

Histopathological changes of decidua and decidual vessels of early pregnancy

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ABSTRACT

Objective: The histological examination of the decidua can provide a clue in the diagnosis of intrauterine pregnancy. The purpose of this study is to describe the morphologic features observed in the decidual blood vessels of early pregnancy loss cases prior to 20 weeks gestation, and to compare these findings with Arias-Stella reaction and with changes found in endometrial biopsies of non-pregnant women as a control group.

Material and method: A prospective case control study done at the Department of Pathology of Mosul Medical College, Histopathological Laboratories of Al-Khansa and Al-Zahrawi Teaching Hospitals and the gynecological units of Al-Khansa and Al- Batool Teaching Hospitals in Mosul.

The study was conducted on 161 reproductive aged women with different clinical types of abortion admitted for uterine evacuation. The histopathological features in the decidua and decidual vessels of curettage specimens were described, graded and compared with that observed in endometrial biopsies of non pregnant women as a control group.

Results: Out of a total 161 abortion specimens examined, 10.6% of cases showed severe degree of obliterative endarteritis involving one or more decidual vessels. This finding was higher than the frequency of Arias-Stella reaction in the same specimens and none of these features were described in the control group .

Conclusion: Obliterative endarteritis of decidual vessels can be used together with other morphological features for the possibility of occurrence of a pregnancy in the absence of chorionic villi, trophoblast and other embryonic elements.

الخلاصة

الهدف: يمكن للفحص النسيجي للغشاء الساقط أن يؤشر لحدوث الحمل داخل الرحم. تهدف الدراسة إلى وصف التغييرات المظهرية الملاحظة لأوعية الغشاء الساقط في حالات فقدان الحمل المبكر قبل عمر ٢٠ أسبوع ومقارنة النتائج مع تغييرات ارياس-ستيلا ومع التغييرات الملاحظة لخزغ بطانة الرحم لنساء غير حوامل كمجموعة مقارنة.

الطريقة: دراسة مستقبلية أجريت في فرع علم الأمراض في كلية طب الموصل والمختبرات النسيجية ووحدات النسائية لمستشفيات الخنساء والزهرراوي والبتول التعليمية في مدينة الموصل.

أجريت الدراسة على ١٦١ امرأة في سن الإخصاب يعانين من حالات إجهاض متنوعة ادخلن لتفريغ الرحم. تم وصف وتصنيف ومقارنة التغييرات النسيجية للغشاء الساقط وأوعيته في عينات تجريف الرحم مع تلك الملاحظة في خزغ بطانة الرحم للنساء غير الحوامل كمجموعة مقارنة.

النتائج: من ضمن ١٦١ عينة إجهاض، أظهرت ١٠,٦% من الحالات درجة شديدة من التهاب بطانة الشريان الأنداسادي والتي شملت واحد أو أكثر من أوعية الغشاء الساقط. وكان تكرارها أكثر من تكرار تغييرات ارياس-ستيلا لنفس العينات بينما لم تشتمل مجموعة المقارنة على أي من تلك الصفات.

الاستنتاج: يمكن استخدام التهاب بطانة الشريان الأندوسادي لأوعية الغشاء الساقط مع التغيرات المظهرية الأخرى كمؤشر لحدوث الحمل في حالة عدم وجود الزغابات المشيمية، الطبقة الغازية والعناصر الجنينية الأخرى.

The histopathological diagnosis of a pregnancy is usually dependent upon finding of fetal parts, gestational sac, viable or necrotic chorionic villi or trophoblast^(1,2).

During implantation the trophoblast invades into capillaries and veins within the superficial endometrium and aggregates of cytotrophoblast cells occlude the distal segments of the spiral arteries until a direct utero-placental circulation is established at around ninth to tenth weeks of gestation as a result of loosening of some of these arterial plugs^(3, 4, 5, 6).

In the absence of fetal parts, trophoblast or chorionic villi, the presence of dilated vascular channels of placental beds are features helpful in distinguishing the true decidua of intrauterine pregnancy from the deciduoid changes secondary to hormonal therapy^(1,2). Furthermore, the presence of enlarged hyalinized spiral arterioles and a fibrinoid matrix are also features suggestive of intrauterine pregnancy⁽¹⁾.

The morphological changes observed in the spiral arteries during early pregnancy are not fully understood⁽⁷⁾. Obliterative changes involving one or more of the decidual spiral arteries have been well described in endometrial curettage biopsies⁽⁸⁾ and were attributed in part to the interaction of the trophoblast with the arterial wall during their migration into these vessels⁽⁷⁾.

