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DIAGNOSTIC ROLE OF MR IMAGING IN CASES OF PELVIC FLOOR DYSFUNCTION FOLLOWING CHILD BIRTH IN A TERTIARY CARE CENTER OF CENTRAL INDIA; AN OBSERVATIONAL STUDY

Radiology

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ABSTRACT

Pelvic floor dysfunction (PFD) is a prevalent condition among postpartum women, including disorders such as pelvic organ prolapse, urinary and fecal incontinence. Accurate diagnosis with imaging is crucial for effective management as traditional clinical assessment often underestimates the extent of dysfunction.To evaluate the diagnostic utility of magnetic resonance imaging (MRI), particularly dynamic MR defecography, in assessing structural and functional abnormalities of the pelvic floor following childbirth. A prospective observational study was conducted over 2.5 years at a tertiary care hospital in Central India, including 33 parous women aged 40–79 years referred for MRI pelvis/defecography due to symptoms of PFD. Standardized static and dynamic MRI protocols using a 3T scanner were employed. Findings were correlated with clinical data and analyzed using descriptive statistics and agreement tests.The majority of participants were multiparous women above 60 years. Chronic cough, episiotomy, and constipation were common associated risk factors. MRI identified structural abnormalities including puborectalis thickening (51.5%), levator ani defects (33.3%), and hiatal widening (33.3%). Cystocele and rectocele were each detected in 28 patients, while uterine descent was present in 26. MRI revealed multicompartmental prolapse in several asymptomatic patients. Statistical analysis showed only moderate agreement between MRI and clinical examination (κ = 0.38–0.51), highlighting MRI's superior sensitivity. High-resolution dynamic MRI provides a comprehensive, non-invasive assessment of postpartum pelvic floor dysfunction, enabling detection of subclinical and multicompartmental prolapse often missed on clinical examination to significantly improve early detection and management in postpartum women.

KEYWORDS

Pelvic Floor Dysfunction, MR Defecography, Pelvic Organ Prolapse, Postpartum MRI, Levator Ani, Dynamic MRI.

INTRODUCTION

Pelvic floor dysfunction (PFD) encompasses a spectrum of disorders caused by impaired support or coordination of the pelvic organs, leading to symptoms such as pelvic organ prolapse, stress urinary incontinence, and obstructed defecation. The underlying etiology is multifactorial but is closely associated with childbirth-related trauma to the pelvic muscles, fascia, and pudendal nerves [1–3].

Vaginal delivery is a well-documented risk factor for PFD. Mechanical and neurological stresses during labor can lead to levator ani avulsion, widening of the levator hiatus, and fascial or nerve injury [4,5]. Cesarean delivery may offer partial protection by avoiding direct trauma; however, it does not completely eliminate the risk, particularly if preceded by labor [10–12]. Other risk factors—such as high parity, advancing maternal age, obesity, and chronic conditions like cough or constipation—exacerbate pelvic floor weakening [13,14].

Traditional diagnostic methods, including clinical pelvic organ prolapse quantification (POP-Q), fluoroscopic defecography, and ultrasound, often provide limited soft-tissue resolution or compartmental visualization [15–17]. In contrast, magnetic resonance imaging (MRI) offers superior soft-tissue contrast, multiplanar capabilities, and functional assessment during physiologic maneuvers. Dynamic MRI (MR defecography) captures pelvic organ motion in real time, enabling detailed evaluation of multicompartmental prolapse, levator ani integrity, and organ descent during straining [18–20].

Despite its established role in advanced centers, MRI remains underutilized in resource-constrained settings such as India, where PFD is often underreported and inadequately assessed. This study aims to assess the diagnostic value of MRI in detecting postpartum pelvic floor abnormalities and its concordance with clinical findings in a tertiary care setup in Central India.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Radiodiagnosis at a tertiary care hospital in Central India over 2.5 years following institutional ethical approval. Thirty-three parous women aged 40–79 years with a history of one or more deliveries and presenting with symptoms of PFD (such as stress urinary incontinence, mass per vagina/rectum, or defecatory difficulty) were recruited. Exclusion criteria included pelvic malignancy, prior pelvic surgery, and contraindications to MRI. Clinical examination was performed using the POP-Q system. MRI was performed on a 3-Tesla Siemens Magnetom Vida scanner using standardized static and dynamic sequences (during rest, squeeze, strain, and defecation phases) following rectal installation of 180–220 cc of ultrasound gel.

Data were analyzed using SPSS software. Cohen's Kappa test assessed agreement between MRI and clinical findings, while Fisher's Exact and McNemar's tests evaluated associations. A p-value <0.05 was considered significant.

RESULTS

The majority of patients (≈66%) were aged above 60 years, with high parity (≥4 deliveries) in over 60% of cases. Chronic cough (48%), constipation (33%), and prior episiotomy (42%) were prominent risk factors. Most women reported symptoms of stress urinary incontinence (37%) or pelvic mass sensation (31%). However, several patients remained asymptomatic despite imaging evidence of prolapse. Dynamic MRI demonstrated high sensitivity in detecting both structural and functional abnormalities.

Puborectalis thickening was the most frequent structural change (51.5%), followed by levator ani defects and hiatal widening (33.3% each). Cystocele and rectocele were identified in 28 patients each, with Grade I prolapse being most prevalent. Uterine descent was seen in 26 women, and enteroceles in 5 cases. Multicompartmental involvement was observed in several patients, underscoring the value of MRI's comprehensive field of view.

Mild cystoceles and rectoceles were found in asymptomatic women, suggesting subclinical dysfunction.

