous distension and core edema (H and E, original magnifications ×100) (e) Light microscopic appearance of partial mole showing small and large villous size, syncytial knots and hydropic villi with cistern formation (H and E, original magnifications ×100) (f) Light microscopic appearance of partial mole showing edematous villus with inclusion (H and E, original magnifications ×100)

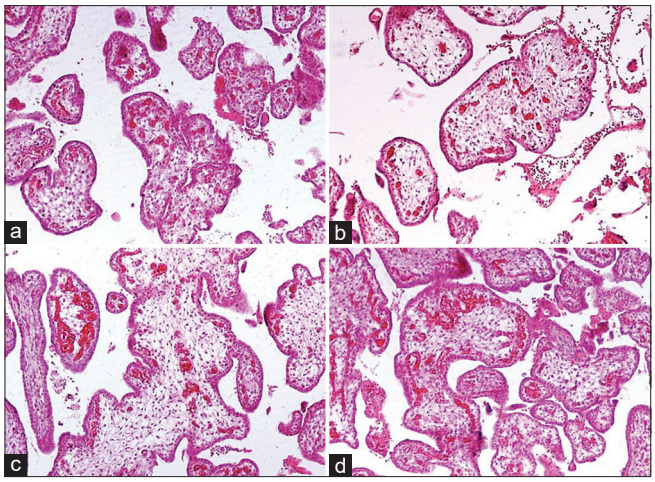

Figure 2: (a-d) Light microscopic appearance of chorionic villi showing increased vascularity (chorioangiosis) in four different noninfarcted areas (H and E, original magnification ×100)

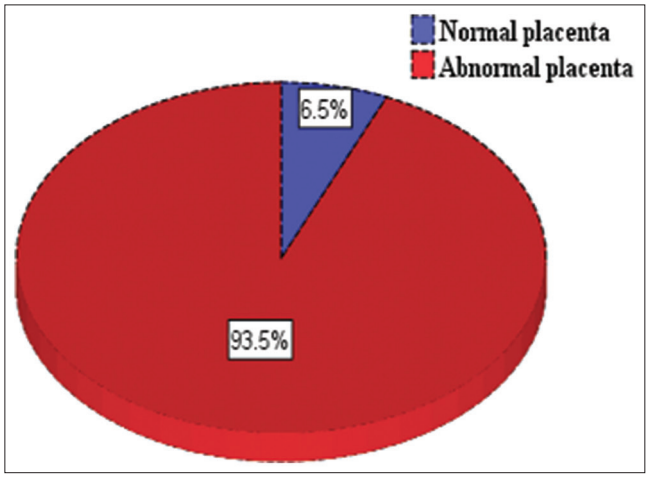

Chart 1: The percentage of normal and abnormal placentae

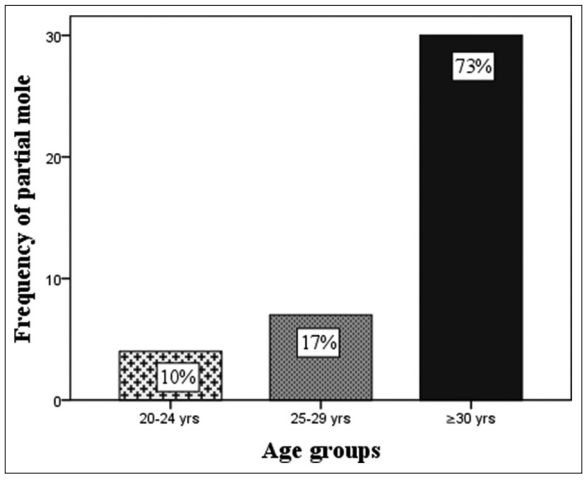

Chart 2: The frequency and percentage of partial mole in different age groups

including the placentae of spontaneous abortions, showed 67% of cases had prominent Hofbauer macrophages. Another study conducted by Lakshmi and Raghupathy,[8] including all the aborted placentae within the first trimester, showed abundant Hofbauer macrophages in 66% of cases. These are high percent compared to this study indicating their role in different diseases and disorders.

Fibrosis is the end-result of long-lasting or chronic inflammatory reactions induced by a variety of stimuli and a feature of progressive diseases that end by organ failure. The current study showed stromal fibrosis in 10% of cases, in contrast to a study by Shetty and Narasimha[13] showed significant stromal fibrosis in 32% of the cases and mild fibrosis in 28% of cases. Another study conducted by Ul Haque *et al*.[12] in which stromal fibrosis was found in 83% of cases. This finding occurs as a consequence of regression after intrauterine fetal death or from impairment of placental circulation.[12]

Chorangiosis categorized by an abundance of blood vessels (normally 8–10 vessels per villous) within the chorionic villi owing to chronic placental hypoperfusion or low-grade tissue hypoxemia as in cases of maternal anemia, preeclampsia, diabetes mellitus, urinary tract infections, and drugs intake.[14] In this study, increased vascularity (chorioangiosis) was in 13% of cases; however, no vascular abnormality detected in the rest of the cases. By reviewing other studies, a study performed by Hassan *et al*.[2] showed areas of placental chorioangiosis in 2.5% of cases, whereas a study by Shetty and Narasimha[13] and a study by Ul Haque *et al*.[12] revealed a markedly reduced vascularity in 72% and 75% of cases. These findings explained by defective vasculogenesis or secondary to fibrosis when stratified according to the weeks of abortion in these studies.

