

Comparative role of MRI vs US and laparoscopy in diagnosis of endometriosis

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Abstract:
Endometriosis is a debilitating disease characterised by abnormal growth and distribution of endometriotic tissue. It results in cyclical pain, infertility, dyspareunia and reduced quality of life. Endometriotic deposits can be found across multiple systems. Diagnostic tools have been an obstacle to diagnosis. Diagnostic laparoscopy has a high sensitivity, but low specificity, likely due to the presence of deep or distant aberrant endometriotic tissue that cannot be reached. Our objective was to highlight the importance of different imaging modalities in diagnosis and treatment planning of endometriosis.

Modalities for assessment of endometriosis

Laparoscopic

Laparoscopic image of peritoneal deposit and ovarian endometriomas

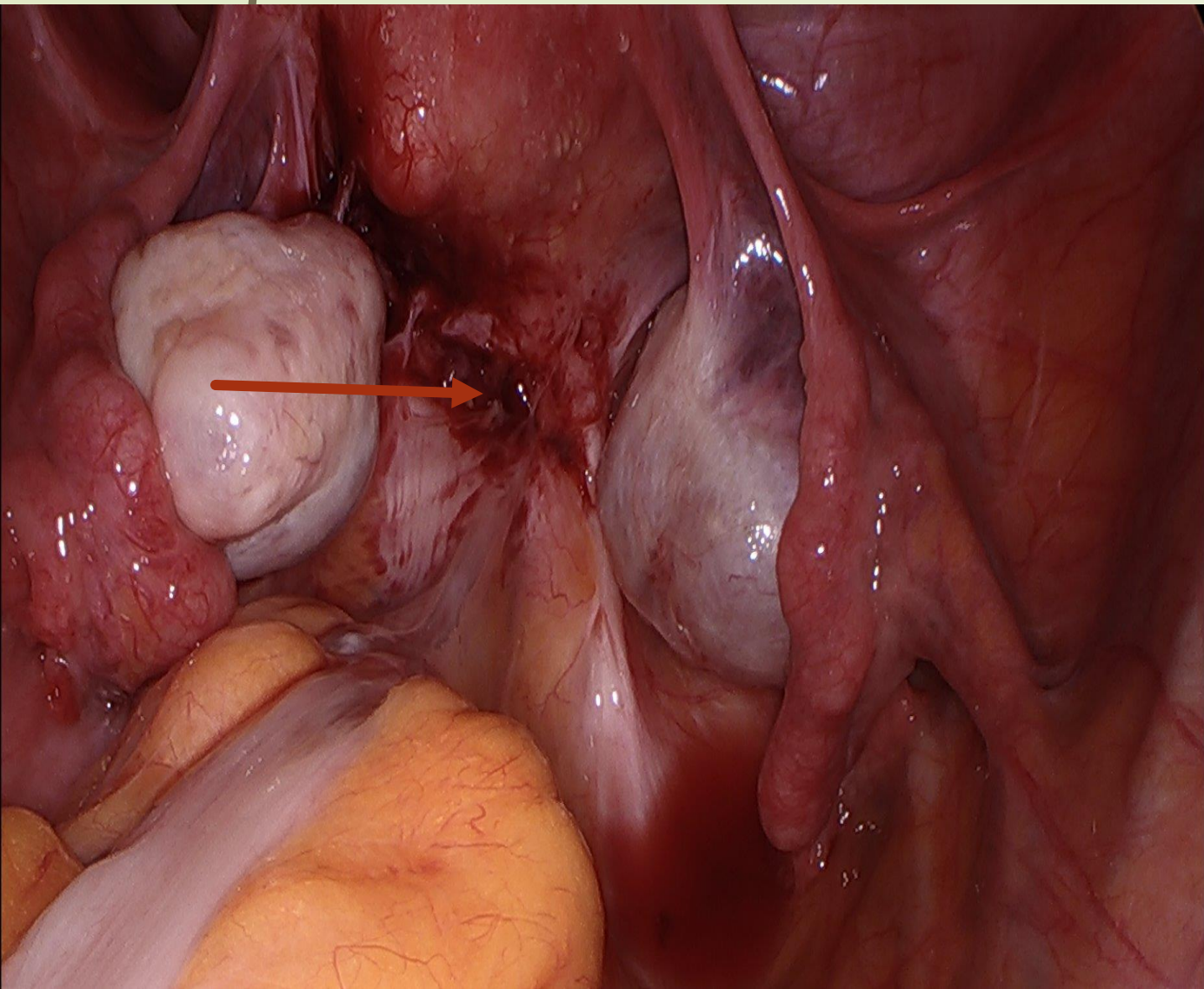


