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Histological Features of Induced Abortion Products in Abidjan, Côte d'Ivoire

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Abstract

The aim of this study was to determine the histological features of products of conception (POCs) collected through induced abortion procedures in Abidjan, Côte d'Ivoire. The study took place from March to May 2024 and covered a three-year period of sample collection starting from 2021 to 2023 at the Central Laboratory of Plateau. One hundred one paraffin-embedded POCs were recovered from the freezers, processed by a technician, and microscopically examined by an experienced pathologist. The data collection was based on the laboratory logs and the report from the pathologist. The average age of the women involved was 34.5 years. Voluntary termination of pregnancy was the most frequent occurrence (66.7%) for which surgical evacuation was performed (74.3%). The procedures recovered together maternal, fetal and placental tissues in 60.4% of the cases. Signs of a decidual reaction were observed in 61.8% of the cases indicating an intrauterine pregnancy. Whereas in the cases of extra-uterine pregnancies, ruptured uterine tubes were the majority (52.0%). The fetal tissues mainly showed signs of bullous dystrophic trophoblastic cells (50.0%). The placental tissues had irregular contours (51.3%) and variable size (67.5%). They were normotrophic (86.4%) but lacked the blood vessels needed for proper exchange between the embryo and the mother (78.3%). The microscopic examination concluded to an inflammation without clear signs of infections in more than one third of the POCs. Henceforth, an immunological and/or a microbiological monitoring of pregnancies could be helpful in this context.

Keywords

Abortion, Decidual, Trophoblast, Placenta, Abidjan

1. Introduction

Induced abortion is the deliberate interruption of an ongoing pregnancy by medical or surgical means [1]. According to the World Health Organization (WHO), roughly 73 million induced abortions occur each year worldwide [2]. They involve six out of ten unwanted and/or unplanned pregnancies and three out of ten of all pregnancies [1]. As a simple healthcare intervention, induced abortion can be safely and effectively managed by a wide range of healthcare workers [2]. Moreover, in the first 12 weeks of pregnancy, a medical abortion can also be safely self-managed by the pregnant person at home, in whole or in part [2]. The main causes of induced abortions are the desire to postpone or limit childbearing, socioeconomic concerns mostly related to the disruption of education or employment, and relationship issues with the husband and/or father of the incoming child [3]. These reasons have led to a lack of consensus on the value of the histological examination of the products of conception (POC) after induced abortions [4] [5]. However, there are also arguments in favor of the histological examination of the POCs [6]-[9]. First, there are medico-legal aspects such as medical negligence cases in the face of a missed ectopic pregnancy or subsequent trophoblastic disease that can be brought against the hospital and/or the practitioner [6]. Secondly, identifying the underlying causes of recurrent miscarriages may warrant histological examination in specific cases where an unexpected medical condition could be discovered [7]. With regard to that last instance, complementary exams such as karyotyping could be helpful in taking care of the patients [8] [9]. In the current study, we aim to characterize the histological features of POCs from induced abortions in Abidjan, Côte d'Ivoire in Western Africa.

2. Methods

A cross-sectional study was conducted at the Central Laboratory of Plateau and the laboratory of Hematology and General Biology of the Department of Pharmacy in Abidjan, Côte d'Ivoire. It focused on POCs received by the Central Laboratory between January 2021 and April 2023 for histological examination. A census from the laboratory logs of all the cases of abortions (spontaneous and induced) was performed. All the paraffin-embedded samples were retrieved and processed according to the classical histological examination using hematoxylin eosin (H&E) staining technique after fixation in buffered formalin. Stained sections were submitted to microscopic examination. In brief, paraffin-embedded POCs were cut with a Leica microtome (Wetzlar, Germany) into 3 mm sections that were stained by routine H&E or Giemsa. The specimens were then mounted with the synthetic resin Eukitt (Fribourg, Germany), and examined microscopically using an Optika light microscope (Milan, Italy) coupled to an HP laptop that had the Optika Vision Pro imaging software. An average of five blocks were examined, and additional blocks were sometimes needed to search for chorionic villi. The report defines the presence or absence of the products of conception,

and the presence of hydropic changes with its different grades. The diagnosis of inflammation was featured by the presence in great number of blood-borne mono-nuclear cells such as neutrophils and/or lymphocyts/plasma cells in the tissues examined under microscopy. The clinical information and history of the patient informed about an ongoing genital infection diagnosed by the healthcare provider prior to tissue collection. No immunohistochemical or microbial tests were performed on the tissue samples. Statistical analysis was performed using Microsoft Excel 2016 and SPSS25 softwares.

