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Original Research Article

## MR imaging evaluation for the assessment of pelvic organ prolapse: a newer technique

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### ABSTRACT

**Background:** MRI is the newest technique used to evaluate patients with pelvic floor disorders. It allows relatively non-invasive, dynamic evaluation of all pelvic organs in multiple planes and can directly visualize the muscular and ligamentous pelvic floor support structures. Using MRI to evaluate pelvic floor disorders may be most helpful in patients with multicompartiment findings or symptoms, posterior compartment abnormalities, severe prolapse, or recurrent pelvic floor symptoms after prior surgical repair. MRI is often able to reveal more extensive organ prolapse than physical examination alone.

**Methods:** The present study was carried out in the Department of Radiodiagnosis and Obstetrics and Gynecology of Mahatma Gandhi Memorial Medical College and M.Y. Hospital, Indore, Madhya Pradesh from November 2014 to October 2015. A total of 43 patients who had symptoms of pelvic floor dysfunction like uterine prolapse, urinary or rectal dysfunction were evaluated by high resolution USG. Patients with low lying uterus on USG were subjected to MRI. Before MRI, these patients were assessed by a Gynecologist, and a clinical diagnosis in form of the organ/organs prolapsed and the grade of individual prolapse was assigned and tabled in the prefixed format.

**Results:** Prolapse is more common in patients with greater than 50 years age (63% patients). MRI picked up more lesions compared to clinical examination, 90% as compared to 82.5% on clinical examination. MRI has good correlation with surgery in diagnosing prolapse. Concomitant prolapse of the Anterior and Middle compartment is the most common clinical entity diagnosed on 52.5% patients in our set up. MRI has poor sensitivity in identifying posterior compartment prolapse. There is good agreement between the clinical grading and MRI grading (81.8% correlation).

**Conclusions:** T MRI offers a novel approach of simultaneous imaging of all compartments of the female pelvis at a single setting. With lesser intraobserver variation and better visualization of the pelvic anatomy MRI would help in accurate staging and hence better outcomes in patients in terms of symptom relief.

**Keywords:** MRI, POPQ, Prolapse

### INTRODUCTION

Pelvic organ prolapse (POP), the herniation of the pelvic organs to or beyond the vaginal walls, occurs in up to 50

percent of parous women and causes a variety of pelvic, urinary, bowel, and sexual symptoms.<sup>1</sup> Historically, the severity of prolapse was graded using a variety of imprecise classification systems that were not easily

reproduced or communicated in a standard way among clinicians.<sup>2</sup> The Pelvic Organ Prolapse Quantitation system (POPQ), introduced in 1996, has become the standard classification system.<sup>3</sup> The POPQ system involves quantitative measurements of various points representing anterior, apical, and posterior vaginal prolapse to create a "topographic" map of the vagina. These anatomic points can then be used to determine the stage of the prolapse. Weakening of the female pelvic floor is a prevalent and debilitating disorder, affecting females of all parts of the world, across ethnicity and socioeconomic strata. Women have a lifetime risk of 11.1% for undergoing single operation for prolapse and incontinence. re-operations are common in up to 25% of the cases.<sup>4</sup> Risk factors include old age, multi-parity, complicated vaginal deliveries, obesity, collagen-related disorders, hysterectomy, menopause and injury to the pelvic floor during childbirth. Baden-Walker Halfway Scoring System and the POP-Q system are the most commonly used staging systems. Pelvic findings involving the ovaries, uterus and adnexa are missed on clinical examination but are easily visualized on imaging. With the advent of USG, imaging of the pelvis is easier. However, the complex anatomy of the pelvis is not well visualized on USG due to its location within the bony vault. MRI is the newest technique used to evaluate patients with pelvic floor disorders. There are several advantages of MRI as it allows relatively non-invasive, dynamic evaluation of all pelvic organs in multiple planes with high soft-tissue. and temporal resolution without the use of ionizing radiation. In addition, MRI can directly visualize the muscular and ligamentous pelvic floor support structures. Using MRI to evaluate pelvic floor disorders may be most helpful in patients with multicompartiment physical examination findings or symptoms, posterior compartment abnormalities, severe prolapse, or recurrent pelvic floor symptoms after prior surgical repair. Several studies have shown that MRI is a useful method for diagnosing and staging pelvic organ prolapse, with detection rates similar to fluoroscopic techniques, and that MRI is often able to reveal more extensive organ prolapse than physical examination alone.

