



The role of Magnetic resonance imaging in evaluation of leiomyoma after uterine artery embolization

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ"

صَدَقَ اللَّهُ الْعَظِيمَ

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List of Abbreviations

Abb.	Meaning
CT	: Computed Tomography
DCE	: Dynamic Contrast Enhancement
DWI	: Diffusion Weighted Imaging
Gd	: Gadolinium
GRE	: Gradient Echo
HIFU	: High Intensity Focused Ultrasound
IM	: Intra Muscular
IV	: Intra Venous
MRA	: Magnetic Resonance Angiography
MRgFUS	: Magnetic Resonance-guided Focused Ultrasound Surgery
MRI	: Magnetic Resonance Imaging
PID	: Pelvic Inflammatory Disease
PVA	: Polyvinyl Alcohol
SD	: Standard Deviation
T1WI	: T1 Weighted Imaging
T2WI	: T2 Weighted Imaging
UAE	: Uterine Artery Embolization
US	: Ultrasound

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Abstract

Background: Uterine fibroids are the most common benign tumours in women and accounts for the majority of hysterectomies in the world. MR imaging performed before and after uterine artery embolization is the best imaging modality to diagnose, map, and characterize fibroids.

Aim of the Work: to emphasize the utility of MR imaging in the post-procedural assessment for uterine leiomyomas patients who underwent uterine artery embolization.

Patients and Methods: A retrospective study was carried out on 15 patients who underwent MRI scan as a six-month follow up after uterine artery embolization for treating uterine fibroids during the period from October 2018 to March 2019.

Results: The mean uterine volume was significantly reduced by 61% (P value 0.015), the mean dominant fibroids volume significantly reduced by 79% (P value 0.004) and the dominant fibroids showed significant lack of enhancement 100% (P value <0.001) that indicted treatment success and in assessing the outcomes and complications as only 1(6.7%) patient detected with pyometra (uterine infection). In this study we noted significant improvement of bleeding in 69.2% and of pain in 11.1% with slight improvement of pressure symptoms in 66.7%.

Conclusion: 6-month follow up MRI has an important role in evaluation of UAE success through uterine and dominant fibroid volume reduction and lack of enhancement, and evaluation of the outcomes and complications including fibroid regrowth, fibroid change site, pyometra and uterine necrosis.

Key words: MRI, uterine leiomyomas, uterine artery embolization

Introduction

Uterine fibroids or leiomyomas are the most prevalent benign uterine tumors with an incidence rate of 20%–40% during women reproductive life (*Khan et al., 2014*).

Management of symptomatic uterine fibroids have been traditionally including different treatments ranging from medical treatment up to invasive hysterectomy (*Vilos et al., 2015*).

When the medical treatment give unsatisfying results in patients with symptomatic uterine fibroids; hysterectomy are used to be an option, which is an invasive procedure that is coupled with significant morbidities, 10-15% complication rates as well as lengthy hospital stay and prolonged recovery time (*Westcott, 2015*).

Laparoscopic and hysteroscopic myomectomy appear as a useful option for women who have not already completed having children or those who wish to retain their uterus and their fertility, but the inoperability of multiple fibroids and high recurrence rate for the operable ones that will require additional surgical intervention make it unfeasible in all cases (*Pritts et al., 2015*).

Uterine artery embolization (UAE) is a minimally invasive alternative option for management of symptomatic leiomyomas (*Liang et al., 2012*).

It was first reported as an effective uterine bleeding treatment option in 1995 and then it has been proven to be an efficacious and safe method with a relatively high success rate in minimizing pain, bulk symptoms and bleeding linked to uterine fibroids. UAE is increasingly being preferred over surgical hysterectomy or myomectomy due to reduced morbidity, shorter hospitalization, and relative uterine preservation when compared to surgical resolution (*Maciel et al., 2016*).

Leiomyomas are hyper vascular benign lesions with large vessels supplying higher vascular flow relative to the normal myometrial vasculature. This permits preferential targeting and occlusion of end arterial branches that perfuse leiomyomas during the delivery of the particulate embolization agent used during UAE. Embolization of these end arterial branches ultimately results in infarction, coagulative necrosis, and eventual shrinkage of the targeted leiomyomas (*Siddiqui et al., 2013*).

Magnetic resonance imaging (MRI) is the preferable modality over transvaginal ultrasound in the pre- and post-procedural evaluation for UAE due to its higher accuracy in

assessing site and size of uterine leiomyomas (*Lopes& Margarida, 2017*).

Moreover, MRI is more sensitive than ultrasound in diagnosing and excluding further causes of pelvic pain like adenomyosis or endometriosis. (*Siddiqui et al., 2013*).

MRI plays an important role in post-procedural follow up for treatment response assessment, failure or recurrence, and detection for any procedural complication(*Verma et al., 2010*).

Aim Of The Study

The aim of this study is to emphasize the utility of MR imaging in the post-procedural assessment for uterine leiomyomas patients who underwent uterine artery embolization (UAE).

Review of literature

Radiological anatomy of the uterus

The uterus is located between the urinary bladder anteriorly and the rectum posteriorly. The average dimensions of the uterus in an adult female are 8 cm length, 5 cm width, and 4 cm thickness. The uterine cavity has an average volume of 80 ml to 200 ml. *(The, 2015).*

T1-weighted images show poor contrast distinction between the endometrium and myometrium. While the T2 weighted images show the normal anatomy of the uterus through a trilaminar appearance *(Graziottin & Gambini, 2015).*

The central endometrium has high signal intensity secondary to mucinous rich endometrial glands and stroma. It varies in thickness with the menstrual cycle and menopausal status as it may measure up to 14 mm during the secretory phase in menstruating women but it gets thinning during the follicular phase *(Fig.2.1., 2.2.), (Chui et al., 2017).*