3. Results

Overall, 127 POCs were recorded in the laboratory logs during the study, of which 101 were induced abortion POCs. The yearly number of cases was roughly unchanged from 2021 to 2022 (Table 1), and stood around 43 cases/year at the Central Laboratory of Plateau.

Table 1. Features of the participants and their samples.

Parameters	Clinical features of the participants	
	Frequency (n)	Percentage (%)
Years		
2021	39	38.6
2022	48	47.5
2023	14	13.9
Age groups (years)		
18 to 27	5	4.9
28 to 37	43	42.6
38 to 47	53	52.7
Average age +/− SD	34.5 +/− 5.9	
Minimum - Maximum age	18 - 47	
Reasons for histological examination request		
Voluntary termination of pregnancy (VTP)	66	65.4
Ectopic pregnancy	17	16.8
Repetitive no POC	11	10.9
Molar pregnancy	7	6.9
Types of collection		
Surgical evacuation	75	74.3
Medical evacuation	22	21.7
Unspecified paraffin-embedded POCs	4	4.0

Continued

Gross examination of the collected tissues		
Bloody POCs	61	60.4
Necrotic POCs	24	23.8
Polychromatic POCs	6	5.9
Unspecified POCs	6	5.9
Not applicable	4	4.0
Origin of the tissues		
Maternal, fetal and placental tissues	61	60.4
Maternal tissues only	22	21.8
Maternal and placental tissues	10	9.9
Fetal tissues only	5	5.0
Placental tissues only	3	3.0
Nature of the tissues		
Uterine samples (endometer and myometer)	76	75.2
Chorionic and placental villi	74	73.3
Trophoectodermic samples	66	65.3
Ovarian and uterine tube samples	17	16.8
Total	**101**	**100.0**

The average age of the pregnant women was 34.5 +/− 5.9 years with the minimum age at 18 years and the maximum at 47 years. The most represented age group was the 38 - 47 year-old group with 52.7%. The histological examinations were mainly requested for POCs obtained from voluntary termination of pregnancy (55.4%). And surgical evacuation of the wombs was the main induced abortion technique used (74.3%). The collected samples were predominantly bloodied (60.4%) at the time of the gross examination. Those tissue samples contained a combination of maternal, fetal and placental components in 60.4% of the cases. Of note, the maternal material was the most received in the laboratory (93 samples/101). And that material was overwhelmingly uterine tissues (75.2%). From these, the microscopic examination showed decidualized stroma cells in 61.8% (Table 2) indicating that implantation of the embryo had successfully occurred in these cases.

The majority of the non-uterine tissues analyzed were ruptured Fallopian tubes (52.9%). The analysis of the embryonic and/or fetal tissues recorded 50.0% of the samples with signs of bullous dystrophy on the trophoblastic cells. Moreover, there were close to 20% of necrotic trophoblastic cells among the samples assessed. With regard to the placental tissue, the chorionic villi were mostly normotrophic. They had irregular contours (74.3%), and their sizes were ranging from small villi to large ones. The connective axis of the placenta was overwhelmingly fibrous, avascular and edematous. The summary of the pathologist conclusion demon-

strated that inflammation without a clear infection cause was the most frequent occurrence during induced abortions in Abidjan. Of note, many examinations led to no apparent causes (23.8%) backing the need for further investigation into these cases.

Table 2. Histological features of the examined POCs.

Parameters	Histological features	
	Frequency (n)	Percentage (%)
Uterine tissues		
Decidual reaction	31	40.8
No decidual reaction	21	27.7
Decidual necrosis	16	21.0
Others	8	10.5
Total	76	100.0
Other maternal tissues		
Ruptured uterine tubes	9	52.9
Non ruptured uterine tubes	7	41.2
Ovarian cysts	1	5.9
Total	17	100.0
Fetal tissues		
Bullous dystrophic trophoblastic cells	33	50.0
Necrotic trophoblastic cells	13	19.7
Non-proliferating trophoblastic cells	12	18.2
Prolifering trophoblastic cells	8	12.1
Total	66	100.0
Placental tissues		
Irregular limits	38	51.3
Variably sized villi	50	67.5
Normotrophic villi	64	86.4
Fibrous, avascular, edematous connective axis	58	78.3
Total	74	100.0
Histopathology conclusions		
Inflammation with no signs of infection	38	37.8
No apparent causes	24	23.8
Genital infection	14	13.8
Suspected chromosomal abnormalities	14	13.8
Hydatiform moles	11	10.8
Total	101	100.0

