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MR Imaging in Posthysterectomy Vaginal Prolapse

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Abstract: In the diagnostic work-up of vaginal prolapse after hysterectomy cystoceles can be identified by sonography, whereas enteroceles and rectoceles can only be suspected in a routine clinical setting. The present pilot study was undertaken to investigate the diagnostic role of magnetic resonance imaging (MRI) in the differentiation of cysto-, entero- and rectoceles in women with posthysterectomy vaginal prolapse. Thirteen women (mean age 61, SD $\pm$ 7 years) with posthysterectomy vaginal prolapse underwent MRI (Gyroscan S 15, Philips). A median sagittal image series was obtained with a gradient-echo sequence, fast field echo, both at rest and during Valsalva maneuvers. MRI allowed the identification of cysto-, entero- and rectoceles, and differentiation between entero- and rectoceles in cases with inconclusive clinical findings. These findings make dissection more reliable and improve the outcome of hernia repair. No additional diagnostic information is obtained with MRI compared to ultrasound in the assessment of cystoceles.

Keywords: Cystocele; Enterocele; MR imaging; Posthysterectomy vaginal prolapse; Rectocele

Introduction

Surgical repair is the treatment of choice in patients with vaginal prolapse after hysterectomy. The surgical approach – abdominal sacrocolpopexy [1–3] or transvaginal sacrospinal/sacrotubal fixation of the vagina [4–6] – depends on the surgeon's preferences and individual findings. The diagnosis of vaginal prolapse is made primarily on clinical grounds. The presence of a concomitant cystocele can be detected by introital or perineal sonography. Disguised urinary incontinence is identified by urethrocystometry before and after repositioning of the prolapse, and may thus be considered in planning the surgical approach. No definite preoperative statement can be made about the presence of an entero- or rectocele. Radiological examination techniques are not widely used or are not well tolerated by patients. Nevertheless, the identification of a recto- and/or enterocele is important for surgical planning, as vaginal repair has to be combined with correction of the former to reduce the risk of relapse.

We performed a pilot study to determine the value of MRI in differentiating cysto-, entero- and rectoceles in vaginal prolapse after hysterectomy. The potential of MRI in the diagnostic work-up of vaginal prolapse will be discussed. The examination technique and image analysis were optimized in an earlier study including 15 healthy subjects and 20 women with urinary incontinence and genitourinary prolapse, examined with identifical imaging parameters [7]. Other studies reported in the literature have already pointed to the diagnostic information provided by MRI in the assessment of pelvic floor anatomy [8,9] and genitourinary prolapse [10,11].

Patients and Methods

Thirteen patients with vaginal prolapse (mean age 61, SD $\pm$ 7, range 47–76) after hysterectomy (abdominal in 5 and vaginal in 8 cases) were examined by MRI (Gyroscan S 15, Philips, Eindhoven, Netherlands) to identify the type of prolapse (presence of a cysto-, entero- or rectocele). Following coronal and axial localizer scans, the pelvis was examined in the median sagittal plane with a T_1-weighted gradient-echo

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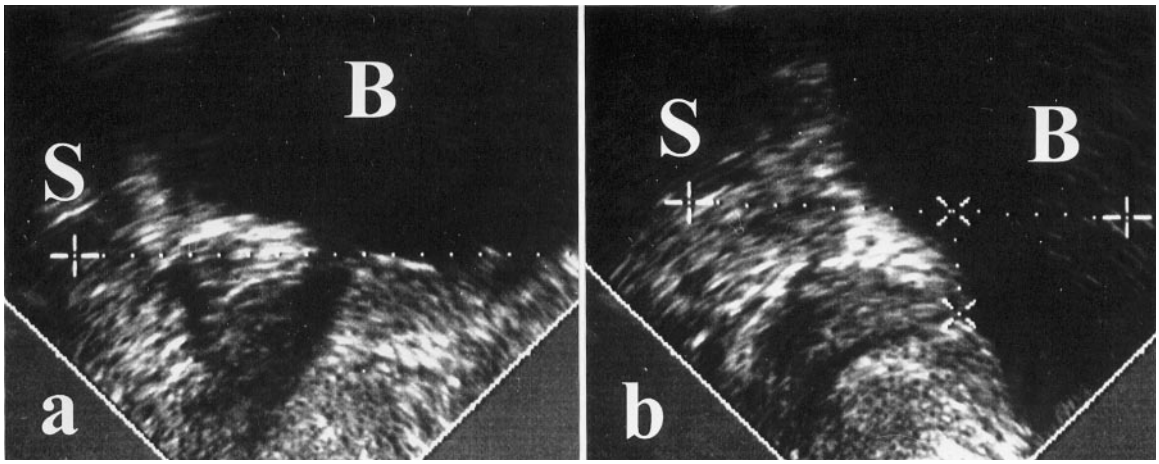