Image courtesy of Mr H Jan

Laparoscopic imaging of superficial peritoneal deposit

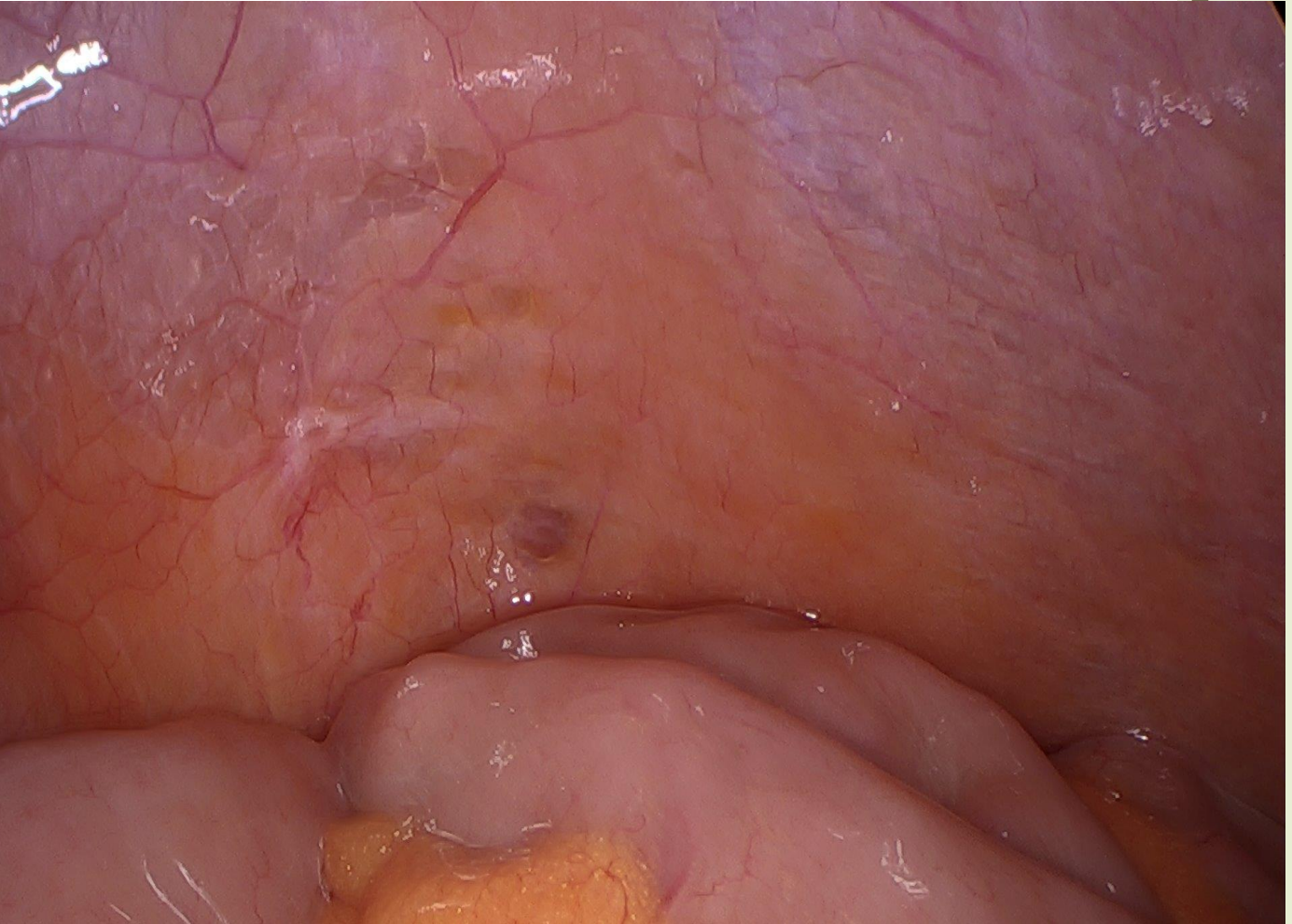


Image courtesy of Mr H Jan

Diaphragmatic umbilical deposit treated with resection

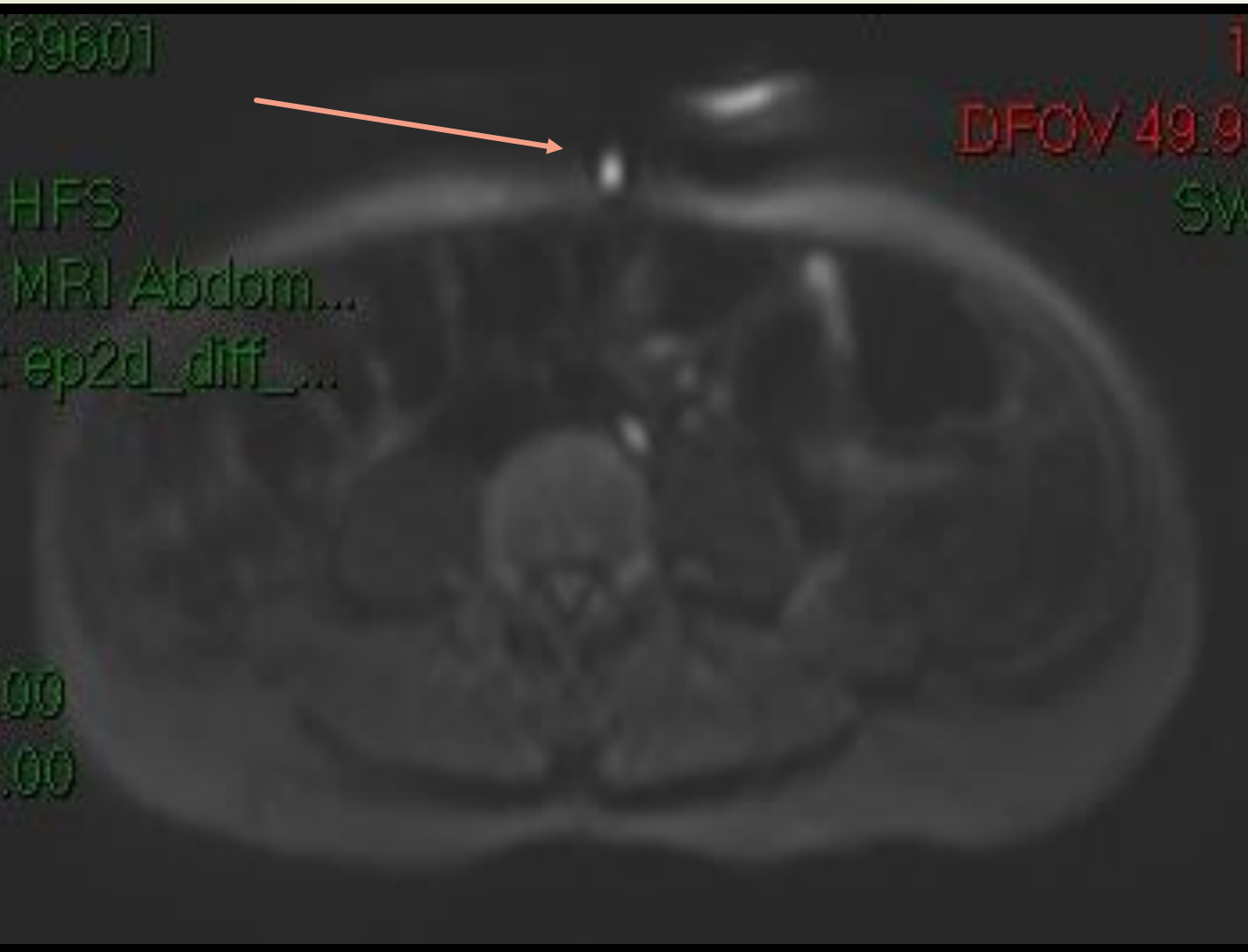
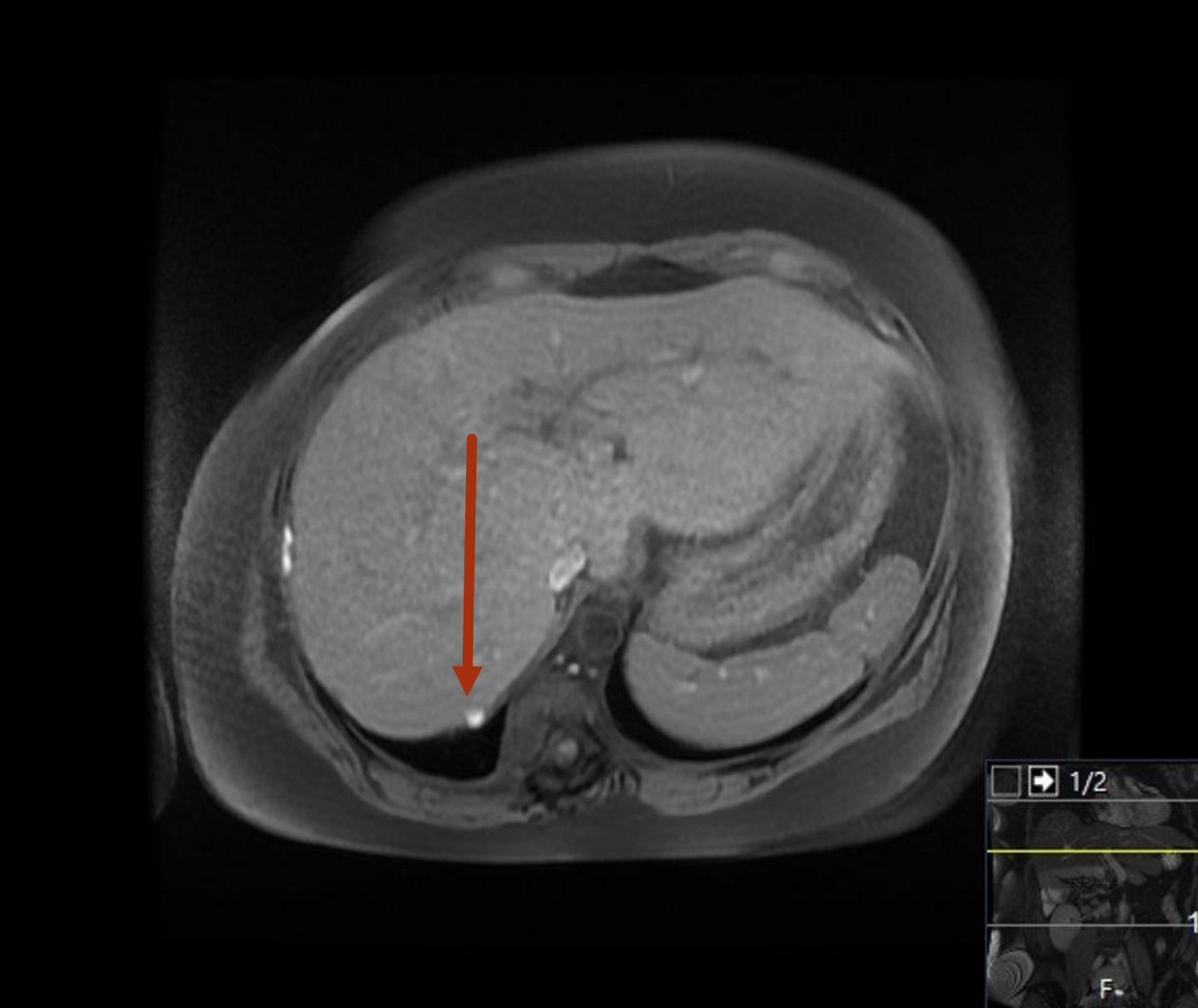
Zondervan KT, Becker CM, Missmer SA. Endometriosis. N Engl J Med. 2020;382(13):1244-1256.
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Okano, E. & Condous, George & Khalid, A. & Timmerman, Dirk & Ameye, Lieveke & Hüttel, Sabine & Bourne, Thomas. (2006). The use of ultrasound-based 'soft markers' for the prediction of pelvic pathology in women with chronic pelvic pain - Can we reduce the need for laparoscopy? BJOG - an international journal of obstetrics and gynaecology, 113, 251-6. doi:10.1111/j.1471-0528.2006.01846.x.
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MRI

