ABSTRACT: Uterine fibroid embolization (UFE) is a widely accepted option for the treatment of symptomatic uterine fibroids. This article provides an overview of the nursing care that was provided for a patient who underwent UFE in a radiology department in a large teaching hospital in the Republic of Ireland. This article provides background information on the pathophysiology of uterine fibroids and an overview of the selection criteria and contraindications, which were taken into account by the radiologist before determining that UFE was the best treatment for the patient. The care plan uses the NANDA International (formerly the North American Nursing Diagnosis Association) planning process and is presented in three phases, that is, preprocedure, intraprocedure, and postprocedure. The selected patient nursing care plan demonstrates the essential role of the nurse in a busy radiology department while highlighting the nurse's role in maintaining a safe environment for the patient. (J Radiol Nurs 2015;34:143-149.)

KEYWORDS: Uterine fibroid embolization; Uterine artery embolization; Nursing care plan; Radiology; Leiomyomata.

INTRODUCTION

Uterine fibroids are the most common benign uterine tumors occurring in women of reproductive age. They affect between 20% and 25% of all women and 40% of menstruating women (James & Ahn, 2010; Lumsden, 2010). Uterine fibroids are also known as leiomyomas. They are frequently asymptomatic, but when symptomatic in approximately 50% of cases (Istre, 2008), they can have a significant impact on a women’s quality of life. Symptoms that women present with include heavy menstrual bleeding, pain, and bulk-related symptoms. Uterine fibroids have also been
implicated in infertility and complications in pregnancy although the exact figure is unknown. Uterine fibroid embolization (UFE) also referred to as uterine artery embolization is a minimally invasive percutaneous image-guided therapy (Andrews, Spies, Sacks, & Worthington, 2009) to treat uterine fibroids, but when symptomatic. Uterine artery embolization (UAЕ) has also been used to treat gynecologic hemorrhage in a variety of clinical conditions, including postpartum hemorrhage, bleeding after cesarean section and bleeding after gynecologic surgery (National Institute of Clinical Excellence, 2013). During UFE, blood supply to the fibroid is blocked by embolic materials. An infarcted fibroid will eventually shrink and will be absorbed or expelled by the body.

**Pathophysiology**

The uterus is a hollow muscular organ that lies in the pelvic cavity between the urinary bladder and the rectum. The walls of the uterus are composed of three layers of tissue: perimetrium, myometrium, and endometrium. Blood supply to the uterus is by the uterine arteries, which branch from the internal iliac arteries (Waugh & Grant, 2007). Fibroids often appear singular but most commonly appear in multiples, varying in size and location (Istre, 2008). Macroscopically, they are firm and round or oval-shaped tumors composed of smooth muscle bundles in a whorl-like pattern (Istre, 2008). They are classified according to their location within the uterus. Subserosal fibroids develop in the outer portion of the uterus. These fibroids can grow outwardly and may contribute to pain because of their size and added pressure on other organs (Ezzati, Norian, & Segars, 2009). Intramural fibroids are the most common uterine fibroids and develop in the uterine wall and expand but do not distort the endometrial cavity (Ezzati et al., 2009). Submucosal fibroids that develop in the uterine cavity are the less common type and distort the endometrial cavity (Ezzati et al., 2009). Pedunculated fibroids occur when the fibroid grows on a stalk, resulting in pedunculated submucosal or pedunculated subserosal fibroids (Mutai, Vinayak, Stones, Hacking, & Mariara, 2015).

**Treatment Options**

UFE offers an alternative treatment to chronic hormonal therapy and traditional surgical treatments, such as hysterectomy and myomectomy, to women with symptomatic uterine fibroids. The Cochrane review compiled by Gupta, Sinha, Lumsden, and Hidy (2012) concluded that UFE appears to have an overall patient satisfaction rate similar to hysterectomy and myomectomy, while offering an advantage with regard to a shorter hospital stay and a quicker return to routine activities. However, UFE is associated with a higher rate of minor complications and an increased likelihood of requiring surgical intervention within 2 to 5 years of the initial procedure (Gupta et al., 2012). Andrews et al. (2009) on behalf of the Task Force on Uterine Artery Embolization and the Standards Division of the Society of Interventional Radiology in the United States recommended that embolization is offered only to women with symptomatic uterine fibroid. Treatment selection depends on the position of the fibroids in the uterus and patient’s opinion about the treatment plan.

