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A study of the Histopahological changes of the human placenta in women who have miscarried and are infected with toxoplasmosis in Al-Diwaniyah Governorate

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Abstract

Objective: The study was designed to determine the infection rate of Toxoplasma gondii in the human and histopathological changes of infected placenta in weman. A total of 50 placenta samples were collected from clinically aborted weman from different region of Dewania city for the histological detection of T. gondii infection. Placental samples were collected from women who had miscarriages at the Diwaniyah Maternity Hospital during June, July, and August 2025. Histological sections were taken from the placental tissue to identify pathological changes. Several pathological conditions were observed in the tissue, including necrosis and vascular congestion, compared to healthy tissue (control group).

Keyword: Histopathology study, Placenta, toxoplasmosis

Introduction:

Toxoplasmosis is an important zoonotic disease . This disease is caused by infection with the Toxoplasma parasite. Jundi This parasite infects humans and many other warm-blooded animals . (Aral, G. A., et.al , 2011). Cats and other members of the Felidae family are definitive hosts . The parasite goes through three stages, each capable of causing disease : the rapidly reproducing tachyzoites , the slowly reproducing bradyzoites that are found inside tissue cysts and egg cysts (oocysts) (A'aiz, N. , 2010). The infection can be transmitted to humans in several ways, including consuming food and water contaminated with the parasite's egg sacs, as well as contact with soil contaminated with the feces of infected cats . (Carruthers, B. & Yasuhiro S., 2007). Infection can also occur through the ingestion or contact with tissue cysts found in the tender or undercooked meat and tissues of intermediate hosts . (Darde, M.L., et.al ,2008). Infection can also occur as a result of drinking unpasteurized milk contaminated by rapidly reproducing animals . (Dubey, J. P.,S. M .Gennari., 2008). Another important route of transmission is through the placenta .

(Gagne, S. 2001).Studies conducted in Iraq indicate The increasing number of pregnant women experiencing miscarriages, in addition to observed cases of birth defects, necessitates further research into the parasite as a cause of miscarriage (Velmurugan, G.V. et.al, 2009) is a unique, short-lived, complex organ that regulates maternal-fetal interactions and the physiological activities of pregnancy. It also functions as the lungs, kidneys, intestines, and liver of the fetus . Its function as a complex tissue of immunological importance has received considerable attention in recent years (Barslow et al. 2001). The placenta is typically fully developed and functional by the end of the embryonic period and before the onset of gestation (Fox , 2002 ; Mader , 2004)

Materials and working methods:

Histological examination :

The tissue sections were prepared from the organs included in the study by following the steps described as follows (16):

1. Fixation. Samples were fixed immediately after dissection in formalin solution (10%), the appropriate time for fixation ranged between 24-48 hours.

2. Washing. Samples were washed after fixation with running water for half an hour to remove all fixative residues.

3. Dehydration. Removing the water completely from the tissue by transferring the samples to a series of gradually rising concentration ethyl alcohol using a tissue scroll device Histokinete, which are: 50%, 70%, 80%, 90%, 95% and 100% and twice for the last two concentrations for a period ranging from (1 to 2) hours for each Concentration.

4. Clearing. It is apply to remove the dehydrant agent from the specimens and replace it with solutions mixed with molten paraffin wax. Xylene was used and repeated twice for a period ranging from half an hour to an hour.

5. Infiltration. Place the samples in melted paraffin wax at a temperature of 56-58 °C and repeat it twice for a period of one to two hours in a convection oven at ranging temperature between 58-60 °C.

6. Embedding. The samples were transferred to molds of plastics containing melted paraffin at 56-58 °C. The samples were placed appropriately and the molds were left at room temperature to solidify and frozen until cutting time.

7-Sectioning: Samples were taken at (5) mm by using rotary microtome. Serial sections of the different regions of placenta were cut at (5) micron and stained by heamatoxlin and eosin .**8-Staining**: The sections were stained with following stains: Hematoxylin and Eosin to demonstrate the general component of tissue.

9-Mounting is the process of liver the samples on a clean glass slide then add the mountant (Canada balsam) and cover it with a clean cover with gentle pressure to get rid of air bubbles.

10-Drying is the last preparation steps during this process, evaporation of the solvent from the mountant. This is done by leaving the slide on a hot plat at laboratory temperature till drying.

