Uterine Fibroid Embolization (UFE)

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Agenda

• Uterine Fibroids: Background
• Case Presentation
• Post-embolization Complications/Issues
• Literature Review
  – MRI Characteristics of Fibroids
  – Outcomes, UFE vs. Surgery
Uterine Fibroids: Epidemiology

• Uterine Fibroids are benign monoclonal tumors arising from the smooth muscle cells of the myometrium.
• They are the most common benign neoplasm in females affecting 25% of white and 50% of black women during their reproductive years.
• White women develop symptomatic fibroids in their 30s and 40s, whereas black women manifest disease at a younger age, even in their 20s.
• The cumulative incidence of fibroids of any size by age 50 has been estimated as >80 percent for black women and almost 70 percent for white women.
• Compared to white women, black women experience more severe disease symptoms.
• In most women uterine fibroids shrink at menopause.
Uterine Fibroids: Risk Factors

- Parity ↓
- Oral contraceptives ↓ (unless early exposure)
- Smoking ↓
- Diet: red meats ↑ and vegetables ↓
- Early menarche ↑
- Familial predisposition ↑
- Alcohol ↑
- Hypertension ↑
- Uterine infection ↑
- PCOS ↑
Uterine Fibroids: Symptoms

• **Heavy and/or prolonged menses** (menorrhagia)
• **Bulk-related symptoms**
  – Pelvic pressure resulting in urinary frequency, constipation, or hydronephrosis
  – Pelvic pain due to tumor degeneration or torsion
• **Reproductive dysfunction**
  – Infertility
  – Miscarriage
  – Pregnancy complications (placental abruption, dysfunctional labor)
Our Patient: Presentation

• 44 year-old G1P0 ♂, with a 2 year history of uterine fibroids and otherwise in good health, presented for uterine fibroid embolization (UFE).

• In last 2 months, she experienced increased pelvic clamping and constant daily bloating, increased urinary frequency, increased constipation, and one episode of urinary incontinence.

• She denied having significant or irregular bleeding with or without her periods
US revealed an enlarged fibroid uterus measuring 10.4 x 10.0 x 5.4 cm.
US revealed a large fibroid in the right fundus measuring 6.4 x 6.2 x 6.3 cm.
US Imaging: Left Fibroid

There is also a somewhat smaller fibroid in the left fundus measuring 5.4 x 4.3 x 4.5 cm.
MR Imaging: Coronal T2

- Coronal T2-weighted images (A-D; anterior to posterior).
- The uterus is anteverted and anteflexed and measures 9.1 x 6.4 x 11.7 cm. Multiple fibroids are present (white oval).
- The two largest fibroids are located in the right lateral aspect (6.4 x 7.8 x 6.8 cm) and in the left lateral aspect of the uterine body (5.4 x 4.3 x 4.2 cm) (white arrows).
- Both fibroids have areas of heterogeneous T2 signal intensity.
MR Imaging: Sagittal and Axial T2

- Sagittal (A-B; right to left) and axial (C-D; inferior to superior) T2-weighted images.
- The uterus is anteverted and anteflexed and measures 9.1 x 6.4 x 11.7 cm. Multiple fibroids are present (white oval).
- The two largest fibroids are located in the right lateral aspect (6.4 x 7.8 x 6.8 cm) and in the left lateral aspect of the uterine body (5.4 x 4.3 x 4.2 cm) (white arrows).
- Both fibroids have areas of heterogenous T2 signal intensity.
Uterine Fibroid Embolization: Indications/Relative Contraindications

• **Indications:** To relieve bothersome bulk-related symptoms and/or abnormal bleeding due to fibroids

• **Relative contraindications:**
  – Postmenopausal status (natural regression of fibroids)
  – GnRH agonists use (decreased uterine artery caliber/blood flow)
  – Pedunculated/submucosal fibroids (myomectomy/hysteroscopic resection is preferred)
  – Adenomyosis (hysterectomy is the definitive treatment)
  – Previous internal iliac artery ligation (vascular compromise)
  – Large/numerous fibroids
  – Future pregnancy plans
Uterine Fibroid Embolization: Absolute Contraindications

• **Absolute contraindications:**
  - GU infection
  - Malignancy
  - Immunosuppression
  - Vascular disease limiting access
  - Contrast allergy
  - Pregnancy
UFE: Procedure Steps