Contraindications for UFE can be divided into absolute and relative contraindications. Absolute contraindications include a viable pregnancy, active untreated infection, and gynecologic malignancy. Active infection can lead to abscess formation and related septic complications. Relative contraindications include desire to maintain childbearing potential, coagulopathy, severe contrast material allergy, renal impairment, immune compromise, previous pelvic irradiation or surgery, and/or chronic endometriosis (Spies, 2011). Fibroid embolization carries significant risks, but these should be balanced against the risks of a surgical procedure. Potential complications are bleeding, hematoma, infection, sepsis, premature menopause, and fibroid expulsion (Spies, 2011).

**Patient Presentation**

This case focuses on a lady in her mid 40s who presented to her general practitioner with a 6 months' history of pelvic fullness, abnormal menstrual bleeding, and increased urinary frequency during day time. A diagnosis of uterine fibroid was established through the use of a pelvic ultrasound scan. The patient was referred to the gynecology department, where in turn she was referred to an interventional radiologist for an opinion with a view to performing a UFE. The patient had an outpatient consultation before embolization to evaluate and determine if embolization was clinical indicated.

Uterine artery embolization is offered only to patients with symptomatic uterine fibroids. Because symptoms associated with uterine fibroids can also occur with other diseases of the uterus, such as uterine malignancies, it is crucial that all patients undergo a preprocedural evaluation to confirm that the symptoms are caused by uterine fibroids (Andrews et al., 2009). Most patients present with symptoms, such as heavy menstrual bleeding; bulk-related symptoms including pelvic pressure, heaviness, or discomfort; abdominal bloating; urinary frequency or incontinence; ureteral compression; and rectal pressure as urinary frequency and pain (including pelvic, back, leg, and flank pain) (Andrews et al., 2009). In addition to the initial ultrasound scan, a preprocedure pelvic magnetic resonance imaging (MRI) scan was performed, which showed a large dominant intramural mass in the anterior wall of the uterus.
According to Spies (2011), fibroid number and location can be assessed most effectively with MRI. Interventionists prefer pelvic MRI, which has superior contrast resolution and provides multiplanar imaging. The location of the fibroid is one of the important factors in patient selection because not all fibroids can be treated with uterine artery embolization (James & Ahn, 2010). Severely pedunculated subserosal fibroids are a relative contraindication because of risk of sloughing into the abdomen (James & Ahn, 2010). The patient’s mass measured 12.0 × 9.9 × 9 cm (Figure 1) and was pressing on the patients’ bladder. Her symptoms were attributed to this compression. UFE is effective in treating bulk-related symptoms and is an accepted alternative to surgical therapy (James & Ahn, 2010).

As mentioned previously, one of the relative contraindications to UFE is the desire to maintain childbearing potential. Although successfully pregnancies have been reported after UFE, most studies do show increased risks, such as spontaneous abortion, abnormal placenta position, and postpartum hemorrhage (Ezzati et al., 2009). Pregnancy-related contraindication was overruled in this patient's case as she did not have plans for more children. The patient had a history of carotid thrombus in 1999 and was on prophylactic aspirin. Her antiplatelet therapy was not discontinued because patients with a high risk of thrombosis undergoing an interventional procedure should continue antiplatelet therapy as close to the procedure as possible (Saad & Mathis, 2010).

**CASE REPORT**

Preprocedure patient assessment is of paramount importance in radiology nursing. This is done to assess physical and psychological well-being, to prevent unnecessary delay, to ensure patient safety and prevention of injury, and to identify potential hazards to both patient and staff (RCN, 2006). Preprocedure patient assessment is the process by which an individual’s suitability for the procedure is determined (McNeil, 2008). The patient assessment started with her initial consultation with the radiologist, approximately 1 month before the procedure. Her medical and surgical history was thoroughly examined. From a radiology nurse’s perspective, preprocedure assessment commenced the day before the procedure by making a previsit telephone call to the patient as recommended by Grossman (2011).

