RADY 401: Uterine Artery Embolization

Minhal Abidi 7.22.19
Overview

• History
• Work-ups
• Imaging
• Treatment options
• Procedure
• Literature review
Focused patient history and workup

• 47 y.o. G3P1021 with abnormal uterine bleeding & menorrhagia Dx w/ fibroids in 2014
  • Periods last 5 days, 9 pads on heaviest day
  • Associated symptoms: bloating, cramping, pelvic pain, dyspareunia, urinary frequency & urgency, nocturia 3x/night, constipation, & fatigue
  • Symptoms progressively worsened in the past 2 years since d/c depo shots

• PMHx: Uterine fibroid (2014), Iron deficiency anemia

• OBGYN Hx: ASCUS on pap (now resolved)

• PSHx: None

• FHx: DM, HTN, fibroids

• Social: Current everyday smoker

• Meds: Iron

• Allergies: NKDA
Indicated Studies

- Initial study for abnormal uterine bleeding

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US pelvis transvaginal</td>
<td>9</td>
<td>3-D imaging may be a useful adjunct to 2-D imaging to better characterize an intracavitary abnormality.</td>
<td>O</td>
</tr>
<tr>
<td>US pelvis transabdominal</td>
<td>8</td>
<td></td>
<td>O</td>
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<tr>
<td>US saline infusion sonohysterography</td>
<td>6</td>
<td>3-D imaging may be a useful adjunct to standard 2-D imaging if intracavitary abnormality is suspected.</td>
<td>O</td>
</tr>
<tr>
<td>US duplex Doppler pelvis</td>
<td>5</td>
<td>This procedure may be useful to better characterize a focal or diffuse endometrial abnormality.</td>
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<tr>
<td>CT pelvis with IV contrast</td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MRI pelvis without and with IV contrast</td>
<td>2</td>
<td></td>
<td>O</td>
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<tr>
<td>CT pelvis without IV contrast</td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>CT pelvis without and with IV contrast</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MRI pelvis without IV contrast</td>
<td>1</td>
<td></td>
<td>O</td>
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**Rating Scale:** 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level*
## Indicated Studies

- Follow-up study for abnormal ultrasound results

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<td>US duplex Doppler pelvis</td>
<td>7</td>
<td>This procedure may be useful to better characterize a focal or diffuse endometrial abnormality and to evaluate for vascular pedicle flow or irregular vessels in endometrial cavity.</td>
<td>O</td>
</tr>
<tr>
<td>MRI pelvis without and with IV contrast</td>
<td>5</td>
<td>Consider this procedure if SIS is not feasible.</td>
<td>O</td>
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<td></td>
<td>O</td>
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<tr>
<td>US pelvis transabdominal</td>
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<td>This procedure may be helpful if the uterus is in a neutral position or if uterine penetration by TVUS is poor.</td>
<td>O</td>
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<tr>
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*Relative Radiation Level*
List of Imaging Studies

- Endometrial biopsy
- US
- MRI
List of Imaging Studies

- Endometrial biopsy
- US
- MRI

Longitudinal Ultrasound showing fibroids

Sagittal T2-weighted MR image showing intramural fibroids
# Treatment Modalities

<table>
<thead>
<tr>
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<th>Preservation of fertility</th>
<th>Location</th>
<th>Outcome</th>
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| **Hysterectomy**        | No                        | Any                             | Definitive therapy  
Treats other gynecological diseases                                      |
| **Myomectomy**          | Likely                    | Hysteroscopic: Submucosal  
Abdominal: Intramural  
Subserosal | Preserves fertility  
Increased risk of uterine rupture in subsequent pregnancies |
| **Uterine Artery Embolization** | Possibly               | Intramural  
+/- Submucosal  
+/- Subserosal  | ↑ Reinterventions  
Shorter hospitalizations   |

(Warhadpande, 2019)
Imaging Studies

- Arterial
  - Radial
  - Femoral
- Vasospasm
- High radial origin
Radial Artery Vasospasm

• Most frequent complication of radial access
  • 15-30% of all coronary procedures
  • Also common with peripheral & visceral intervention
  • More common in vessels with a smaller diameter
• Anomalous origin of the radial artery is a major risk factor
  • 5-fold increase in risk of spasm
  • Possibly due to increased catheter manipulation in cannulation
• Difficulty in catheter manipulation
• Generally does not require changing access
• Best treatment is prevention via careful assessment of vessel diameter & prophylactic spasmolytic
• Chugh grade 3 & 4 requires additional sedation & analgesia