• Performed under local anesthesia with moderate sedation:
  1) Percutaneous access is obtained via femoral artery (most often right fem. a.).
  2) Arteriogram is performed for visualization. Uterine artery, ovarian/vesical artery branches supplying fibroids, and anatomic variations are identified.
  3) Catheter is passed into the distal uterine artery under fluoroscopic guidance and the embolizing agent is infused. The infusion is continued until flow to the fibroid/s ceases. The procedure is then repeated on the contralateral side.
  4) If necessary and feasible, utero-ovarian branches are embolized with superselective catheterization.
Patient’s UFE: Pre-embolization

Angiogram shows **hypertrophy of the uterine arteries with fibroid blush** (white arrows). No aberrant vessels or significant vesical/ovarian supply are seen.
Patient’s UFE: Post-embolization

- Abdominal aortogram demonstrates abrupt cut-off of the uterine arteries bilaterally (white arrows), as expected. In addition, there is no evidence for any ovarian/vesical arterial supply to the uterus.
Post UFE Complications

- Fever (2-4%)
- Readmission (2.4-3.5%)
- Unplanned surgical procedure (1-2.5%)
- Allergic reaction (2.5%)
- Hemorrhage (0.15-0.75%)
- Life-threatening event (0.2-0.5%)
Post-embolization Issues

- **Pain** – related to fibroid/uterus ischemia; mild to severe with variable duration; managed with PCA
- **Vaginal discharge** – bloody discharge can last ≥2 weeks
- **Postembolization syndrome** – occurs within 48 hrs and lasts up to 7 days; characterized by pelvic pain/cramping, nausea/vomiting, fever, fatigue, myalgias, and leukocytosis
- **Vaginal passage of fibroids** – can occur up to a year post UFE
- **Undetected sarcoma** – a handful of case reports of hysterectomies post UFE revealing low grade leiomyosarcoma previously diagnosed as fibroids
- **Ovarian dysfunction** – age-related transient or permanent loss of ovarian function; 1-2% risk in women <45, 15-20% risk in perimenopausal women >45
UFE: Short-term Outcomes

- Procedure is completed in 98-100% of patients
- Improvement of abnormal bleeding in 85-94%
- Improvement of dysmenorrhea in 77-79%
- Significant improvement in quality of life in 95%
- Additional invasive procedure in 14%
- Bulk-related symptoms controlled in 60-96%
- Mean uterine volume reduced by 40-70%
MR Characteristics of Fibroids and Outcomes

• Burn PR et al:
  – 18 women, 32 fibroids
  – On T1 pre and post contrast compared fibroids with hyperintense signal to those with hypointense signal (relative to myometrium)
  – Similarly, on T2 compared fibroids with hyperintense signal to those with hypointense signal (relative to skeletal muscle)
Burn PR et al: Results

- High T1 signal intensity before embolization was predictive of a poor response to UFE ($P = .008$)
- High T2 signal intensity was predictive of a good response to UFE ($P = .007$)
- Contrast enhancement signal characteristics were not predictive of post UFE uterine fibroid volume reduction
Burn PR et al: T1 MRI

• High signal intensity (relative to myometrium) seen on T1 MRI results from hemorrhagic necrosis and the presence of blood breakdown products. Thus, a fibroid that has outgrown its blood supply and degenerated is expected to show a poor response to UFE (black arrows).

• High signal intensity (relative to skeletal muscle) seen on T2 MRI results from increased cellularity and/or vascularity (white arrows). This feature renders the fibroid susceptible to UFE. At times the T2 signal intensity is heterogeneous, which reflects the diverse histologic composition of fibroid.
UFE vs. Surgery

• **Versus hysterectomy:**
  – Shorter procedure duration (-16 minutes; 95% CI -26 to -7 minutes)
  – Lower blood loss (-405 mLs; 95% CI -512 to -298 mLs)
  – Shorter hospitalization (-3.3 d; 95% CI -3.8 to -2.8 d)
  – Faster full recovery (-27 d; 95% CI -36 to -17 d)
  – *MORE* unscheduled visits (OR 1.8; 95% CI 0.98-3.30)
  – *HIGHER* rate of readmission (OR 6.0; 95% CI 1.1-31.5)

• **Versus myomectomy:**
  – Shorter procedure duration (-34 minutes; 95% CI -49 to -20 minutes)
  – Shorter hospitalization (-1.6 d; 95% CI -2.5 to -0.7 d)
  – Faster full recovery (-16 d; 95% CI -21 to -12 d)
  – *HIGHER* reintervention rate (OR 9; 95% CI 2-44)
References


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