The preprocedural assessment was recorded in the procedural sedation patient record. Accurate and comprehensive documentation of a patient episode is vital for the continuation of care and also to make sure that all patient details are easily accessible to the entire team (Goldsmith & Lumsden, 2008). The procedural sedation record consists of patient profile, baseline observations, allergies, infectious status, timeout section, preprocedure risk assessment by medical team, blood results, preprocedure check by the nurse, anticoagulation status, Modified Aldrete Sedation Scoring System, Ramsay Sedation Scale, inprocedure patient monitoring, medication and fluid prescription, as well as transfer and discharge checklist.

The preprocedural risk assessment was undertaken by the radiologist to establish the patients’ suitability for sedation and analgesia. The assessment included American Society of Anaesthesiologists Classification (ASA, 2014); airway classification; neck motion, jaw size; respiratory, cardiovascular, and neurology assessments, and the documentation of last menstrual period. UFEs are performed within the radiology department within 10 days of the last menstrual period. The patient also signed a not pregnant declaration form. The preprocedural checklist was completed, which included confirmation of patient’s identity by securing an arm band with patient details, provision of medical notes, consent, fasting history, diabetic history, and anticoagulation status. The patient was classified into class P2 of the ASA classification, which confirms that she was a patient with controlled medical conditions without systemic effects. The Modified Aldrete Sedation Scoring determines the levels of activity, respiration, circulation, consciousness, color, and oxygen saturation. The patient had a total score of 12. According to the Ramsay Sedation Scale, the patient was identified as co-operative, oriented, and tranquil.

For a planned invasive procedure, a written consent is necessary, and adequate time should be given to the patient to consider the information given. At the outpatient consultation, the consultant radiologist counseled the patient carefully in relation to a clear description of the
outcomes of UFE in comparison to alternatives, a full description of the procedure, a full discussion of the complication, and the possibility that further surgery may be required. These principles of discussion are aligned with the recommendations by National Institute of Clinical Excellence (2013). On admission, an informed written consent was obtained from the patient by the radiologist. Elements of informed consent that includes purpose of the procedure, risks and discomfort, benefits, alternative treatments, and voluntary participation were acknowledged during the process (Applebaum, 2007). In accordance with National Institute of Clinical Excellence (2013) guidelines, the unit manager participated in the process of consent taking by being a manager, witness, information giver, and also as a patient advocate (Susilo, Scherpbie, Tanto, Yuhanti, & Ekawati, 2013) (Table 1).

**Nursing Care During Radiological Management**

The nursing process during radiological intervention is a continuous process with three phases of interlinked

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**Table 1. Nursing care plan: preprocedural phase**

<table>
<thead>
<tr>
<th>Nursing diagnosis</th>
<th>Plan</th>
<th>Implementation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of bleeding related to antiplatelet therapy</td>
<td>To review nursing assessment, patient’s medical history, medication history</td>
<td>1. Blood tests (full blood count, urea &amp; electrolytes, and coagulation profile) 2. Documentation 3. Handover</td>
<td>To assess the risk for bleeding Documentation and handover confirms patient safety (Grossman, 2011)</td>
</tr>
<tr>
<td>Risk of contrast-induced nephropathy</td>
<td>To assess the risk level of renal injury and take necessary steps to minimize injury</td>
<td>1. Blood urea &amp; creatinine levels 2. Intravenous administration of 0.9% sodium chloride 100 mL/hr 3. Diabetic history 4. Maintain intake output chart (Stacul et al., 2011)</td>
<td>Nursing interventions reduce the toxic effect of contrast media (Jones &amp; Taylor, 2006)</td>
</tr>
</tbody>
</table>

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nursing activities (Smeltzer, Bare, Hinkle, & Cheever, 2008); preprocedure, intraprocedure, and postproce-
dure phases. The nursing care that the selected patient
received during her procedure in the radiology depart-
ment is outlined using NANDA (NANDA Interna-
tional, formerly the North American Nursing
Diagnosis Association) (Table 2).