(Chugh, 2015)  (Posham, 2016)  (Ruiz-Salmerón, 2005)
Imaging Studies

- Pelvic arteriogram
  - Uterine artery is anteromedial in location
  - Long, tortuous
  - Often hypertrophied
Imaging Studies

Left uterine angiogram (pretreatment)

Left uterine angiogram (posttreatment)
Imaging Studies

Right uterine angiogram (pretreatment)

Right uterine angiogram (posttreatment)
Imaging Studies

• Check for ovarian supply

Aortogram of the aortic bifurcation & iliacs
Patient Treatment

• TR Band
• Ibuprofen 800mg
• Percocet 500mg
• Colace 100mg
• Zofran 4mg
• Admission vs Discharge
• Outpatient follow-up
Imaging Discussion: Appropriate Imaging

• Did the patient undergo appropriate imaging?
  • **Diagnostic Imaging**
    • Ultrasound: correct
    • MRI: correct for procedural planning
  
  • **Procedural Imaging**
    • Ultrasound: necessary to confirm radial artery patency
    • Fluoroscopy: necessary for real-time imaging of relevant structures during UAE
Imaging Discussion: Ultrasound

• Initial imaging of choice for abnormal uterine bleeding
• Uterine Leiomyoma
  • Sensitivity: 96.38%
  • Specificity: 96.00%
• Cost: $250 - $1100
• Radiation dose: ☐
Imaging Discussion: MRI

• Imaging useful for problem-solving and procedural planning
• Uterine Leiomyoma
  • Sensitivity: 94.10%
  • Specificity: 68.70%
• Cost: $1000 - $5000
• Radiation dose: ☺

(Stamatopoulos, 2012)
Imaging Discussion: UAE

• Uterine artery embolization
  • Sensitivity/Specificity: not applicable
  • Total cost: $6708 (vs. $7603 for myomectomy)
    • Decreased hospital care and operating costs
  • Radiation dose
    • DAP: 211 Gy cm$^2$
    • Fluoroscopy: 27 minutes

(Baker, 2002) (Tse, 2010)
Uterine artery embolization using a transradial approach: initial experience and technique

- Journal of Vascular and Interventional Radiology
- **Prospective study** with small sample size at a single center (24 cases)
  - Barbeau test
  - 4F Glidesheath via US guidance
  - 3000U heparin, 2.5mg verapamil, & 200mcg nitroglycerin
  - 4F 120 cm angled tip Glidecath
  - Embolization with calibrated microspheres
  - TR Band
- No major adverse events at 30 days
  - 1 minor grade 1 hematoma (spontaneously resolved)
- Patients able to ambulate after the procedure & discharged home same day
- Conclusion: transradial access is feasible, safe, & well tolerated

(Resnick, 2014)
Safety and efficacy of transradial uterine fibroid embolization via small caliber arterial access

- Journal of Vascular and Interventional Radiology
- Transradial access is safe with radial diameter ≥ 3.0 mm
- Average female RA is < 3.0 mm
- Retrospective study with small sample size (60 cases) in a single center
- Examined patients with RA calibers of 2 to 3.0 mm (mean 2.4 mm)
- No major adverse events
  - 2 minor: intra-operative RA vasospasm & ecchymosis around puncture site
- Conclusion: Transradial UFE with RA diameters of 2 – 3mm is safe & effective for treating fibroids
Uterine fibroid embolization via transradial versus transfemoral arterial access: technical results

- Open Access Macedonian Journal of Medical Sciences
- Retrospective study with small sample size (24 cases) at a single center
  - 11 TRA vs 13 TFA
- Mean procedure time
  - TRA: 60.3 minutes
  - TFA: 72.4 minutes
- Mean fluoroscopy time
  - TRA: 21.1 minutes
  - TFA: 25.3 minutes

(Gioreski, 2019)
Wrap up

• UAE is a minimally invasive option for fibroids
• Ultrasound is the initial imaging of choice, followed by MRI for problem solving
• Transfemoral and transradial access is most common
• Anomalous origin of the arteries predisposes to vasospasm
• Vasospasm is best handled prophylactically
• Literature suggests that radial approach is safe & feasible
References


• Hanafi, Magdi. "Ultrasound diagnosis of adenomyosis, leiomyoma, or combined with histopathological correlation." Journal of human reproductive sciences 6, no. 3 (2013): 189.


References


