MRI with Susceptibility Weighted Image (SWI) In Preoperative Evaluation Of Patients With Suspected Pelvic Endometriosis

Thesis

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List of Abbreviations

Abb.	Meaning
2D	Two-dimensional
3D	Three-dimensional
AD	Alzheimer's disease
DIE	Deep infiltrating endometriosis.
DPE	deep pelvic endometriosis
DWI	Diffusion-weighted imaging
ESUR	European Society of Urogenital Radiology
FOV	Field of view
GPP	Good practice point
GRE	Gradient echo
HASTE	Half-Fourier acquisition single shot turbo-spinecho
HD	Huntington's disease
IM	Inttramuscular
IV	Intravenous
LE	Level of evidence
MIP	Maximum intensity projection (MIP)
MRA	MR angiography
MRI	Magnetic resonance imaging
PD	Parkinson's disease
ROS	Reactive oxygen species.
SC	Subcutaneous
SNR	Signal-to-noise ratio
SWI	Susceptibility weighted image
T	Tesla
T1W	T1-weighted
T2W	T2-weighted
TE	Time to echo
TVS	Transvaginal sonography
US	Ultrasound
USL	Uterosacral ligament.

ABSTRACT

Purpose of this study is to highlight the role of MRI with SWI in preoperative evaluation of suspected cases with pelvic endometriosis.

Methods: 28 patients were included in our study. All patients had US finding of cystic adnexal lesions with internal low levels of internal echoes.

Results: Our study demonstrated that MRI with SWI is a significant promising tool factor for pelvic endometriosis detection (ovarian and extra ovarian lesions) with high sensitivity, specificity and accuracy.

Conclusion: SWI imaging with its high sensitivity to blood products, contributes to the diagnosis of pelvic endometriosis by depicting different phases of hemorrhage. Another advantage of SWI is the ability to differentiate between blood products and calcification which provides additional value to improve diagnostic ability of pelvic MRI.

Key words:

MRI SWI, DPE, EOE.

INTRODUCTION

Endometriosis is a chronic gynecologic disorder that is characterized by the presence of ectopic endometrial tissue outside the uterine cavity primarily as implants in the peritoneal and ovarian tissue ***(Bulun, 2009).***

Deep infiltrating endometriosis, which is manifested as invasive tissue that infiltrate the adjacent structure at a depth more than 5 cm, from the peritoneal surface is associated with fibrosis and muscular hyperplasia. Ovarian lesions are characterized by cysts and hemorrhagic contents ***(Bulun, 2009).***

There is different theories implicated in the pathogenesis of endometriosis indicating that the aetiology of endometriosis is complex and multifactorial, involving hormonal, genetic, immune, and environmental components including retrograde menstruation, metaplasia, hormones, oxidative stress and inflammation, immune dysfunction, apoptosis suppression, genetic, stem cells and alteration of endometrial cell fate. While retrograde menstruation may be one of the initiating steps in the pathogenesis of superficial endometriosis, genetic and micro environmental factors that prevent clearance of ectopic lesions and allows remodelling of peritoneum are essential for the propagation of endometriotic lesions ***(Sourial, 2014)***.

Endometriosis may cause symptoms including chronic pelvic pain and infertility, and increases susceptibility to the development of ovarian cancer ***(Kobayashi et al., 2008).*** Other symptoms like Secondary dysmenorrhea, deep dyspareunia, sacral back ache with menses ***(Chapron et al., 2002).*** The extent of the pain is influenced primarily by the location and depth of the endometriotic implant, with deep implants in highly innervated areas most consistently associated with pain ***(Olive et al., 2001).***

Other common manifestation include pre menstrual diarrhea, cramping and dichasia, dysuria and haematuria are the most common and relevant clinical manifestation ***(Chapron et al., 2002).***

A definitive diagnosis of endometriosis is based on histologic confirmation of surgically resected lesions containing endometrial glands and stroma, with various amount of inflammation and fibrosis. A presumptive diagnosis of deeply infiltrating endometriosis may be developed on the basis of imaging by transvaginal ultrasonography (TVUS) and magnetic resonance imaging (MRI), for many years laparotomy, and laparoscopy were the only means of access to pelvic endometriotic lesions ***(Chapron et al., 2002).***

MR imaging provide comprehensive depiction of deeply infiltrating endometrial lesions in pelvic and sub peritoneal areas that are not easily accessible laparoscopically and the old

haemorrhagic contents that characterize the endometriosis giving its large field of view, multiplanner capabilities, and outstanding contrast resolution ***(Bazot et al., 2009).***

Magnetic resonance imaging has the advantage of non use of ionizing radiation which is an important consideration in women of reproductive age, less invasive than laparoscopy and less observer dependent than the classic imaging techniques as US. Furthermore, recent advances in MR imaging with phased-array coil have created further imaging possibilities resulting in excellent spatial and tissue contrast resolution and relatively fast techniques ***(Ezzat et al., 2014).***

SWI has been used in imaging of central nervous system and recently in body imaging, too. SWI combines magnitude and phase information from fully velocity compensated gradient-echo sequence, and visualizes the susceptibility effects caused by local in homogeneity of the magnetic field as signal voids. SWI is more sensitive to the susceptibility difference between tissues than is conventional T2*WI., SWI has exquisite sensitivity to the blood products such as hemosiderin and deoxyhemoglobin, and may contribute to the diagnosis of various gynecologic pathologies with fresh or obsolete hemorrhage ***(Takaeuch et al., 2009)***.

The ovaries are frequently involved and subsequent cystic mass is formed as endometrioma. MRI can diagnose endometrioma with high accuracy due to its high sensitivity to