**Table 2. Nursing care plan: intraprocedural phase**

**Nursing diagnosis I: Potential to procedure-related hazards**

**Plan:** To take necessary steps to prevent potential hazards

**Implementation:**
1. Time out
2. Medication safety guidelines
3. Labeling of syringes (Statler et al., 2009)
4. Discarding used syringes
5. Radiation safety by following local protocols and practices
6. Positioning—supine to allow right femoral artery entry (Dean & Scoggins, 2012)
7. Contrast reaction tray
8. Emergency trolley (Gross et al., 2002)

**Rationale:** A radiology department poses some risk to the patient from environmental considerations, such as use of X-rays. The imaging nurse can make sure that the potential risk is minimized by following evidence-based practice and internationally accepted guidelines

**Evaluation:** Risk of procedure-related hazards is kept as low as reasonably achievable

**Nursing diagnosis II: Anxiety and pain related to procedure**

**Plan:** To assess the level of anxiety and pain and to achieve maximum comfort and co-operation

**Implementation:**
1. Local anesthesia
2. Patient-controlled analgesia
3. Procedural sedation (Skehan et al., 2000)
4. ABCDE Sedoanalgesia protocol (Skehan et al., 2000)
5. Supplemental oxygen (Gross et al., 2002)
6. Monitoring (Gross et al., 2002)
7. Provide further dose of sedation or analgesia if required after verbal order by radiologists
8. Music (Vanderboom, 2007)

**Rationale:**
1. To prevent initiation and conduction of nerve impulses
2. For pain management in the postprocedure phase
3. To prevent anxiety and pain
4. Prevent deep sedation and to provide adequate sedation
5. To prevent hypoxia (Gross et al., 2002)
6. To detect changes in vital signs
7. To maintain continuity of sedation & patient comfort
8. Music helps to reduce anxiety

**Evaluation:** Patient verbalizes her anxiety and better understanding about the procedure and postprocedure events (Nagle, 2007)

**UFE: Technique and Equipment**

The right femoral artery was accessed with ultrasound
guidance with a 21-gauge micropuncture needle. Because the uterine arteries are the branches of the internal iliac arteries, the internal iliac artery was selec-
tively catheterized with a 5-FR hydrophilic Cobra cath-
ether (Terumo Europe N.V., Leuven, Belgium) and 0.035” hydrophilic guide wire. The bilateral uterine arteries were selected, and the embolization of the fibroid was done by injecting 20 mL of 500 µg Embo-
zene polyvinyl alcohol particles (CeloNova BioSci-
ences, Inc, Ulm, Germany). Successful treatment of the uterine fibroid requires distal occlusion of all branches of the uterine arteries feeding the fibroid (Andrews et al., 2009). A satisfactory-successful embo-
lation was confirmed by imaging the to and fro flow of Embozene within the uterine arteries (Figure 2A and B). The catheter and guide wire were removed under fluoroscopic guidance, and hemostasis was achieved using an Angioseal closure device (St Jude Medical, Minnetonka, MN, USA) (Table 2).

**Procedural Sedation Agents**

The administration of procedural sedation is based in the ABCDE Sedoanalgesia protocol (Skehan et al., 2000). The protocol guides the interventional team in the initial dose and the subsequent maintenance doses of sedation agents. The ABCDE protocol is based on the patient’s body weight. The patient received a total of 150 µg of intravenous fentanyl and 8 mg of midazolam to achieve moderate sedation during the procedure (Table 3).

**Discharge and Follow-Up**

The patient was transferred to the ward when the pain score was 2 of 10, and her Aldrete score was the same as the preprocedure score. The purpose of overnight stay after UFE is to ensure that pain is controlled adequately and to provide maximum comfort in the postprocedural phase (Andrews et al., 2009). She was received by ward nurse, and handover was given based on the transfer and discharge checklist. The patient was reviewed by the radiologist within several hours of completing the procedure to assess pain control and any complications. The patient was discharged on the next day after the review by the radiologist. A
A prescription for oral anti-inflammatory agents and analgesics was prescribed. An information leaflet that explains the expected complications and management was also provided at the time of discharge.