**METHODS**

The present study was carried out in the Department of Radiodiagnosis and SRL Diagnostic Centre of Mahatma Gandhi Memorial Medical College and M.Y. Hospital, Indore, Madhya Pradesh from November 2014 to October 2015. A total of 43 patients who had symptoms of pelvic floor dysfunction like uterine prolapse, urinary or rectal dysfunction were evaluated by high resolution ultrasonography. Patients with low lying uterus on sonography were subjected to MRI for further evaluation after taking written consent of the patients. Before MRI, these patients were assessed by a Gynecologist, and a clinical diagnosis in form of the organ/organs prolapsed and the grade of individual prolapse was assigned and tabled in the prefixed format.

**Inclusion criteria**

Multiparous women at least 2 years postpartum, Suspicion of pelvic floor dysfunction, History of vaginal delivery.

**Exclusion criteria**

Patients with contraindications to MRI like metallic implants, pacemakers, cochlear implants, vascular coils and dentures, Women with history of pelvic trauma.

**RESULTS**

The present study was undertaken to evaluate the role of non-contrast MRI in the evaluation of pelvic floor prolapse.

**Table 1: Age distribution.**

| Age   | No. of patients | Percentage of total |
|-------|-----------------|---------------------|
| <30   | 2               | 5                   |
| 30-40 | 4               | 10                  |
| 40-50 | 9               | 22.5                |
| 50-60 | 11              | 27.5                |
| >60   | 14              | 35                  |

Prolapse is more common with increasing age, 63% of the patients were greater than 50 years of age. More than 80 percent had a history of 3 or more child birth.

**Table 2: Vaginal deliveries.**

| No. of vaginal deliveries | No. of patients | Percentage of total |
|---------------------------|-----------------|---------------------|
| <2                        | 5               | 12.5                |
| 3                         | 11              | 27.5                |
| 4                         | 14              | 35                  |
| 5                         | 7               | 17.5                |
| >5                        | 3               | 7.5                 |

History of 'something coming out of the Vagina' was the most common (80%) symptom.

**Table 3: Presenting features.**

| Chief complaints               | No. of patients |
|--------------------------------|-----------------|
| Something coming out of vagina | 32              |
| Vaginal discharge              | 24              |
| Burning micturition            | 8               |
| Low Back pain                  | 12              |
| Rectal incontinence            | 1               |
| Pelvic heaviness/mass inside   | 14              |

MRI picked up 90% lesions as compared to 82.5% on clinical examination. MRI has good correlation with surgery in diagnosing prolapse.

**Table 4: Clinical grading.**

| Clinical Grading | Anterior Compartment | Middle Compartment | Posterior Compartment |
|------------------|----------------------|--------------------|-----------------------|
|                  | No. of patients      | No. of patients    | No. of patients       |
| Stage 0          | 17                   | 12                 | 36                    |
| Stage I          | 3                    | 0                  | 0                     |
| Stage II         | 6                    | 10                 | 3                     |
| Stage III        | 11                   | 14                 | 1                     |
| Stage IV         | 3                    | 4                  | 0                     |
| Total            | 40                   | 40                 | 40                    |