The Arias-Stella reaction is the histological glandular feature that was originally described with the presence of intrauterine pregnancy, ectopic pregnancy^(9,10,11) as well as in association with administration of exogenous hormones⁽¹²⁾. It is marked by hypersecretory gland with large cells, abundant clear to eosinophilic cytoplasm and irregularly protruded nuclei which exhibit hyperchromasia and marked pleomorphism⁽¹²⁾.

The present study is designed to describe the morphological changes in the decidual vessels among abortion specimens prior to twenty weeks' gestation and to compare these

features with those observed in the endometrial biopsies of non-pregnant women as a control group and with Arias-Stella reaction as a possible marker of viable pregnancy.

Patients and method

Patients

During the period of study between October 2004 to June 2005, products of conception were collected from 161 reproductive aged women with different clinical types of abortion prior to 20 weeks' gestation. The age of women varied from 17-45 years. They were admitted for uterine evacuation at both Al-Khansa and Al-Batool Teaching Hospitals in Mosul City. The occurrence of a pregnancy was confirmed by a pregnancy test and/ or ultrasonography. An obstetric history of pre-eclampsia, diabetes, and Rhesus incompatibility were excluded. The evacuation of the uterus was performed by either D & C or sponging curettage. Endometrial tissues were fixed in 10% neutral formalin, embedded in paraffin blocks, cut at 5 μ sections and stained by H & E.

Histopathological Examination

On microscopical examination, obliterative endarteritis of decidual blood vessels were described and classified depending upon the severity of luminal narrowing and the degree of intimal proliferation⁽⁸⁾, as follow:

Grade 0: Normal arterioles.

Grade I: Arterioles with slight thickening of their walls and minimal intimal proliferation.

Grade II: Arterioles with moderately severe wall thickening with a lumen –to-wall ratio 2:1 or 1:1 or with eccentric intimal proliferation and intimal foamy cells.

Grade III: At least one or more of the vessels is showing a near total obliteration of the lumen due to marked intimal hyperplasia and intimal foamy cells with surrounding edema.

Results

The mean age of the sampled women was 26.5 years. The results obtained from 161 endometrial biopsies examined are illustrated in table (1). Mild arteritis of decidual vessels (grade I) (figure 1) was elicited in only five cases (3.1%), whereas the majority of the observed arteritis are associated with moderate intimal proliferation with moderate and severe luminal reduction and fell within grade II (figure 2) and grade III (figure 3). They include 17 cases representing 10.6% (table 1).

The percentage of obliterative endarteritis was compared with that of Arias-Stella reaction in the same 161 curettage specimens and with twenty endometrial biopsies obtained from non pregnant women as a control group. The total number of arteritis observed in 161 abortion specimens is 22 (13.7%) while arteritis associated with moderate and severe luminal reduction is observed in 17 cases (10.6%) (table 1 & 2). The Arias-Stella reaction was only described in 11 cases among the same 161 abortion specimens representing 6.8% of all cases (table 2), figure 4 shows Arias-Stella reaction.

Vascular changes were also compared with twenty endometrial biopsies obtained from non-pregnant women who served as a control group. Table (3) shows that only one case of proliferative endometrium of the control group elicits mild degree of obliterative endarteritis while none of these changes were described in cases with secretory endometrium.

Table (1): Frequency of vascular changes in 161 endometrial biopsies of early pregnancy.

Degree of vascular changes	Number of cases	Percentage
Grade 0	139	86.3
Grade I	5	3.1
Grade II	13	8.1
Grade III	4	2.5
Total	161	100

Table (2): Frequency of vascular changes and Arias-Stella reaction in 161 endometrial biopsies of early pregnancy.

Histopathological changes	Arteritis	%	Arias-Stella reaction	%
Number of positive cases	22	13.7	11	6.8
Number of negative cases	139	86.3	150	93.2
Total	161	100	161	100

Table (3): Vascular changes in control material

Degree of vascular changes	Proliferative endometrium	%	Secretory endometrium	%
Grade 0	9	90	10	100
Grade I	1	10	0	0
Grade II	0	0	0	0
Grade III	0	0	0	0
Total	10	100	10	100

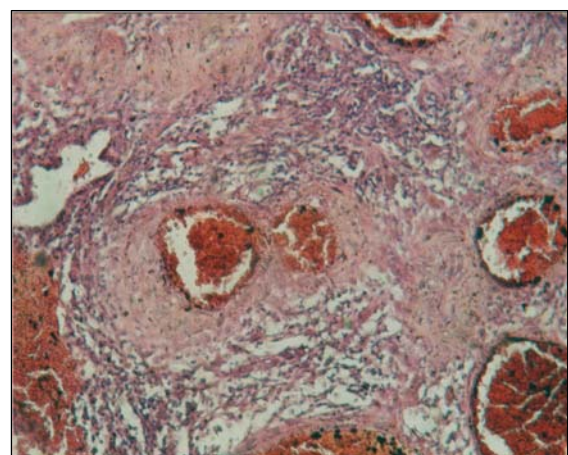


Figure (1): Grade I: mild thickening of the wall of the vessel (H & E)