In conclusion, the patient had an uneventful UFE without any immediate complication. She was given an outpatient appointment with the radiology consultant after 6 weeks and MRI scans after 6 months to determine whether all existing leiomyomata have been infarcted and to determine whether any uterine complications have occurred (Andrews et al., 2009). The follow-up MRI result is unknown.

**DISCUSSION**

This case presentation has outlined the patient presentation and journey through the radiology department from a nursing perspective using NANDA to describe the nursing care given. The highly technical and specialty area of radiology requires the nurse to achieve knowledge skills and competencies in perioperative nursing, critical care, ambulatory day care, emergency nursing, and radiation safety (Sousa, 2011). Radiology nurses are responsible for the assessment, care planning, and direct care of patients before, during, and after therapeutic imaging procedures, such as

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**Table 3. Nursing care plan: postprocedural phase**

<table>
<thead>
<tr>
<th>Nursing diagnosis I: Acute pain because of infarction to the fibroid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan: To assess the level of pain and to take necessary steps to reduce the pain</td>
</tr>
<tr>
<td>Implementation:</td>
</tr>
<tr>
<td>1. Assess the pain using numerical pain assessment tool. Pain score 8/10</td>
</tr>
<tr>
<td>2. Patient-controlled analgesia</td>
</tr>
<tr>
<td>3. Medications: Intravenous paracetamol/acetaminophen 1 g, and intramuscular morphine 5 mg</td>
</tr>
<tr>
<td>4. Reassessment</td>
</tr>
<tr>
<td>5. Reassurance</td>
</tr>
<tr>
<td>6. Therapeutic environment</td>
</tr>
<tr>
<td><strong>Rationale:</strong></td>
</tr>
<tr>
<td>1. To determine the severity of pain and intervention</td>
</tr>
<tr>
<td>2. To control the pain caused by transient uterine ischemia (Spies, 2011)</td>
</tr>
<tr>
<td>3. Paracetamol/acetaminophen intravenously is the first drug of choice for the management of post UFE pain (Hong, Rodriguez, &amp; Thornton, 2010)</td>
</tr>
<tr>
<td><strong>Evaluation:</strong> Patient expressed reduction in pain (Hong et al., 2010)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nursing diagnosis II: Potential to hemodynamic and physiologic imbalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan: To observe the patient closely to detect early changes in hemodynamic balance</td>
</tr>
<tr>
<td>Implementation:</td>
</tr>
<tr>
<td>1. Monitor and record vital signs every 15 min</td>
</tr>
<tr>
<td>2. Observe for postembolization syndrome (Schirf, Vogelzang, &amp; Chrisman, 2006)</td>
</tr>
<tr>
<td>3. Check the access site for bleeding and hematoma</td>
</tr>
<tr>
<td>4. Absolute bed rest</td>
</tr>
<tr>
<td>5. Intravenous fluids &amp; intake/output chart (Andrews et al., 2009)</td>
</tr>
<tr>
<td><strong>Rationale:</strong> Nursing interventions are directed toward the early detection and management of complications (Jones &amp; Taylor, 2006)</td>
</tr>
<tr>
<td><strong>Evaluation:</strong> Less potential for complications</td>
</tr>
</tbody>
</table>

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**Figure 2.** (A) Before embolization: selective digital subtraction angiogram of the left uterine artery before embolization. (B) After embolization: digital subtraction angiogram of the left uterine artery after embolization.
UFE and others. This case presentation has highlighted the intrinsic role of the nurse within the radiology department demonstrating the plethora of specialized knowledge and skills required for safe and effective practice. Relatively, radiology nursing is a new specialist area, and thus, there are a limited number of publications by nursing and academic experts, which can be drawn on when planning nursing care during these therapeutic interventions. Thus, the reporting of patient cases such as this will aid in the development of nursing care plans and/or care pathways in radiology departments.

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National Institute of Clinical Excellence (2013). Clinical recommendations on the use of uterine artery embolization (UAE) in the management of fibroids. UK: NICE.

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