Fig. 1. Sagittal introital ultrasound image of the pelvis showing rotational descent of both the urethra and bladder. The bladder neck is seen on the perpendicular line to the body axis at the level of the lower edge of the symphysis at rest (a), and below this line during a Valsalva maneuver (b). S, symphysis; B, bladder.

sequence during breath-holding (fast field echo, flip angle 60°, TR 31 ms, TE 13 ms, field of view 350 mm section thickness 10 mm). The acquisition time for one section was 8 s. Images were obtained at rest and during a maximal Valsalva maneuver. During the clinical examination it was determined whether the women were able to perform the Valsalva maneuver or not, in order to exclude false-negative findings resulting from insufficient straining. In 8 of the 13 women the rectum was visualized with 50 ml of diluted gadolinium-DTPA (Magnevist) and the urethra marked by a catheter filled with gadolinium. The patients were examined in the recumbent position. The MR images were analyzed using the sacrococcygeal inferior pubic point (SCIPP) line as a reference. A cystocele or enterocele was diagnosed when the bladder or the former pouch of Douglas, with or without parts of the small bowel, respectively, sank below the SCIPP line during a maximal Valsalva maneuver. A rectocele was assumed when a distance of more than 3 cm was measured between the anterior wall of the anal canal at rest and the most distal point of the rectocele during the Valsalva maneuver [11].

The images were interpreted by a radiologist and a gynecologist, who were blinded to the clinical, ultrasound and intraoperative findings, and the results compared.

Vaginal vault prolapse was clinically assessed using the standardized terminology for female pelvic organ prolapse [12]: anterior vaginal wall (Aa, Ba); leading edge of the vaginal cuff (C); posterior vaginal wall (Ap, Bp); and stages I–IV of pelvic organ prolapse.

Sonographically, a cystocele was diagnosed when during a Valsalva maneuver, the bladder was displaced to below a line running perpendicular to the body axis at the level of the lower edge of the symphysis (Fig. 1). In addition, funneling of the urethra (Fig. 2) was assessed during a Valsalva maneuver.

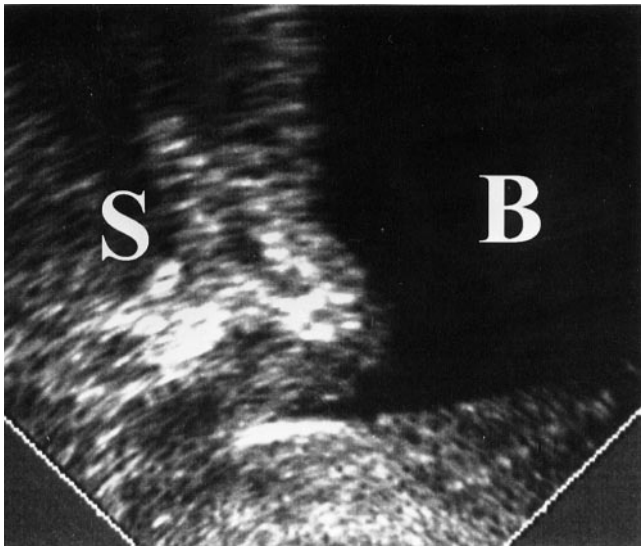

Fig. 2. Sagittal introital ultrasound image of the pelvis, showing funneling of the proximal urethra during a Valsalva maneuver. S, symphysis; B, bladder.