11-Cleaning is the removal of excessive mountant from the cover slide and cleaning the slide itself by using (Xylen).

12-Labeling is done by putting small pasting paper on one end of the slide to write any information example: the type of the tissue, the stain used and the type of sectioning (longitudinal or transverse or oblique) or any other information the researcher need (Luna, 1968).

Results and discussion :

Normal group: The ordinary placental tissue is distinguished by extensive chorionic villi, a delicate but firmly attached villous membrane, an abundance of fetal capillaries, and an orderly maternal–fetal blood interface free of inflammation, necrosis, and cyst creation, according to a photograph of placenta tissue (Figuer,1).

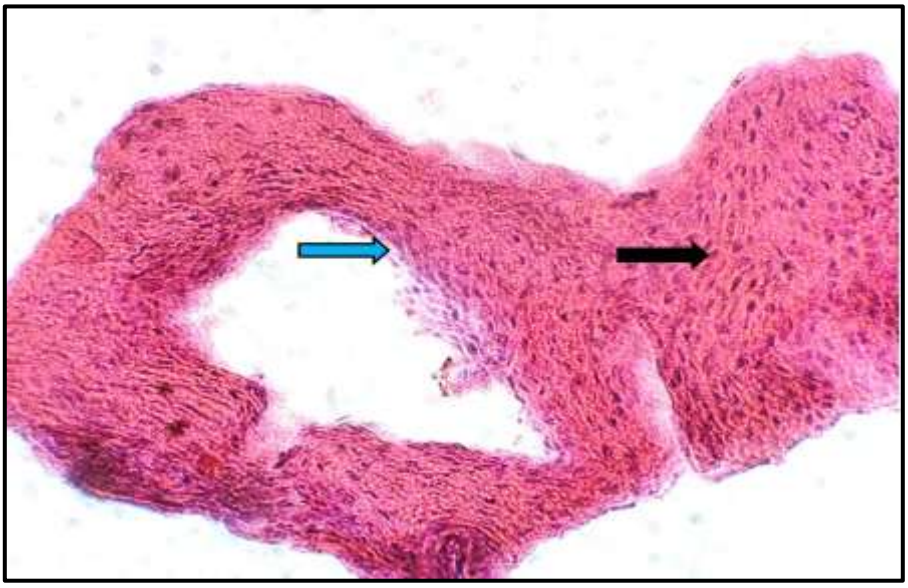

Figure 1: The ordinary placental tissue is distinguished by extensive chorionic villi, a delicate but firmly attached villous membrane, an abundance of fetal capillaries, and an orderly maternal–fetal blood interface free of inflammation, necrosis, and cyst creation, according to a photograph of placenta tissue (Normal group). H&E stain 100X.

