

Original articles

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Angiogenesis: a new diagnostic aspect of obstetric and gynecologic echography

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1 Introduction

The color flow imaging (CFI), a Doppler technique well known by the cardiologists from more than ten years, is one of the newest diagnostic tools in the gynecologist's equipment. This technique has been well described elsewhere [12] and it could be compared to the angiography. Indeed, we can consider ultrasounds as the Xrays and red blood cells as the contrast mean. This consideration explains the reliability of this technique in the detection and in the depiction of every moving fluid. In addition, the possibility to associate the color flow imaging to the pulsed Doppler allows the study of every haemodynamic variation from both the velocimetric and the depicting point of view. There is no doubt that the obstetric and gynecological practice has been enriched by the use of the color flow imaging and, recently, many reports have been presented about this issue [8, 9, 10, 14, 31, 32, 46]. Most of these papers are very enthusiastic about the precision of this technique in detecting blood flow velocity waveforms from vessels in normal and abnormal tissues and indicate new field of research for the color Doppler. One of the most intriguing fields is the study of angiogenesis. This term was firstly coined in 1935 to express the process of generating new capillary blood vessels which leads to neovascularization and it was first described in human placenta [20]. Neovascularization occurs during embryonic development and during sev-

eral physiologic and pathologic conditions in adult life. For example, folliculogenesis and luteogenesis could not take place without angiogenesis. Furthermore, angiogenesis can be monthly observed in normal menstruating endometrium [1, 2, 3, 6, 7]. With regards to pathologic conditions, neovascularization is associated with chronic inflammation, with certain immun reactions and with cancer [4, 5, 13, 19, 20, 26]. Nevertheless, there is a fundamental difference between benign and malignant angiogenesis. In the former condition this process is self-limiting, while, in the latter no self-limitation is observed, since, once tumoral angiogenesis begins, it continues until the tumor is removed. Thorough studies on angiogenesis have been performed by Folkman and colleagues [19, 20, 21]. This author, in 1972, stated that "once tumor take has occurred, every increase in tumor cell population must be preceded by an increase in new capillaries that converge upon the tumor [20]. Of course, the possibility of studying neovascularization by means of ultrasounds fascinated the gynecologists and introduction of color flow imaging in the obstetric and gynecologic practice has immediately emphasized this attitude.

The aim of this study was to review our experience over the last two years in the study of pelvic haemodynamics and angiogenesis in normal and abnormal gynecologic conditions, using color flow imaging and Doppler ultrasound technology.