NON INVASIVE IMAGING OF THE GESTATIONAL TROPHOBLASTIC DISEASE

Essay

Submitted for the partial fulfillment of
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By

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Germeen Joseuph Matta

List of Contents

List of Tables

Title Page No.

List of Figures

Title Page No.

INTRODUCTION

Gestational trophoblastic disease (GTD) is a term that includes several conditions which are associated with the result of abnormal pregnancy. These conditions are molar pregnancy, invasive mole, metastatic mole and gestational choriocarcinoma ***(Ashfag, ٢٠٠٤).***

Gestational trophoblastic disease (GTD) is actually a group of diseases, derived from trophoblast the cells that surround the embryo during gestation. The trophoblasts- of which there are three, cytotrophoblast, syncytiotrophoblast, and intermediate trophoblast contribute to the substance of the placenta. The most common type of GTD is hydatidiform mole, and the resulting pregnancy is called a molar pregnancy ***(Ashfag, ٢٠٠٤).***

Investigation in the first trimester of pregnancy gives the early detection of Gestational trophoblastic disease. An elevated serum human chorionic gonadotrophin value reliably suggests the presence of Gestational trophoblastic disease ***(Kaori , ١٩٩٨).***

The greatest diagnostic accuracy can be obtained from the characteristic ultrasonographic picture of the Gestational trophoblastic disease. The safety and precession of the transvaginal ultrasound and

transabdominal ultrasound make it the technique of choice ***(Hricak, ٢٠٠٤).***

Doppler ultrasound facilitates the diagnosis of Gestational trophoblastic disease because the tumor is highly vascular ***(Taylor et al., ١٩٨٧).***

CT imaging is the study of choice in staging extrapelvic metastasis ***(Pritchard et al., ١٩٩٧).***

MRI is useful for assessing the primary uterine lesion and residual abnormalities in patients with persistently elevated serum HCG levels or an enlarged uterus ***(Pritchard et al., ١٩٩٧).*** MRI is reported to provide several advantages over other imaging techniques in identifying the site of the invasive disease and distant metastasis ***(Hricak et al., ٢٠٠١).***

AIM OF WORK

The aim of our study is to emphasize the diagnostic value of the different imaging modalities as non invasive methods in diagnosis and differentiation of gestational trophoblastic disease.

ANATOMICAL CONSIDERATIONS OF PLACENTA AND UTEROPLACENTAL CIRCULATION

Throughout gestation, the mammalian embryo is a parasite that survives "at the pleasure" of its mother. Early in gestation, the embryo is small and has correspondingly small requirements for nutrients and for waste disposal systems. It subsists by taking up endometrial secretions and dumping its metabolic wastes into the lumen of the uterus. This situation changes rapidly. As the embryo grows and develops a vascular system, it must establish a much more efficient means of obtaining nutrients and eliminating waste products, and does so by establishing an efficient interface between its vascular system and that of its mother. That interface is the placenta ***(Freese, ٢٠٠١).***

Implantation or Embedding of the Ovum: Fertilization of the ovum occurs in the lateral or ampullary end of the uterine tube and is immediately followed by segmentation. On reaching the cavity of the uterus the segmented ovum adheres to the uterine mucous membrane, destroys the epithelium over the area of contact, and excavates for itself a cavity in the mucous membrane in which it becomes imbedded. In the ovum, the point of entrance is visible as a small gap closed by a mass of fibrin and leucocytes, the

narrow stalk of which plugged the aperture in the mucous membrane (fig.١). Soon, however, all trace of the opening is lost and the ovum is then completely surrounded by the uterine mucous membrane ***(Gray and Warren, ٢٠٠٠).***

The structure actively concerned in the process of excavation is the trophoblast of the ovum, which possesses the power of dissolving and absorbing the uterine tissues. The trophoblast proliferates rapidly and forms a network of branching processes which cover the entire ovum and invade and destroy the maternal tissues and open into the maternal blood vessels, with the result that the spaces in the trophoblastic network are filled with maternal blood; these spaces communicate freely with one another and become greatly distended and form the intervillous space ***(Gray and Warren , ٢٠٠٠).***