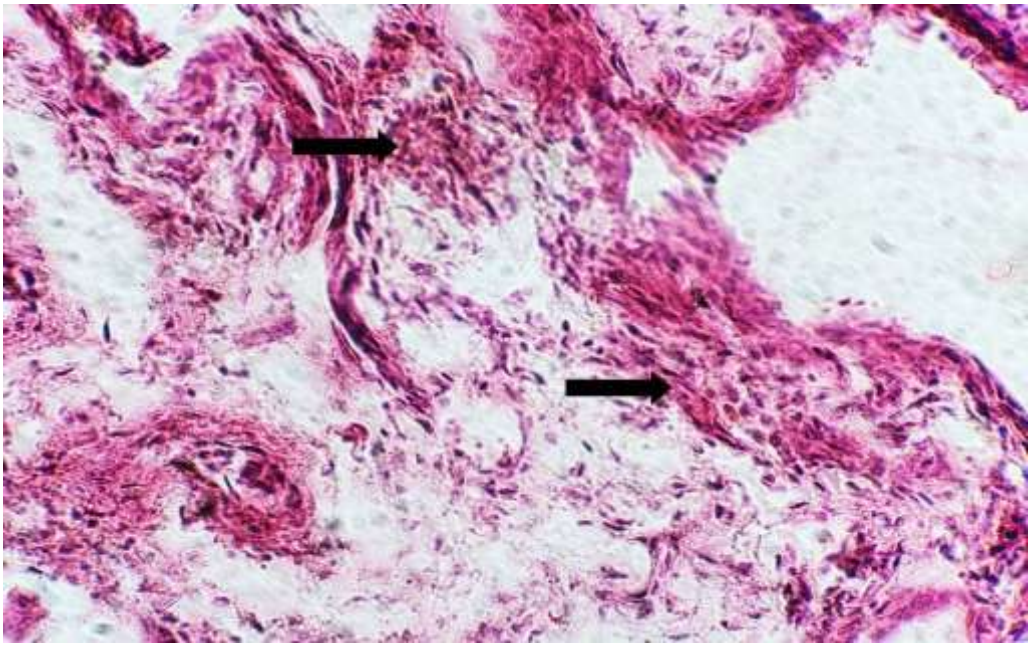

Figure 2: Photograph of placenta tissue (Positive group) show aggregation of inflammatory cells with some of congested area. fibrinoid deposition or necrosis in placental stroma (black arrows). H&E stain.400X.

This result was consistent with the study (Saafa Ressan. Et.al , 2023) which indicates that indicated presence Toxoplasma gondii within epithelial cells of placenta with presence of spaces of necrotic epithelial in affected area.(Hematoxylin).

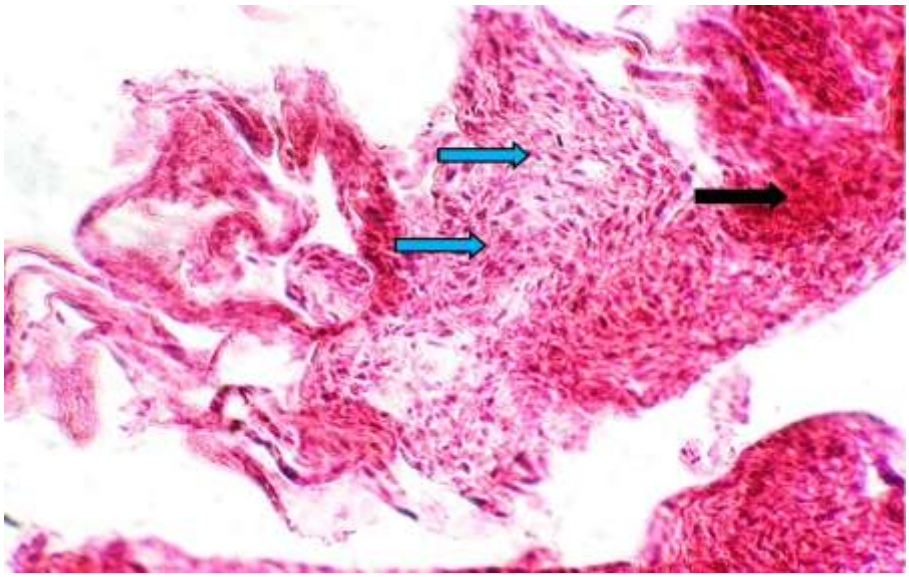

Figure 3: The villi seems irregular and slightly collapsed in the placenta tissue photograph (positive group). There are darker basophilic nuclei scattered throughout the tissue, along with inflammatory cell infiltration (blue arrow) and degenerative changes in certain areas of the villous tissue (black arrow), which are caused by cell damage that results in the formation of vacuoles. H&E stain. 400X.

This result was consistent with the study (Blotta, et. Al , 2006) which indicates that infection at the maternal blood-syncytiotrophoblast interface is possible but requires overcoming the syncytial barrier. Human placental villitis associated with multiple pathogens (including T. gondii) induces syncytial expression of ICAM-1 and monocyte binding to the syncytial surface with inflammatory syncytial damage.