The hydropic changes were seen in 19% of studied cases, comparing to different studies, different percentages of hydropic changes, 32% in a study conducted by Shetty and Narasimha[13] and 5% in a study conducted by Hassan *et al*.[2] These findings explained by reduced or loss of the villous vascular supply when categorized to the weeks of abortion since the hydropic change is more likely to be present with early embryonic death when the villi are not well vascularized.[9]

Partial mole detected in 48% of studied cases with mean age 33.5 ± 6.3 years. Most of the cases were seen at the older age group (≥30 years). In a study performed by Hassan *et al*.,[2] molar changes were found in 5% of cases while a study conducted by Alsibiani[15] showed that partial mole was found in 0.2% of cases with mean age 33.7 ± 7.5 years that is similar to the mean age of cases in this study. However, the low incidence of molar change in the region of the study was due to sociomedical improvements.[15] Another study done by Jagtap *et al*.[4] showed that complete mole was the most common (57.3%), whereas the partial mole was the second (41.3%) found at younger age groups (20–25 years), the finding explained by early marriage at the region of study. A study done by Chauhan *et al*.[16] revealed only one case of partial mole.

The variation in the percentage of different histologic findings in the placental tissues in different regions may be due to many factors and diseases that are common in those areas. Histopathological examination of the product of conception has recognizable medical importance, to rule out the presence of trophoblastic disease and, therefore, its consequences. In addition, the examination of the product of conception can help to prove the clinical diagnosis.

Conclusion

Most of the cases of abortion have abnormalities in chorionic villi; the most common abnormality observed is the partial mole, occurring mostly at the age group ≥30 years, followed by hydropic change then increased vascularity, fibrosis, and numerous Hofbauer macrophages. Abnormal premature calcification is the least finding. Histopathological examination is an important implement to diagnose molar pregnancy, to give a clue about the associated maternal disease that affects the placenta, predicting the next pregnancy outcome and necessary intervention needed. Cases that should be evaluated cytogenetically can be selected through the histologic examination of the product of conception is one more benefit.

Limitation of the study

Limitation of this study is shortage of information about maternal status, gestational age, laboratory investigations, treatment options, and follow-up data.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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ملخص المقال باللغة العربية

التغييرات النسيجية في المشيمة المجهضة

المؤلفون:

جهينة عاشور، نبيه علي الغرياني، تونس ميدان[1]

قسمي علم الأمراض، و1 طب الأسرة والمجتمع، كلية الطب، جامعة بنغازي، بنغازي، ليبيا

المؤلف المسؤول: جهينة عاشور، قسم علم الأمراض، كلية الطب، جامعة بنغازي، بنغازي، ليبيا. ly.edu.uob@ashour.guheina

مقدمة: يساعد الفحص النسيجي المرضي للمشيمة مع الآثار السريرية على التشخيص واستنتاج سبب الإجهاض ووفيات الأجنة والاعتلال ومضاعفات الحمل.

الهدف: تهدف هذه الدراسة إلى تحديد تكرارات وأنواع تشوهات الزغابات المشيمية في المشيمة المجهضة.

المواد والطرق: ثم تجميع جميع العينات الناتجة عن الحمل والمقدمة إلى معمل تحاليل تابع للقطاع الخاص ببنغازي خلال الفترة (من 01 يناير 2016 إلى 31 ديسمبر 2018)، جميع العينات ثم تثبيتها في مادة الفورمالين - والبارافين، ومراجعة التشريح المرضي باستخدام الهيماتوكسيلين وصبغة الإيوزين تحت المجهر الضوئي. تم جمع البيانات وتحليلها إحصائيًا باستخدام الإصدار 22 من SPSS.

النتائج: اشتملت الدراسة على 92 عينة، 86 منها كانت غير طبيعية والتغيرات المرضية تشمل الشامة (الخال) الجزئية (48٪)، تَبَدُّلٌ خَزَبِيّ (19٪)، زيادة الأوعية الدموية (المشيمية) (13٪)، تليف (10٪)، خَلاَيا هُوفْباوَر البلعمية (8٪)، تكلس سابق لأوانه (2٪). أما باقي العينات (6.5٪) فكانت مشيمة طبيعية. كانت معظم حالات الشامة الجزئية (73٪) في الفئة العمرية 30 سنة، وحالات التكلس غير الطبيعي المبكر كانت في عمر أكثر من 40 سنة.

الخلاصة: الفحص النسيجي المرضي هي أداة مهمة لتشخيص تشوهات المشيمة. معظم حالات الإجهاض لها تشوهات في الزغابات المشيمية. يحدث الشامة الجزئية في فئة عمرية أكبر من 30 عامًا.

الكلمات المفتاحية: تكلس، داء المشيمية، الزغابات المشيمية، التليف، خَلاَيا هُوفْباوَر البلعمية ، تَبَدُّلٌ خَزَبِيّ، الشامة (الخال) الجزئية.