Intraoperatively, the findings were verified by dissection of the celes: dissection of the cystocele and confirmation of the diagnosis by filling the bladder and labeling of the bladder neck with a balloon catheter; dissection of the enterocele through herniotomy; dissection of the rectocele and confirmation by digital rectal examination.

Results

The preoperative and intraoperative findings are listed in Table 1.

Table 1. Clinical, ultrasound, intraoperative and MRI findings

Pat./no.	Clinical findings (stage)			Ultrasound		Intraoperative findings			MRI findings			
	Aa/Ba	C	Bp/Ap	CC	Funneling	CC	EC	RC	CC	Funneling	EC	RC
1	III	*?*		R		X	*X*		R		*?*	
2	II			V	X	X			V	X		
3		III					X				X	
4		IV					X				X	
5	II	III	II	R		X	X	X	R		X	X
6	IV	IV	IV	R		X	X	X	R		X	X
7			III					X				X
8		*?*	III				*X*	X			*X*	X
9		IV	III				X	X			X	X
10	II	*III*	III	*V,R*		X	*?*	X	*V*		*?*	X
11		IV	III				X	X			X	X
12			II					X				X
13		IV	II				X	X			X	X

CC, cystocele; EC, enterocele; RC, rectocele; Funneling, funneling of the proximal urethra; V, vertical, R, rotational descent of the bladder; ?, missing findings compared to other investigation techniques.

MRI Clinical Assessment

In 11/13 cases the clinical findings matched the MRI results; one clinically suspected enterocele was not confirmed by MR imaging (patient no. 10) and the intraoperative findings, and one enterocele was not suspected on clinical grounds (patient no. 8).

MRI Ultrasound

In 5/5 cases there was agreement in the diagnosis of a cystocele (descent of the bladder below the SCIPP line); in the other 8 cases neither ultrasound nor MRI identified a cystocele. In one case (patient no. 10), ultrasound demonstrated a mixed (rotational and vertical) descent of the bladder and urethra, whereas MRI only identified vertical descent. In 1 case ultrasound demonstrated definitive funneling of the urethra, which was only suspected on MRI.

MRI Intraoperative Findings

In 12/13 patients enteroceles (Fig. 3), rectoceles (Fig. 4), combined entero- and rectoceles (Fig. 5), and combined