**Table 5: Diagnostic efficacy of clinical versus MRI.**

| Clinical Grading    | Anterior compartment |                      | Middle compartment |                      | Posterior compartment |                      |
|---------------------|----------------------|----------------------|--------------------|----------------------|-----------------------|----------------------|
|                     | MRI                  | Clinical examination | MRI                | Clinical examination | MRI                   | Clinical examination |
| Sensitivity         | 90.6%                | 70.9%                | 85.7%              | 77.7%                | 62.5%                 | 50%                  |
| Specificity         | 100%                 | 88.9%                | 100%               | 100%                 | 100%                  | 100%                 |
| PPV                 | 100%                 | 95.6%                | 100%               | 100%                 | 100%                  | 100%                 |
| NPV                 | 72.7%                | 47%                  | 50%                | 33.3%                | 91.4%                 | 88.9%                |
| Diagnostic Accuracy | 92.5%                | 75%                  | 87.5%              | 80%                  | 92.5%                 | 90%                  |

Diagnostic accuracy of approx. 90%. Down sloping of pelvic floor on MRI is an important ancillary finding to diagnose pelvic floor weakness, was seen in 77.5% patients. Concomitant prolapse of the Anterior and Middle compartment is the most common clinical entity diagnosed on MRI in our set up (52.5% of cases). Also, MRI was found to be more sensitive and more specific with better diagnostic accuracy in prolapsed involving any compartment. Overall Correlation b/w Clinical Grading vs MRI Grading =81.8%. A change of grade was observed in 18.2 % patients. In maximum cases shifting was of single stage.

**Table 6: Clinical versus mri diagnosis and correlation.**

|                  | Clinical diagnosis | MRI diagnosis   |
|------------------|--------------------|-----------------|
|                  | No. of patients    | No. of patients |
| Cystocele        | 23                 | 29              |
| Uterine Prolapse | 28                 | 30              |
| Enterocoele      | -                  | 1               |
| Rectocele        | 4                  | 5               |

**DISCUSSION**

Pelvic floor dysfunction, severe enough to result in surgical repair, affects 11 % of women and is anticipated to increase in prevalence with our aging population.<sup>5</sup> Thorough assessment of pelvic floor weakness may not be possible by clinical examination alone as studies have reported poor sensitivity and specificity of physical examination in diagnosing various forms of pelvic floor dysfunction.<sup>6</sup> The present study was undertaken to evaluate the role of non-contrast MRI in the evaluation of

pelvic floor prolapse. Pelvic organ prolapse is a cause of significant social and mental morbidity to the patient. Conventionally these females are assessed clinically. Multicompartment prolapsed is difficult to diagnose clinically and is often inaccurate. Grade IV uterine prolapsed when present, poses hindrance to adequate clinical evaluation. MRI offers imaging quality par excellence for imaging of the female pelvic system. MRI offers an overlap approach of simultaneous imaging of all compartments of the female pelvis at a single setting. Our study aims to evaluate the advantages offered by MRI over the clinical diagnosis and quantification of prolapsed and provides greater insight in pre-operative surgery selection.

In present study 62.5% were between 50-60 yrs of age with mean age of prolapsed being 51.5yrs. This is inconsistent with study by Hoda et al who found mean age of 37.3 years.<sup>7</sup> This deviation is explained by the development of prolapse at a relative younger age in Indians due to higher number of childbearing than the western population. Increase in incidence of organ prolapsed with age is explained by the laxity of pelvic floor muscles with increasing age which causes the pelvic organs to descent.

History of something coming out of vagina was the most common presenting complaint in 80% of the patients while vaginal discharge was present in 24 (60%) of the patients. Pelvic heaviness or a feeling of abdominal mass was present in 14 patients, low back pain was present in 12 patients, burning micturition was present in 8 patients and rectal incontinence in 1 patient. On clinical examination 57.5% had cystocele, 28 (70%) had uterine

descent and 4 (10%) had rectocele. On MRI, 36 out of the 40-patient organ prolapsed in one or more compartments, 4 patients had no prolapse. 1 of the patient was not able to strain during MRI. Clinically this patient had grade II uterine prolapse, but was not to reproduce the findings during the MRI scan. 28 patients had cystocele (5 patient grade I, 7 patients-Grade II, 11 patients-Grade-iii 5 patients-Grade IV), 30 patients had uterine prolapse (4 patients grade I, 8 patient-Grade II, 14 patients-Grade III and 5 patients-Grade IV, 2 patients had component of enterocele and 5 patients had MRI detectable rectocele.