4. Discussion

In our context, induced abortion was the most frequent form of abortion [10]. That observation could be due to the fact that spontaneous abortion may occur without medical intervention. It can go unnoticed whereas induced abortion oftentimes leads to a hospital visit to perform or complete it. The voluntary termination of pregnancy with a surgical evacuation of the womb was the main technique of induction as shown elsewhere [11] [12]. Indeed, published data from the United States of America and Europe point to the fact that half to 3/5 of all pregnancies is unplanned/unwanted [1] [3]. Those unplanned pregnancies are oftentimes resolved through induced abortions and are more likely to occur in advanced-age women as the desire to stop child bearing and limit the family size sets in [1] [3]. Some of the cases described in this study could also be a reflection on the poor quality of the female gametes produced at advanced age [13], especially in women who delayed parenthood for educational and/or carrier reasons [3]. These gametes after fertilization lead to unhealthy embryos that end up causing bleeding and/or uterine contraction despite being successfully implanted as shown by the decidual reaction and the Aria-Stella reaction in the uterine tissue analyzed during this study [8] [14]-[16]. It also highlights a trend in human reproduction in Côte d'Ivoire where women tend to postpone maternity for various reasons [10].

The quality of the sampling allowed for the complete examination of more than half of the cases. This provides the laboratory with an opportunity to assess the tissues with various techniques in order to decipher the underlying cause of the failed pregnancies [4]-[6] [9]. As expected, the overwhelming majority of the pregnancies took place in the uterine cavity [17] with only a limited number of embryos that failed to implant there as highlighted by the lack of uterine decidual reaction. The very few ectopic pregnancies were located in Fallopian tubes which is shown to be the main site of ectopic pregnancy in humans [9] [17]. They resulted in the rupture of those uterine tubes henceforth the hospital visit to clear them. With regard to the intra-uterine pregnancies, they were accompanied by an important inflammatory reaction in the absence of any genital infection. That reaction is expected early on during implantation, but it should recede as implantation is completed [18]. However, it seemed to persist beyond that in the cases analyzed in this study suggesting some maternal causes instead of issues with the implanted embryos [9] [13] [19].

The placentas in this study showed signs of dysmorphia in most cases indicating some issues with some implanted abnormal embryos [11] [14]-[16] [18]. Chromosomal abnormalities within the trophoblastic cells forming the placenta could be the underlying mechanism of the failure to form a proper mother to child interface required for the various exchanges between them [11] [13] [14] [18]. Those peculiar placenta formations usually lead to the embryo being cleared from the uterine cavity as the pregnancy goes on [11] [15]. Unfortunately in some cases, they could lead to a gestational trophoblastic disease [15] [16] [19]. The edema-

tous placental tissues recovered suggest that blood flow to the embryos might have been compromised during pregnancy resulting in embryonic death. The inflammatory endometrium that dominated the cases could also be a strong reaction to an abnormal placenta formation [11] [16] [19]. In some of the cases, the trophoblastic cells were even proliferating. Almost a quarter of the cases were suspected to be related to chromosomal abnormalities as expected with molar pregnancies [14]-[16].

In the current study, half of the embryonic tissues showed a dystrophic embryo with some signs of necrosis. Those signs were compatible with chromosomal and/or genetic defects of the embryos [20]. In a few cases, there were no embryonic tissue despite a well-established placental tissue suggesting a total molar pregnancy [4] [5] [8] [15] [16]. This highlights the need for complementary additional tests in order to look into the genetic background of the pregnant woman and her partner. Genital infections were seldom found in the participants removing bacterial infections as the main cause of miscarriage in our context.

5. Conclusion

In our context, induced abortion remained very frequent. However, POCs from those induced abortions are still rarely sent to the pathology laboratories for examination. The current study showed that there could be a good value to it. Indeed, it highlighted the fact that maternal causes such as endometrial inflammation were most likely responsible for the abortions. The inflammation involved very few cases of bacterial or viral infections.

Ethical Consideration

The study was approved by the laboratory management board. And as part of the routine practice of the Central Laboratory of Plateau in Abidjan, the patients are required to sign a consent form for the use of their samples for further analysis and research.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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