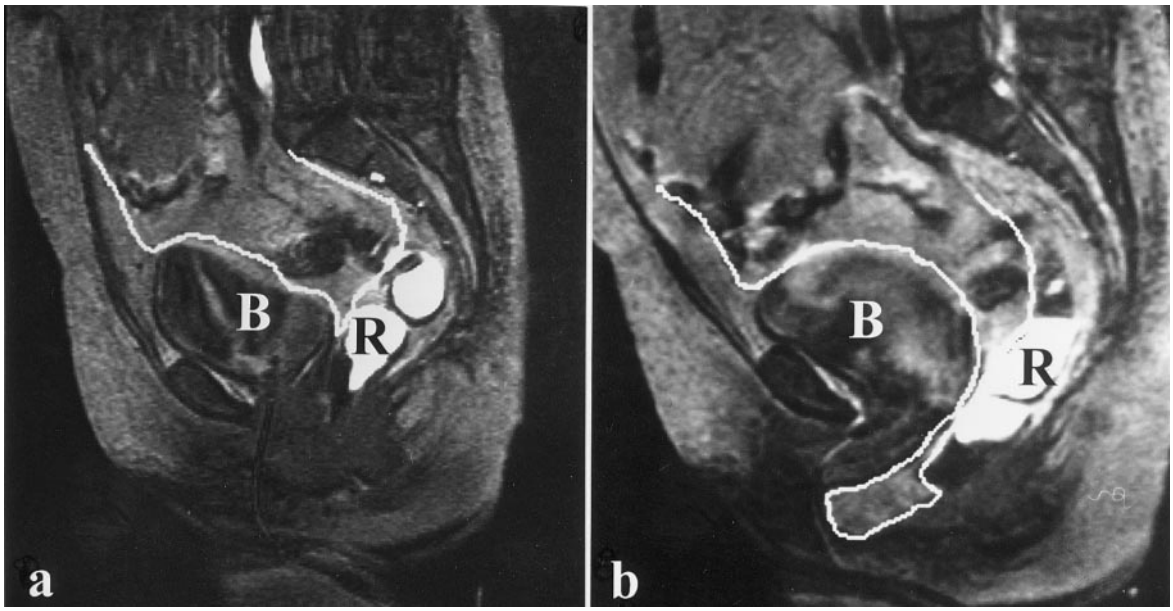

Fig. 3. Sagittal MRI of the pelvis at rest (a) and during Valsalva maneuver (b) in a 63-year-old patient with vaginal prolapse following vaginal hysterectomy in 1975 and vaginal repair in 1980. Predominant enterocele (indicated by the line); a small rectocele (R) occurred during the Valsalva maneuver. B, bladder.

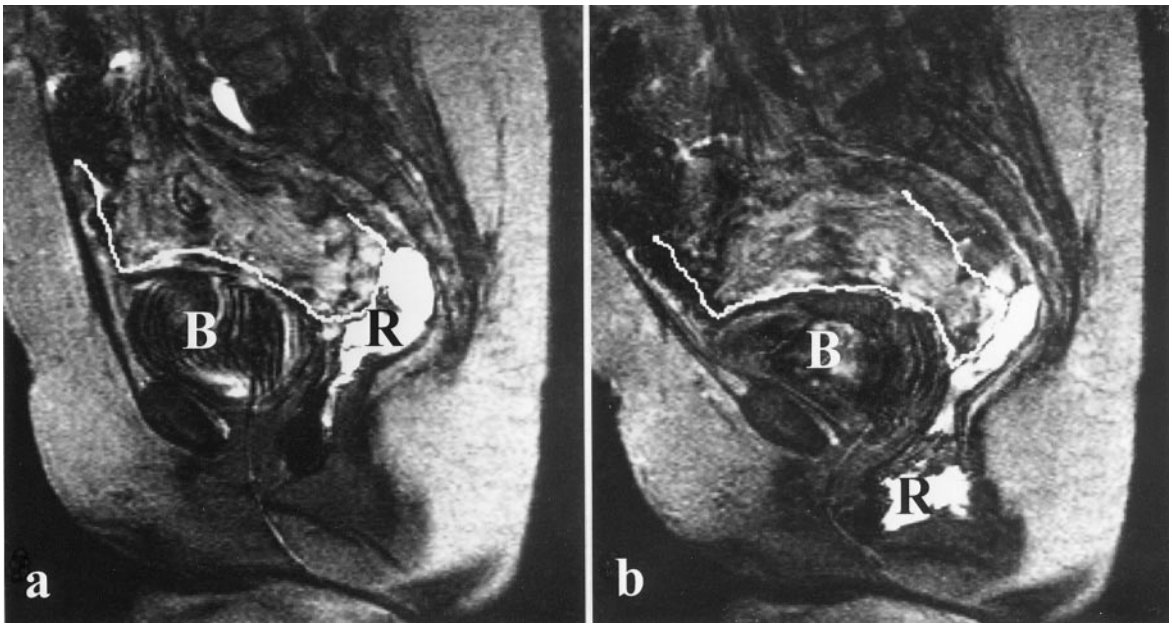

Fig. 4. Sagittal MRI of the pelvis at rest (a) and during a Valsalva maneuver (b) in a 68-year-old patient with vaginal prolapse following abdominal hysterectomy in 1969. Extensive rectocele (R, opacification of the rectum), no enterocele and cystocele occurred during the Valsalva maneuver B, bladder.