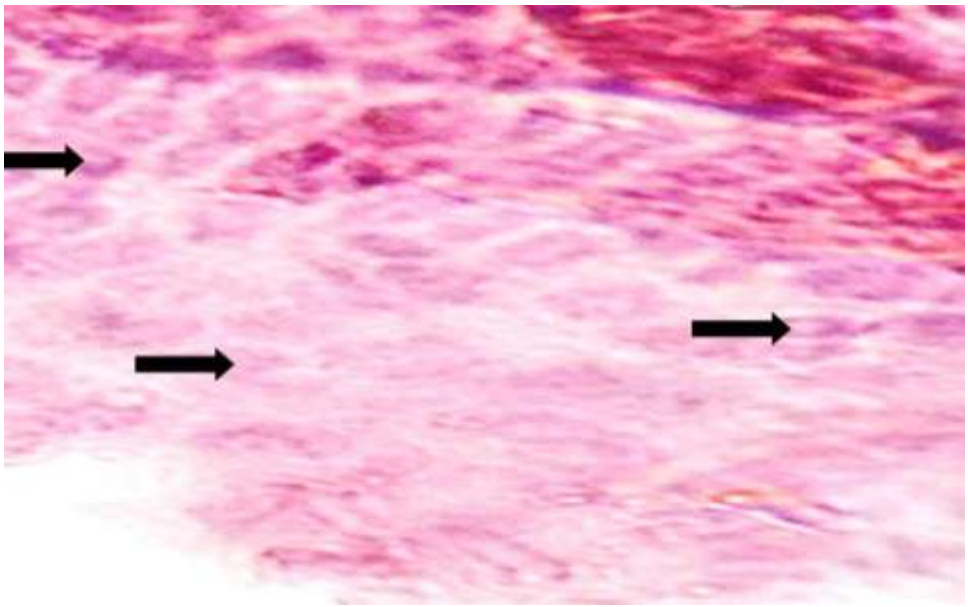

Figure 4 : Photographs of placenta tissue (positive group) reveal actual Toxoplasma tissue cysts in the placenta. These oval-shaped tissue cysts contain bradyzoites, which are occasionally visible under a microscope (black arrows). stain with H&E stain.400 X.

This result was consistent with the study (Shahad K. et.al . (2023)) which indicates that shows the presence of tissue cysts during microscopic examination in the tissues of the placenta of aborted women stained with Giemsa at 100x magnification.

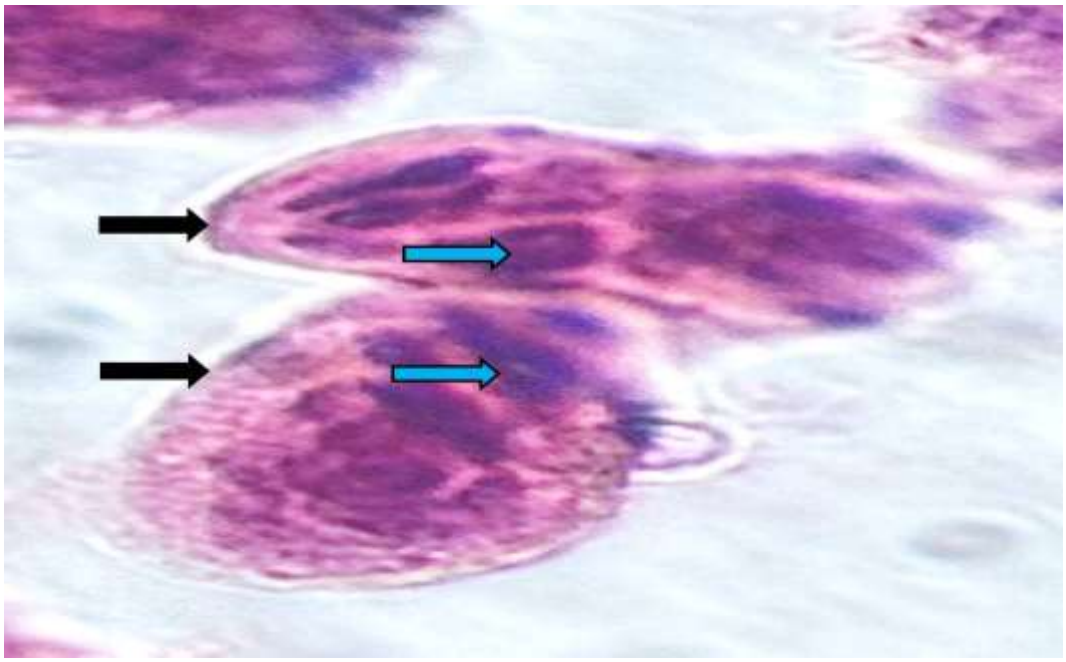

Figure 5: Bradyzoites stain purple (blue arrows) and large cysts appear as rectangular or oval structures encircled by a thin, eosinophilic cyst wall (black arrow) in placenta tissue photos (positive group). H&E stain.1000X.

This result was consistent with the study (Wayne G. Elliott, M. 2000) which confirmed that Toxoplasma organisms are further shown in various free and encysted forms within the advancing syncytiotrophoblast and villus stroma of the placenta. The significant variations in the inflammatory lesions are believed to depend largely upon the degree of parasitemia.

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