In a similar study by study by El-gharib et al showed the mean age of the patients was  $38 \pm 4.2$  years, mean parity  $4.2 \pm 1.4$ . The main complaints were: sensation of heaviness or pulling in the pelvis with something protruding from the vagina in 56.6% cases, low back pain in 40%. Stage of prolapse at baseline according to POPQ system, Stage one 13 cases (21.7%), Stage two 18 cases (30.0%), Stage three 29 cases (48.3%). Clinical examination revealed that 24 women had anterior and posterior prolapse, 30 had anterior prolapse only, and 6 had uterine and apical prolapse. The MRI findings showed that among 30 women. diagnosed clinically as anterior prolapse, three women had lateral cystocele. Meanwhile, The POPQ evaluation did not find the lateral cystocele to be related to the prolapse score.<sup>8</sup>

On surgery, a total of 35 cases of Uterine prolapsed were diagnosed either solitary, or in combination with other compartment prolapse. While on clinical examination 28 patients were diagnosed to have uterine prolapsed with sensitivity, specificity, PPV, NPV and diagnostic accuracy of 77.1%, 80%, 96.4%, 33.3% and 77.5% respectively. On MRI 30 patients were diagnosed with uterine prolapse, with sensitivity, specificity, PPV, NPV and diagnostic efficacy of 85.7%, 100%, 100%, 50% and 87.5% respectively. MRI had as lightly higher sensitivity and specificity for uterine prolapse.

A similar study was conducted by Broekhuis SR et al who on comparing clinical findings with MRI grade for grade, on clinical examination 0, 10, 14, 4 patients with Grade I, II, III and IV were found while on MRI patients in the respective grade were 1, 8, 14, 5 respectively, there was upgrading in 3 patients and downgrading in 2 patients, which was seen mainly in the Grades II and III. Clinical examination shows a correlation of approx. 82% with the MRI Grading for the middle compartment. Correlations were good to moderate in the anterior compartment ( $r(s)$  range = 0.49; 0.70) and moderate to poor ( $r(s)$  range = -0.03; 0.49) in the central and posterior compartment. This finding was independent of the staging method and reference lines used.<sup>9</sup>

Study by Etlik O et al showed physical examination and MR findings were very concordant in the diagnosis of pelvic prolapse and statistical correlations in the stages of prolapse were established between both of the methods ( $P < 0.01$  for anterior and middle compartment,  $P < 0.05$  for

posterior compartment.<sup>10</sup> Similar study by Deval et al showed intra-operative findings were considered the gold standard against which physical examination, dynamic colpocystodefecography and MRI were compared. Using these criteria, the sensitivity, specificity and positive predictive value of MRI were 70%, 100%, 100% for cystocele; 42%, 81%, 60% for vaginal vault or uterine prolapse; 100%, 83%, 75% for enterocele; 87%, 72% and 66% for rectocele.<sup>11</sup>

MR demonstrated simple or complex organ descent in all pelvic compartments, and may become a standard preoperative examination for pelvic floor abnormalities. The MR images facilitated comprehensive planning by the surgeon; thus, they can increase the success rate and help to accurately predict the outcome of the surgical intervention. The surgeons also expressed high post-surgical satisfaction with the information provided by dynamic MR.<sup>12</sup>

## CONCLUSION

MRI offers a novel approach of simultaneous imaging of all compartments of the female pelvis at a single setting. With lesser intraobserver variation and better visualization of the pelvic anatomy MRI would help in accurate staging and hence better outcomes in patients in terms of symptom relief. In today's era of medico-legal scenario, POPQ will offer a subjective finding of prolapse which may vary from doctor to doctor. With introduction of MRI, at least a basic cut off would be set which will lead to a uniform diagnosis and better strategy before surgery and better outcomes. Although it adds to the health care costs, for its recommendation, more studies are required.

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