Axial T2 high resolution MRI- showing B/L ovarian endometriomas and endometriotic plaque tethering the colon (arrow)



Diaphragmatic endometrial deposits, subsequently treated with resection



TVUS

TVUS image of ovarian endometrioma (arrowhead)



Image courtesy of Charlotte Whittaker

Features of endometriosis

- Endometriosis can affect women of any age
- Long term condition
- Asymptomatic to wide ranging non-specific symptoms
- Dysmenorrhea
- Dyspareunia
- Dyschezia
- Abdominal/Pelvic pain
- Painful intercourse
- Infertility/subfertility
- Depression
- Often a delay in diagnosis

Symptomatic overlap with other conditions

- Adenomyosis
- Uterine fibroids
- Inflammatory bowel disease
- Pelvis inflammatory disease
- Cystitis
- Pelvic floor disorders
- Depression/anxiety

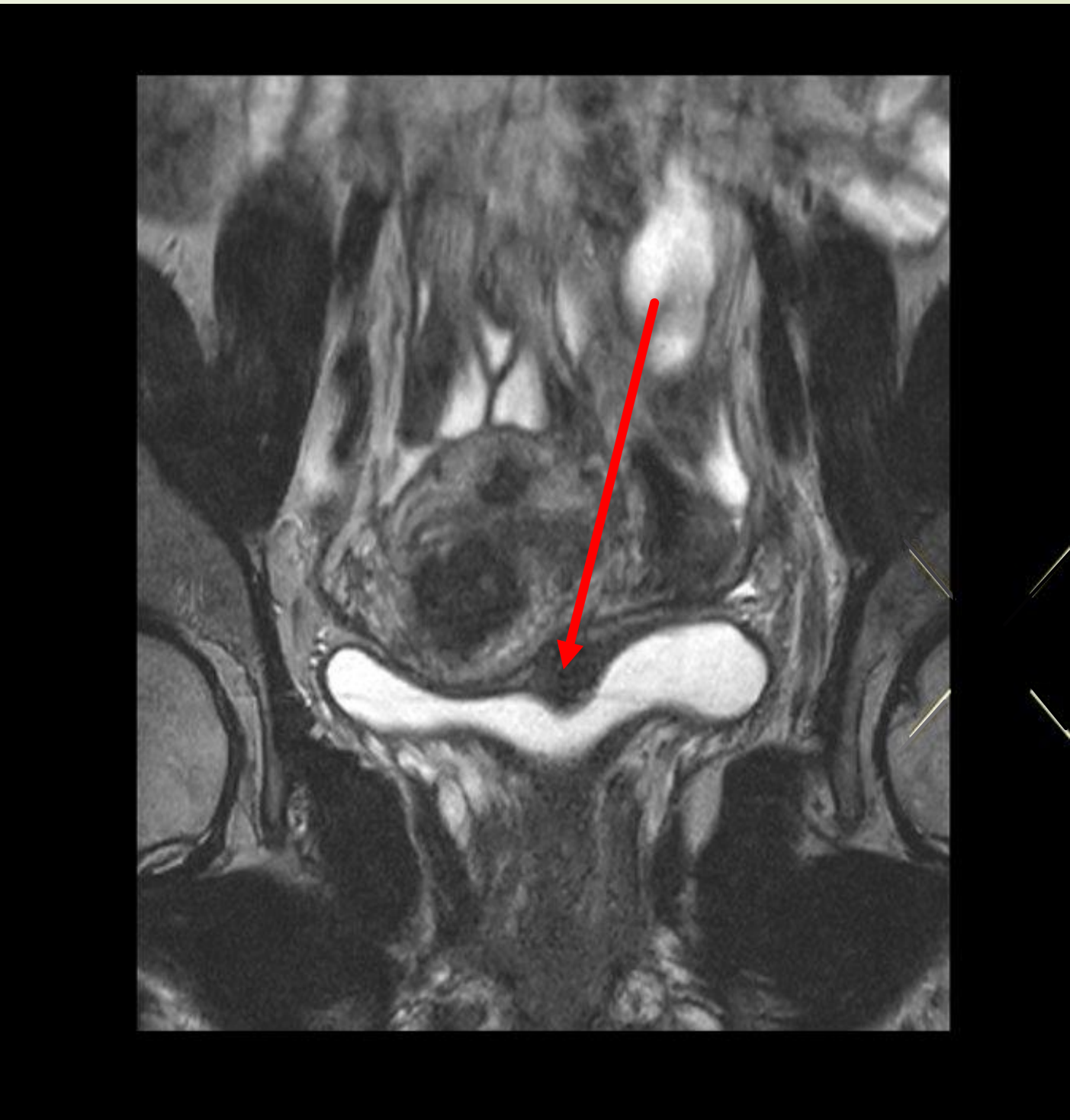
Imaging for Endometriosis

Utility of US or MRI partly dependent on the type of endometriotic lesion:

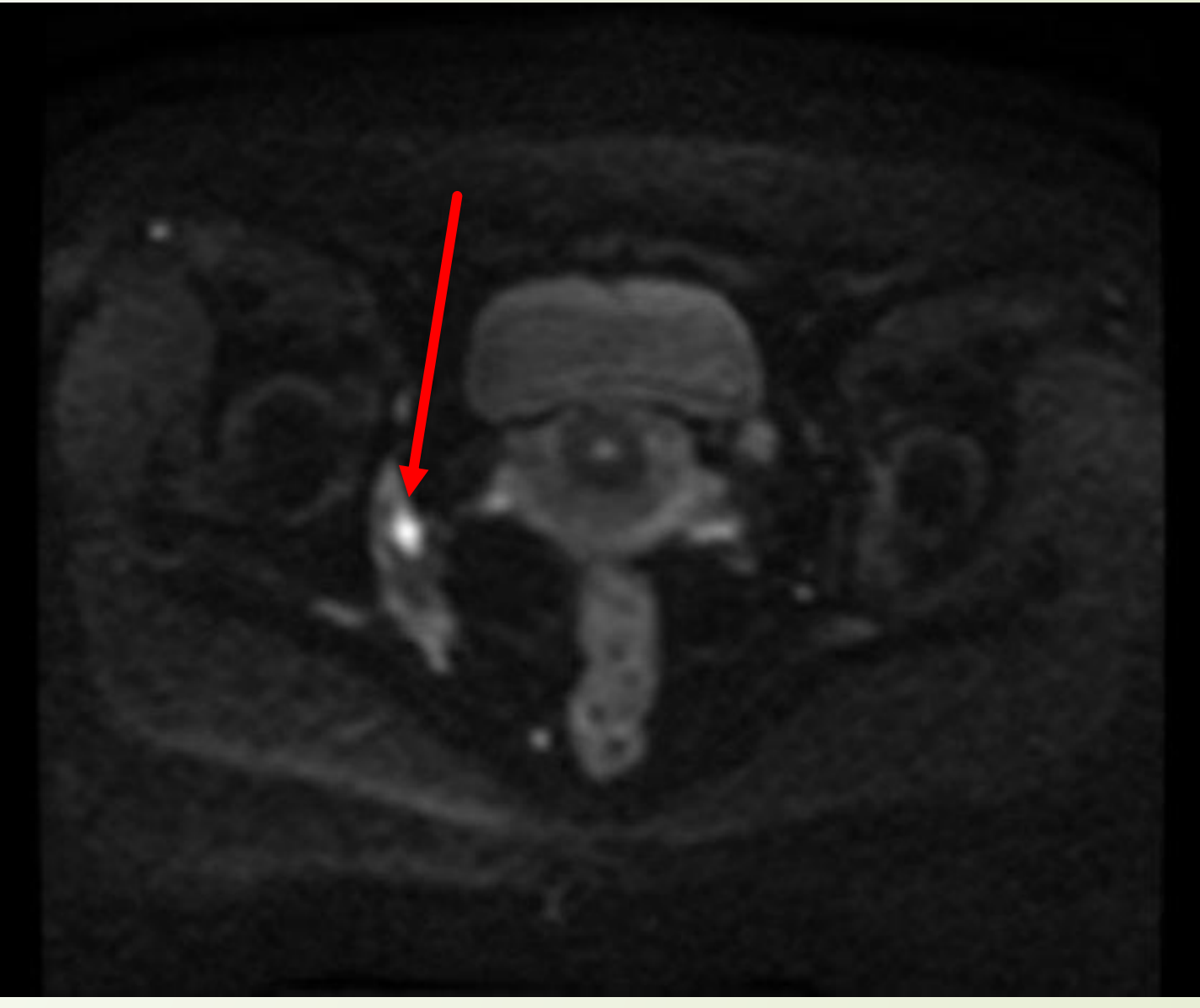
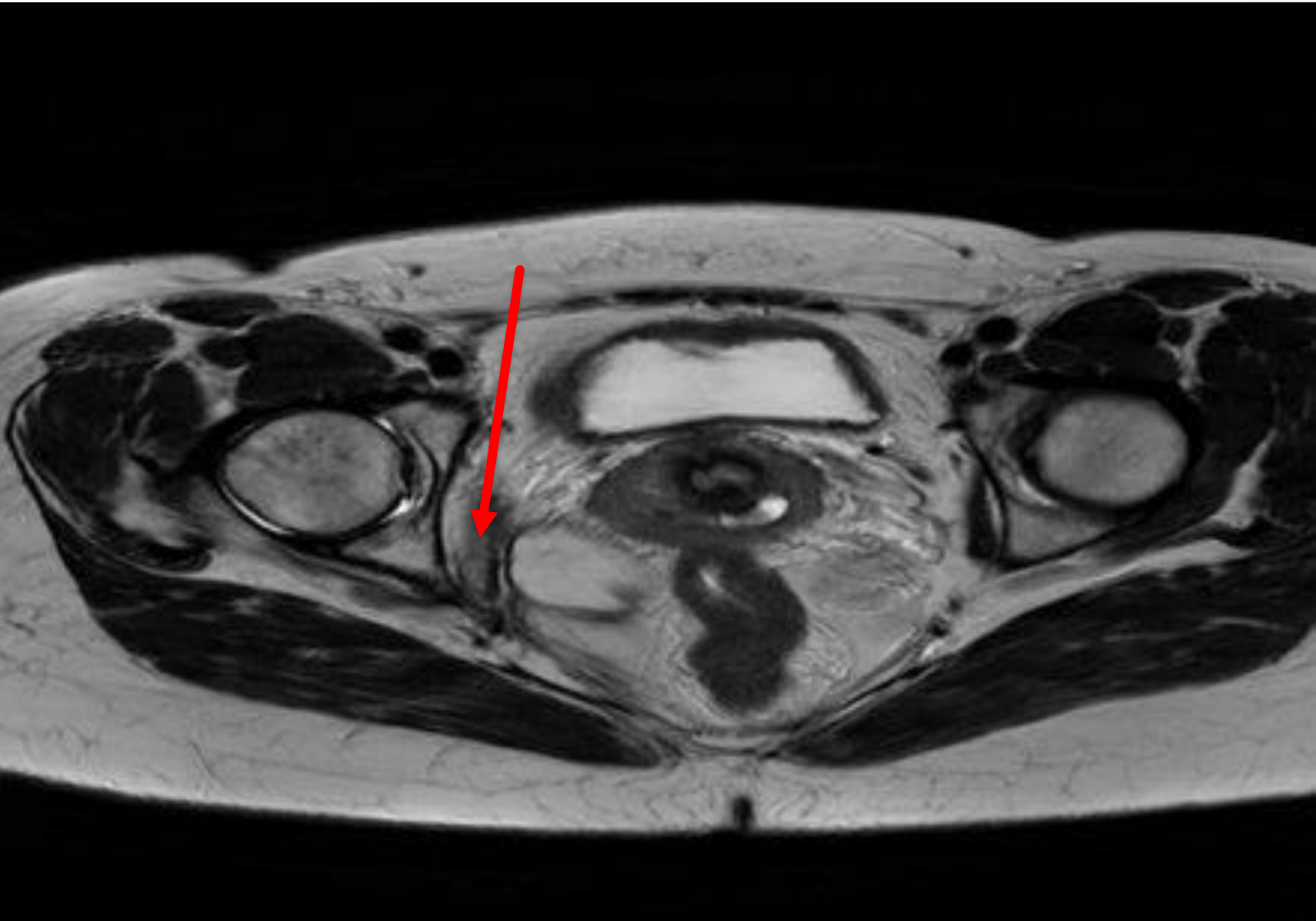
- **Superficial peritoneal disease**
- **Endometriomas**
- **Deep infiltrating endometriosis(DIE) (>5mm invasion)**