Agreement between clinical and MRI findings was modest (Cohen's κ = 0.38–0.51), indicating that clinical examination underestimates the extent of prolapse. McNemar's test confirmed significant diagnostic discrepancy between clinical and imaging findings ($p < 0.05$). The F1 diagnostic score for MRI was 1.0 across compartments, compared with 0.68–0.75 for clinical evaluation, confirming superior diagnostic accuracy of MRI.

SUMMARY AND CONCLUSION

The predominance of older, multiparous women in this study mirrors findings from global literature, where cumulative obstetric trauma, hormonal decline, and aging contribute to PFD progression [21,22].

Chronic cough and constipation were frequent comorbidities, consistent with studies by Beer-Gabel et al. and Stoker et al., which identify chronic intra-abdominal pressure as a precipitating factor for organ descent [23,24].

Levator ani injury and hiatal widening were among the most significant findings, reflecting muscle weakening from prior vaginal deliveries. These results align with the work of DeLancey et al., who reported levator avulsion in up to 20% of women after their first vaginal delivery [4]. Such defects can lead to permanent hiatal ballooning and secondary prolapse of adjacent organs.

The observed discordance between clinical and MRI findings highlights a key diagnostic challenge. In this study, many women exhibited high-grade prolapse radiologically despite minimal symptoms. This "asymptomatic descent" has also been described by Martin-Fernandez et al. and Bitti et al., emphasizing MRI's role in detecting occult or multicompartmental prolapse not evident on examination [25,26].

The H-line, M-line and pubococcygeal line serve as standardized MRI metrics for quantifying pelvic floor descent [27,28].

Dynamic MR defecography was particularly useful in identifying posterior compartment pathologies such as rectoceles and enteroceles. Similar to findings by Hecht et al. and Flusberg et al., rectoceles >2 cm were best appreciated during evacuation, underscoring the importance of including defecation phases in MRI protocols [35,36].

From a clinical perspective, MRI findings influenced management strategies. Physiotherapy was the most common intervention, particularly for mild to moderate descent, while surgical correction was reserved for advanced prolapse. These outcomes echo global recommendations advocating imaging-guided individualized management [38,39].

While MRI's cost and limited availability remain challenges in low-resource settings, its ability to provide radiation-free, multiplanar, and reproducible assessment justifies its use in tertiary care centers. The study's prospective design and standardized 3T MRI protocol provide robust evidence supporting MRI's diagnostic superiority thus justifying integration of MRI into postpartum diagnostic algorithms for detection of subclinical prolapse, guide individualized therapy, and prevent long-term morbidity.

Case 1

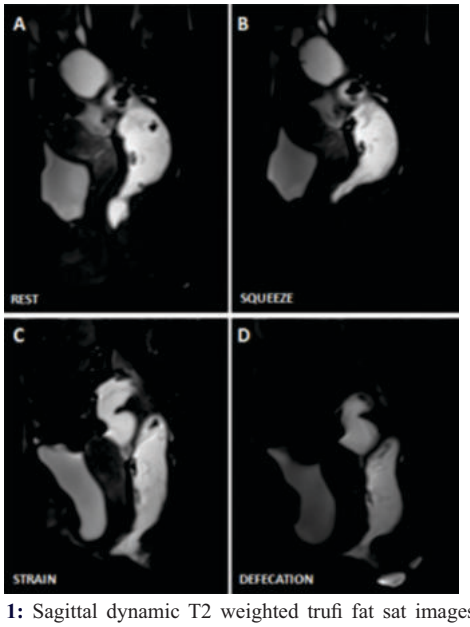

Figure 1: Sagittal dynamic T2 weighted trufi fat sat images were obtained at rest (A), squeeze(B), strain (C),and maximal defecation (D).

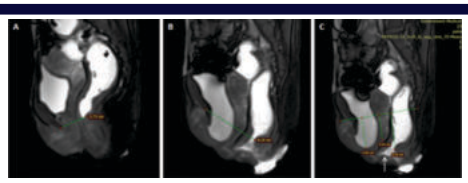

Figure 2: Mid sagittal FIESTA MR image at rest (A), the M line is mildly elongated (3.7 cm) and at maximal defecation (B), there is caudal descent of the pelvic floor, with the M line increasing to 8.2 cm; Mid sagittal FIESTA MR image obtained at maximal defecation (C) shows a cystocele (4.8cm), moderate vaginal/cervical prolapse (4.0cm), rectal prolapse (5.7cm) and small anterior rectocele (arrow).

Case 2

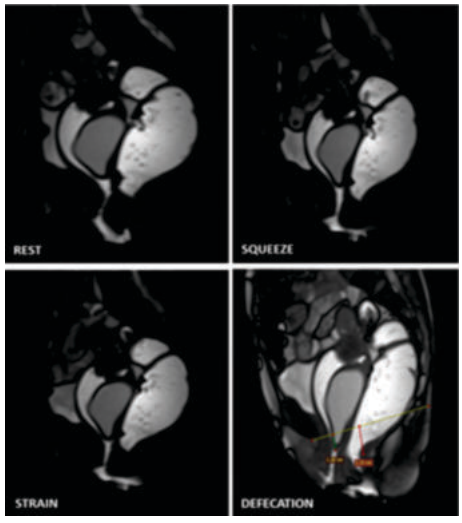

Figure 3: Sagittal dynamic T2 weighted trufi fat sat images were obtained at rest (A), squeeze(B), strain (C),and maximal defecation (D). Defecation phase shows that the anorectal junction lies approximately 2.3 cm below the pubococcygeal line during defecation - mild rectal prolapse. Incidental finding of a large well defined benign cystic lesion seen along the posterior wall of upper 2/3 rd of vaginal canal. Mild descent of vaginal cyst seen below the pubococcygeal line by 1.3 cm on straining and defecation phases.

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