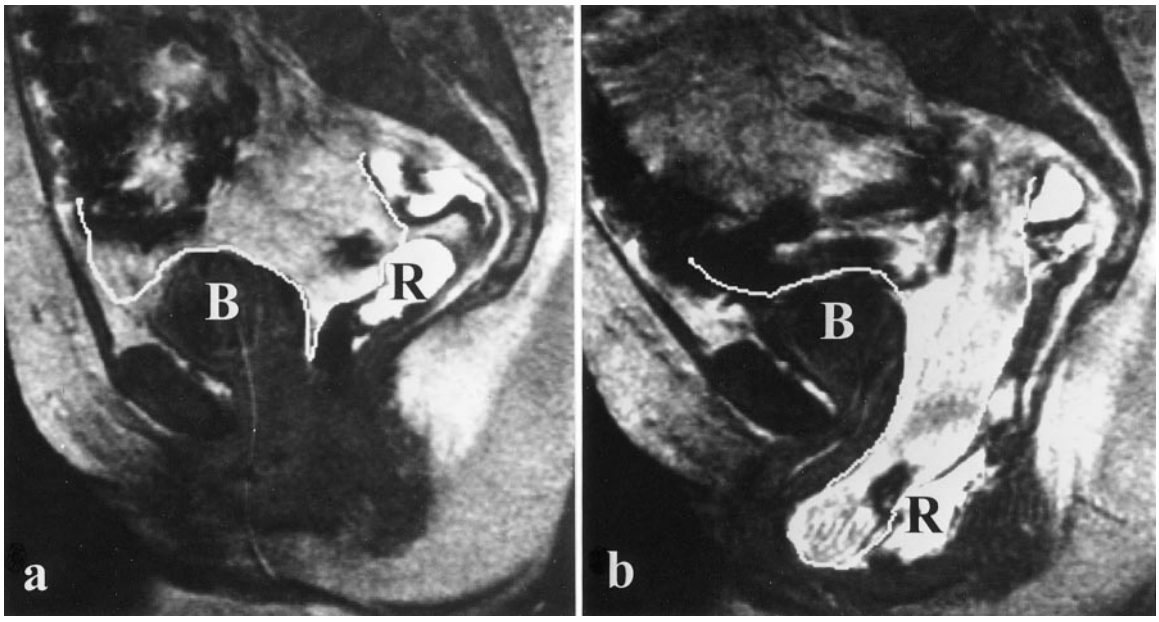

Fig. 5. Sagittal MRI of the pelvis at rest (a) and during Valsalva maneuver (b) in a 56-year-old patient with vaginal prolapse following vaginal hysterectomy with vaginal repair in 1983 and repeated vaginal repair in 1988. Enterocele (indicated by the line) and rectocele (R) occurred during the Valsalva maneuver. B, bladder.

cysto-, entero- and rectoceles (Fig. 6) were depicted by MRI in accordance with the intraoperative findings. In one case (patient no. 1), MRI missed an enterocele that was identified intraoperatively. This patient also had a pronounced cystocele that was likewise barely visible on the MR images. It is therefore assumed that this patient did not strain hard or long enough during the MR examination.

MRI With/Without Contrast Agent

The urethra and rectum were also depicted without the administration of contrast material; however, assessment of the images was more difficult, especially as regards identifying the displacement of the urethra and bladder (rotational vs. vertical descent).