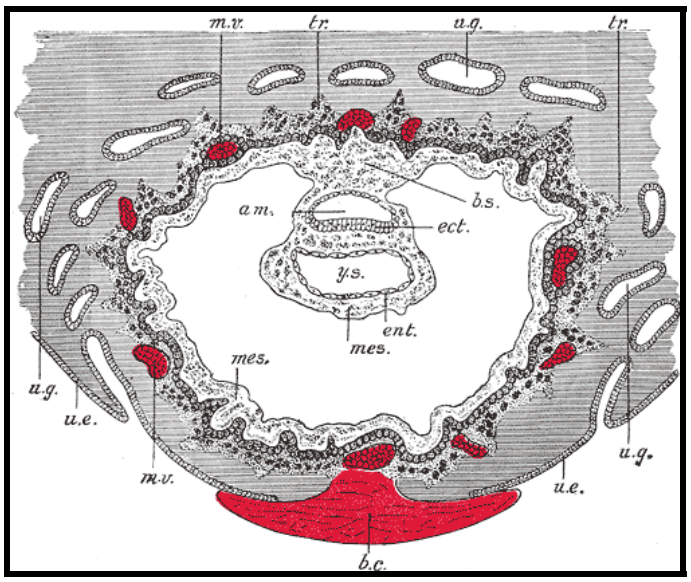

Fig. ١– Section through ovum embedded in the uterine decidua. *am.* Amniotic cavity. *b.c.* Blood-clot. *b.s.* Body-stalk. *ect.* Embryonic ectoderm. *ent.* Entoderm. *mes.* Mesoderm. *m.v.* Maternal vessels. *tr.* Trophoblast. *u.e.* Uterine epithelium. *u.g.* Uterine glands. *y.s.* Yolk-sac. ***(Gray and Warren , ٢٠٠٠)***

The Decidua: Before the fertilized ovum reaches the uterus, the mucous membrane of the body of the uterus undergoes important changes and is then known as the decidua. The thickness and vascularity of the mucous membrane are greatly increased; its glands are elongated and open on its free surface by funnel-shaped orifices, while their deeper portions are tortuous and dilated into irregular spaces. The interglandular tissue is also increased in quantity, and is crowded with large round, oval, or polygonal cells, termed decidual cells. These changes are well advanced by the second month of pregnancy, when the

mucous membrane consists of the following strata (Fig. ٢): (١) stratum compactum, next to the free surface; in this the uterine glands are only slightly expanded, and are lined by columnar cells; (٢) stratum spongiosum, in which the gland tubes are greatly dilated and very tortuous, and are ultimately separated from one another by only a small amount of interglandular tissue, while their lining cells are flattened or cubical; (٣) a thin unaltered or boundary layer, next to the uterine muscular fibers, containing the deepest parts of the uterine glands, which are not dilated, and are lined with columnar epithelium; it is from this epithelium that the epithelial lining of the uterus is regenerated after pregnancy. Distinctive names are applied to different portions of the decidua. The part which covers the ovum is named the decidua capsularis; the portion which intervenes between the ovum and the uterine wall is named the decidua basalis or decidua placentalis; it is here that the placenta is subsequently developed. The part of the decidua which lines the remainder of the body of the uterus is known as the decidua vera or decidua parietalis ***(Gray and Warren, ٢٠٠٠)***.