MRI

Sagittal and coronal MRI T2 images showing a bladder deposit with obliteration of the anterior compartment



MRI imaging of endometriotic deposit in obturator internus. Left: T2. Middle: DWI. Right axial T1 fat saturation



Role of imaging in endometriosis

- Diagnosis
- Excluding cancer
- Ovarian endometriomas
- Cyst related pain, pressure and bleeding
- Bladder and bowel involvement
- Peritoneal disease
- Adhesions
- Fertility issues
- Post surgical complications
 - Haemorrhage
 - Bladder, ureteric or bowel injury
- Treatment response and monitoring

Reduced TVUS ovarian mobility has excellent correlation with laparoscopy. Tender ovaries, adnexae and uterus correlate with endometriosis(p<0.001)

Table shows effectiveness of TVUS in endometriosis. Specificity of DIE varied from 50% (bladder, vaginal wall and rectovaginal septum) and 84% (rectosigmoid). Specificity of modified technique is much improved.

MRI assessment of endometriosis. The overall accuracy of TVS for preoperative assessment and estimation of DIE severity seems to be inferior to MRI.

TVUS markers for endometriosis	
Soft	Hard
Reduced ovarian mobility.	Endometrioma
Site-specific tenderness	Hydrosalpinx/haemosalpinx
Loculated Pelvic peritoneal fluid	DIE nodules

Effectiveness of TVUS in endometriosis			
	Standard TVUS		Modified TVUS – including site tenderness-guided
	Endometriomas	Deep-infiltrative endometriosis	Deep infiltrative endometriosis
Studies	8	9	-
Participants	765	934	-
Sensitivity	0.93	0.79	0.97
Specificity	0.96	0.94	0.97

MRI for endometriosis		
	Endometriomas	DIE
Studies	3	6
Participants	179	266
Sensitivity	0.95	0.94
Specificity	0.91	0.77

All images and data used with consent from patients and authors

Summary:

- **Superficial lesions most common but least likely to diagnosed with US or MRI**
- **Endometriomas are readily identified on US or MRI with more than 90% sensitivity and specificity.**
- **DIE can be found on ultrasound performed by a skilled sonographer while MRI has a 94% sensitivity and 79% specificity for DIE.**