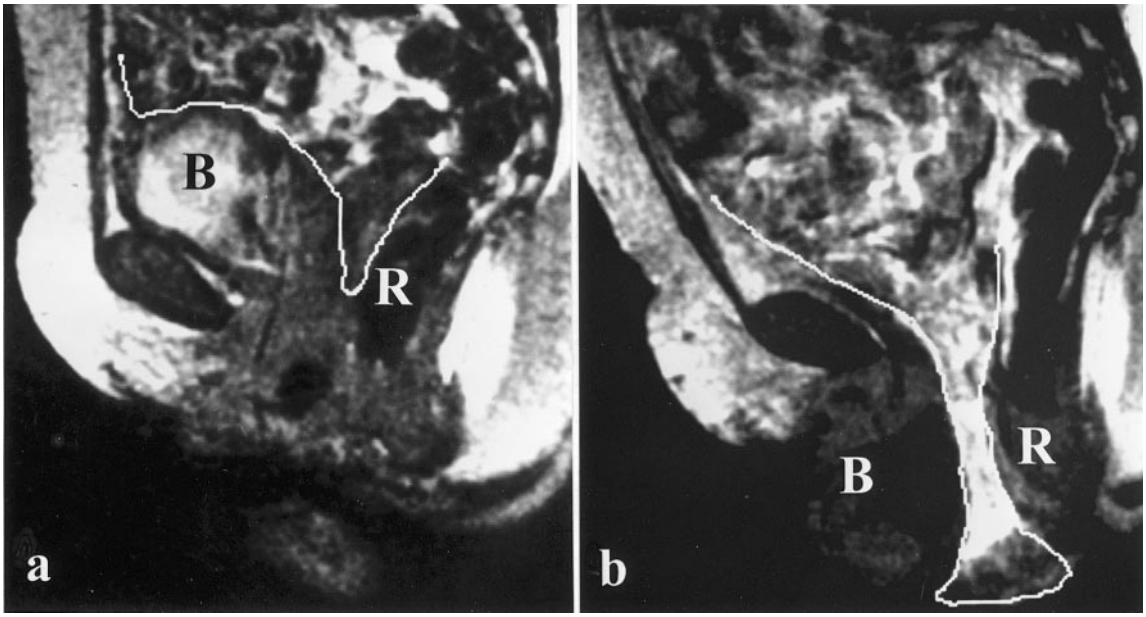

Fig. 6. Sagittal MRI of the pelvis at rest (a) and during Valsalva maneuver (b) in a 63-year-old patient with vaginal prolapse following abdominal hysterectomy in 1982. Enterocele (indicated by the line), rectocele, distension cystocele occurred during Valsalva maneuver. B, bladder; R, rectum.

Discussion

Despite the low number of cases, the results of our study indicate that MRI reliably differentiates between entero- and rectoceles in patients with vaginal prolapse after hysterectomy.

Although it is true that the examination in the recumbent position with stretched legs does not allow assessment of the full extent of the prolapse, it does not impair the depiction of celes. The clinical examination is more useful for determining the extent of prolapse, as it is reproducible in the recumbent and sitting, as well as standing, positions.

It is likewise possible to assess displacement of the bladder in relation to the SCIPP line, but it is difficult to objectify the quality of descent (rotational vs. vertical) or funneling of the proximal urethra without opacification of the urethra and bladder. Here, the ultrasound findings are more reliable. Future MRI examinations performed to assess the presence of entero- and rectoceles alone can therefore be carried out without labeling the urethra by placing a catheter, which will make the examination even more acceptable to the patient. Opacification of the rectum facilitates the visualization of rectoceles and should not therefore be dispensed with.

Because of the high technical prerequisites and considerable cost, MRI is at present not available for routine clinical examination of posthysterectomy vaginal prolapse, although preoperative visualization of entero- and rectoceles would make dissection more reliable and improve the outcome of hernia repair. MRI should in particular be performed in cases of recurrent vaginal prolapse, where it is necessary to assess the insufficiency of vaginal fixation and the extent of cele formation.

Future MRI studies should investigate the role of dynamic imaging of hernial orifices, and also the assessment of connective tissue and muscle lesions of the pelvic floor in transverse and coronal imaging planes [13]. The pathogenesis of vaginal vault prolapse and the formation of the various cele types remain to be elucidated. Some surgeons perform prophylactic measures, such as fixation of the round and sacrouterine ligaments on the vaginal vault and culdeplasty [14,15], whereas others are strictly opposed to any such measures. Comparative MRI studies after hysterectomy might show which of these measures is actually effective in preventing vaginal vault prolapse.

Furthermore, pre- and postoperative imaging may help to evaluate different surgical approaches and hence define the role of new, minimally invasive surgical techniques [16,17] in the treatment of vaginal prolapse after hysterectomy.

Conclusion

The preoperative identification and differentiation of entero- and rectoceles by MRI contributes to a more reliable surgical procedure and hernia repair. Future studies using MRI are also expected to throw light upon the pathogenesis of vaginal prolapse after hysterectomy.

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EDITORIAL COMMENT: MRI is used in many fields of medicine as a diagnostic tool, providing information that is not available by any other non-invasive technique. There have been reports of its use in gynecology, specifically in the diagnosis of prolapse and the various 'celes' that can develop in genital proslapse. This study of a small number of patients confirms that MRI is useful in the outpatient evaluation of prolapse. It is not without limitations, however, in that it is not perfect in its diagnostic imaging, and must be performed in the supine position, where certain defects might not be visible because of positional effects. The most important issue is that of cost. In today's healthcare environment it is doubtful that third-party payers will authorize this very expensive testing.