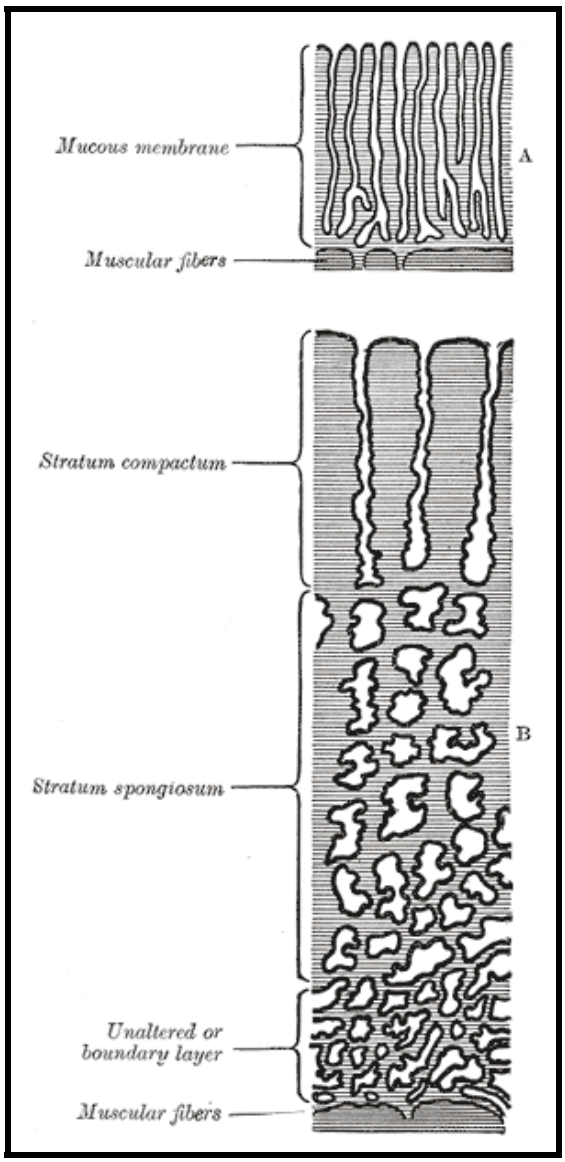

Fig ٢: Diagrammatic sections of the uterine mucous membrane: *A.* The non-pregnant uterus. *B.* The pregnant uterus, showing the thickened mucous membrane and the altered condition of the uterine glands ***(Gray and Warren , ٢٠٠٠)***

Coincidently with the growth of the embryo, the decidua capsularis is thinned and extended (Fig. ٣) and the space between it and the decidua vera is gradually obliterated, so that by the third month of pregnancy the two are in contact. By the fifth month of pregnancy the decidua capsularis has practically disappeared, while during the succeeding months the decidua vera also undergoes atrophy, owing to the increased pressure. The glands of the stratum compactum are obliterated, and their epithelium is lost. In the stratum spongiosum the glands are compressed and appear as slit-like fissures, while their epithelium undergoes degeneration. In the unaltered or boundary layer, however, the glandular epithelium retains a columnar or cubical form ***(Gray and Warren, ٢٠٠٠)***.

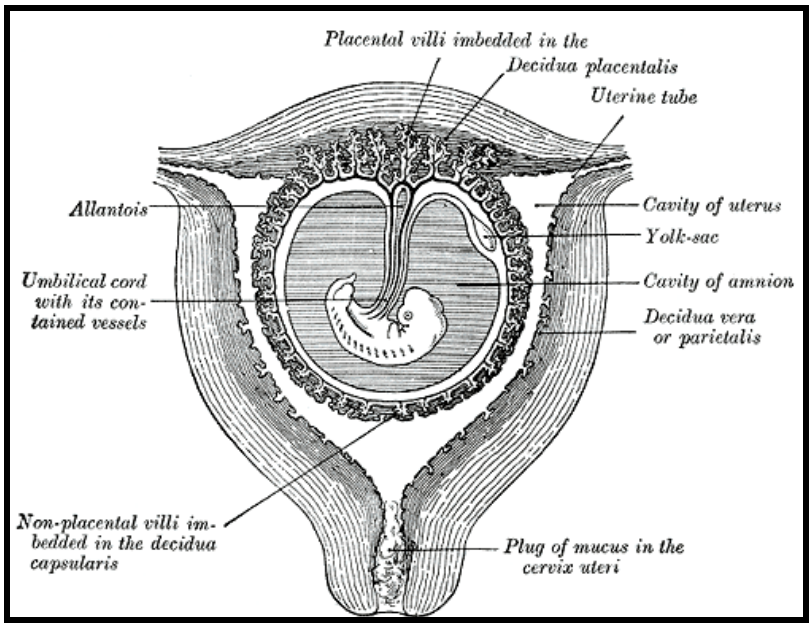

Fig ٣: Sectional plane of the gravid uterus in the third and fourth months ***(Gray and Warren , ٢٠٠٠).***