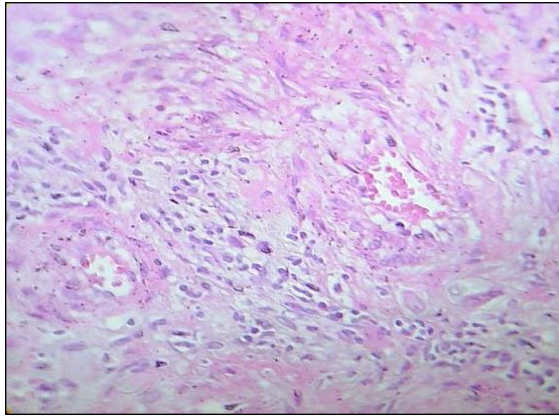


Figure (2): Grade II Arterioles with moderately severe wall Thickening (H & E).

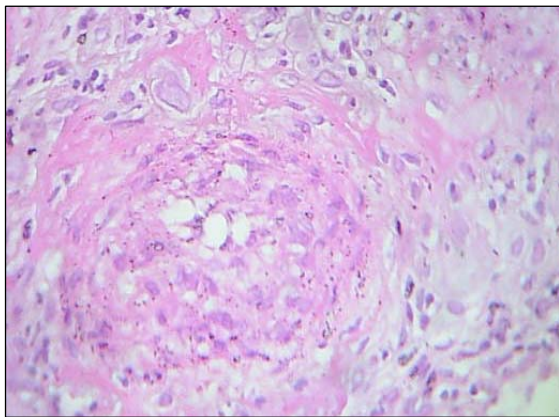


Figure (3): Grade III : marked thickening of the wall of the vessel with foam cells and severe narrowing of the lumen (H & E)

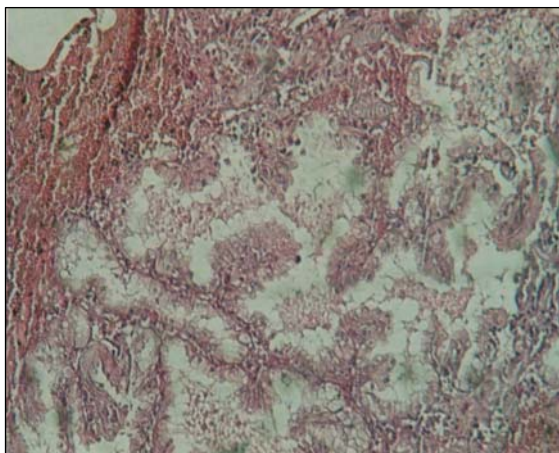


Figure (4): Arias-Stella reaction (H & E)

Discussion

The finding of characteristic histological features that can be used to confirm the diagnosis of intrauterine pregnancy in the absence of fetal parts, villi or trophoblast has been the subject of previous works particularly when such a diagnosis is important as in cases of infertility with the possibility of abortion following hormonal therapy⁽⁸⁾. A recent field in which the diagnosis of pregnancy is necessary are cases in whom the conception was attempted by in vitro fertilization with subsequent abortion.

Many endometrial patterns have been found to be helpful in suggesting that a gestation has occurred although some of these changes have been also described in the decidua of cases with extra uterine pregnancy or following hormonal therapy such as the Arias-Stella reaction. Nevertheless, it is still regarded as a possible physiological response to viable trophoblastic tissue⁽¹⁾.

In the present study, the frequency of obliterative endarteritis among abortion specimens was compared with that of Arias-Stella reaction in the same specimens. The frequency of arteritis in curettage specimens was 13.7% and was 10.6% for vessels with more severe lumen reduction. This percentage was higher than that of Arias-Stella reaction (6.8%), these results were remarkably comparable with that observed by Lichtig C *et al*⁽⁸⁾. On the other hand, only one case of proliferative endometrium of the control group showed a mild degree of arteritis, this finding might be explained by the over interpretation of histopathological features, or it could be related to an associated medical illness like hypertension or diabetes .

Arias-Stella reaction was detected at a relatively low frequency among abortion specimens. This marker is less specific for intrauterine pregnancy and could also occur in extra uterine pregnancy or following hormonal therapy^(1,9,12).

In conclusion, obliterative endarteritis was suggested to be due to the result of interaction of the trophoblast with the vessel wall and hence necessitating the occurrence of a pregnancy for this change⁽⁸⁾. They could be

used with other histological and endocrinological parameters as suggestive marker of intrauterine pregnancy in the absence of chorionic villi, trophoblast, or other embryonic fragments.

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