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HOW I DO IT

Uterine Artery Embolisation for the Treatment of Symptomatic Uterine Leiomyomata — Technique

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ABSTRACT

Uterine leiomyomata (fibroids) are extremely commonly encountered in gynaecological practice. Treatment has traditionally focused on medical and surgical modalities, but the interventional radiology technique of uterine artery embolisation has evolved as an alternative in the past few years. The purpose of this review is to describe this technique as practised at St James' Hospital, with particular emphasis on its logical stepwise approach and peri-procedural care.

Key Words: *Artery, Embolisation, Leiomyoma, Technique*

INTRODUCTION

Uterine leiomyomata (fibroids) are the most frequent cause of abnormal uterine bleeding across all age groups. Symptoms related to bulk such as frequency of micturition and pelvic pressure sensations are well described, while their significance as a cause of infertility is somewhat more controversial.[1]

Uterine artery embolisation to treat fibroids was first described by Ravina et al in 1995.[2] The technique was initially used as a last resort when surgical therapies such as hysterectomy and myomectomy were contraindicated, but it is now often employed following failure of medical therapy such as hormonal manipulation with gonadotrophin-releasing hormone (GnRH) analogues.[3] Greater patient awareness of the availability of the technique has led to a significant referral base from the gynaecology services affiliated to St James' Hospital. Final decision on patient selection for uterine artery embolisation is made after combined clinico-radiological work-up and case discussion between clinical and radiology consultants.

The bulk of fibroid disease is documented by a combination of ultrasound and magnetic resonance imaging and all patients at St James' Hospital have formal pre-procedure counselling by an interventional radiologist. Informed consent is formally sought in writing on the day of the procedure.

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Anatomy

The internal iliac arteries arise bilaterally from the common iliac arteries in front of the sacro-iliac joint at the level of L5/S1 or the pelvic inlet. These arteries descend to the sciatic foramen and divide into anterior trunks, which continue down towards the ischial spine, and posterior trunks. The uterine artery on each side is 1 of 8 named branches of the anterior trunk in women, and runs medially and ascends tortuously in the broad ligament. Tortuosity becomes progressively more marked with increasing fibroid size. In addition to supplying the body of the uterus and embedded fibroids, the uterine artery contributes some of the blood supply to the fallopian tubes, ovaries, cervix, and vagina by way of rich pelvic anastomoses.[4]

Technique

Embolisations at St James' Hospital are performed in a standard angiographic suite using the Siemens Multistar Plus/T.O.P (Siemens AG, Forchheim, Germany). On the morning of the procedure, patients receive 100 mg diclofenac sodium by suppository and are then premedicated with sedoanalgesia in the form of titrated doses of midazolam and an opiate such as cyclimorph or pethidine immediately preprocedure. A broad-spectrum antibiotic such as a third-generation cephalosporin is

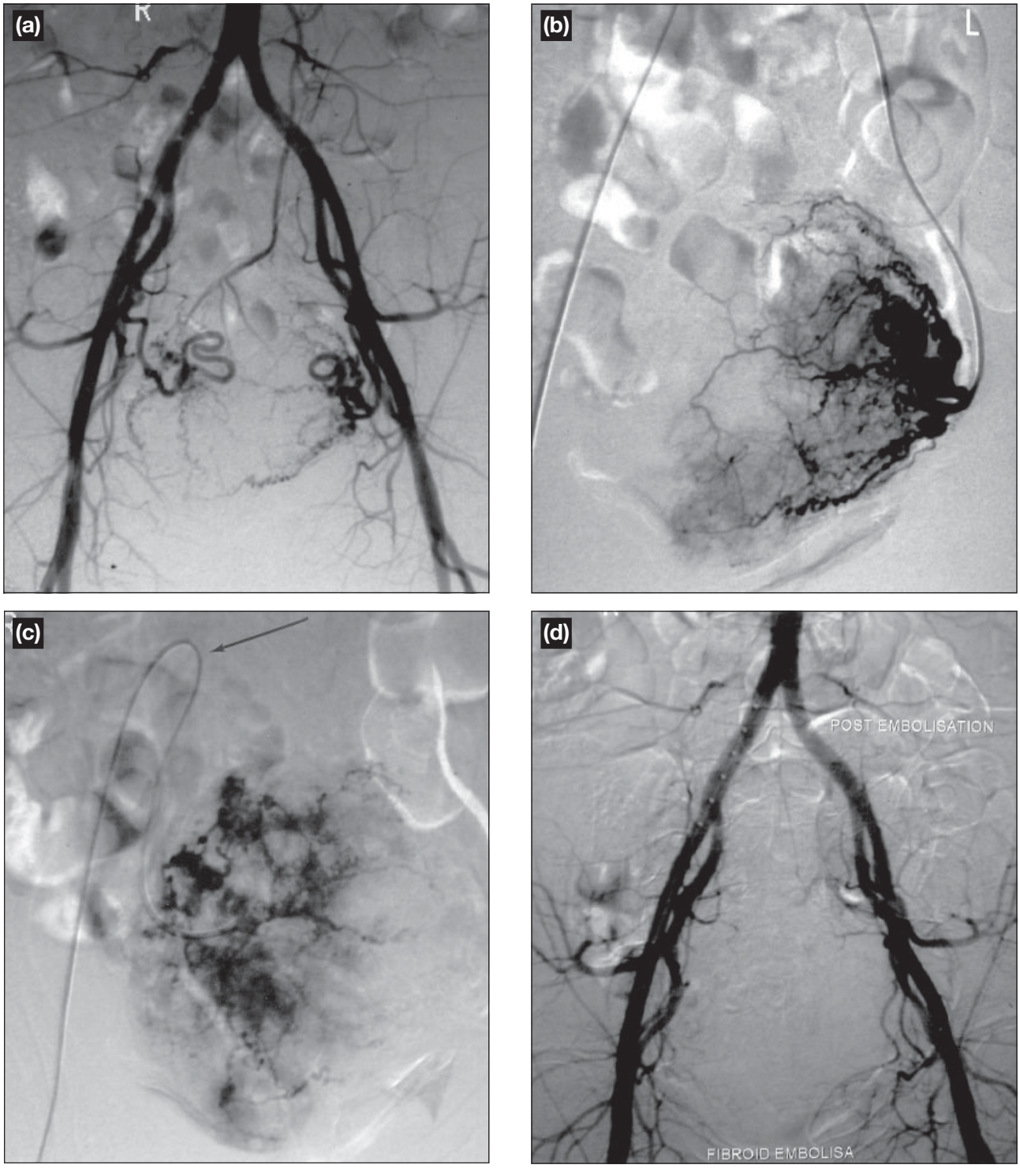

Figure 1. (a) Flush aortogram at the level of the bifurcation shows enlarged tortuous uterine arteries bilaterally, running medially from the internal iliac artery on each side. (b) Test injection of contrast pre-embolisation after selective catheterisation of the contralateral uterine artery shows the optimum position for embolisation and the hypervascularity associated with large fibroids. (c) The ipsilateral uterine artery has been selectively catheterised. Embolisation is nearly complete, as evidenced by the greatly decreased hypervascularity. Note the acute angulation of the catheter (arrow). (d) Flush aortogram postembolisation of both uterine arteries shows almost complete vessel occlusion on each side.

administered intravenously once the patient is ready. Patients are monitored with pulse oximetry and electrocardiography during the procedure.

A single vessel femoral arterial puncture is used, usually on the right side, using an 18 G arterial entry needle (Boston Scientific Corporation, Watertown,

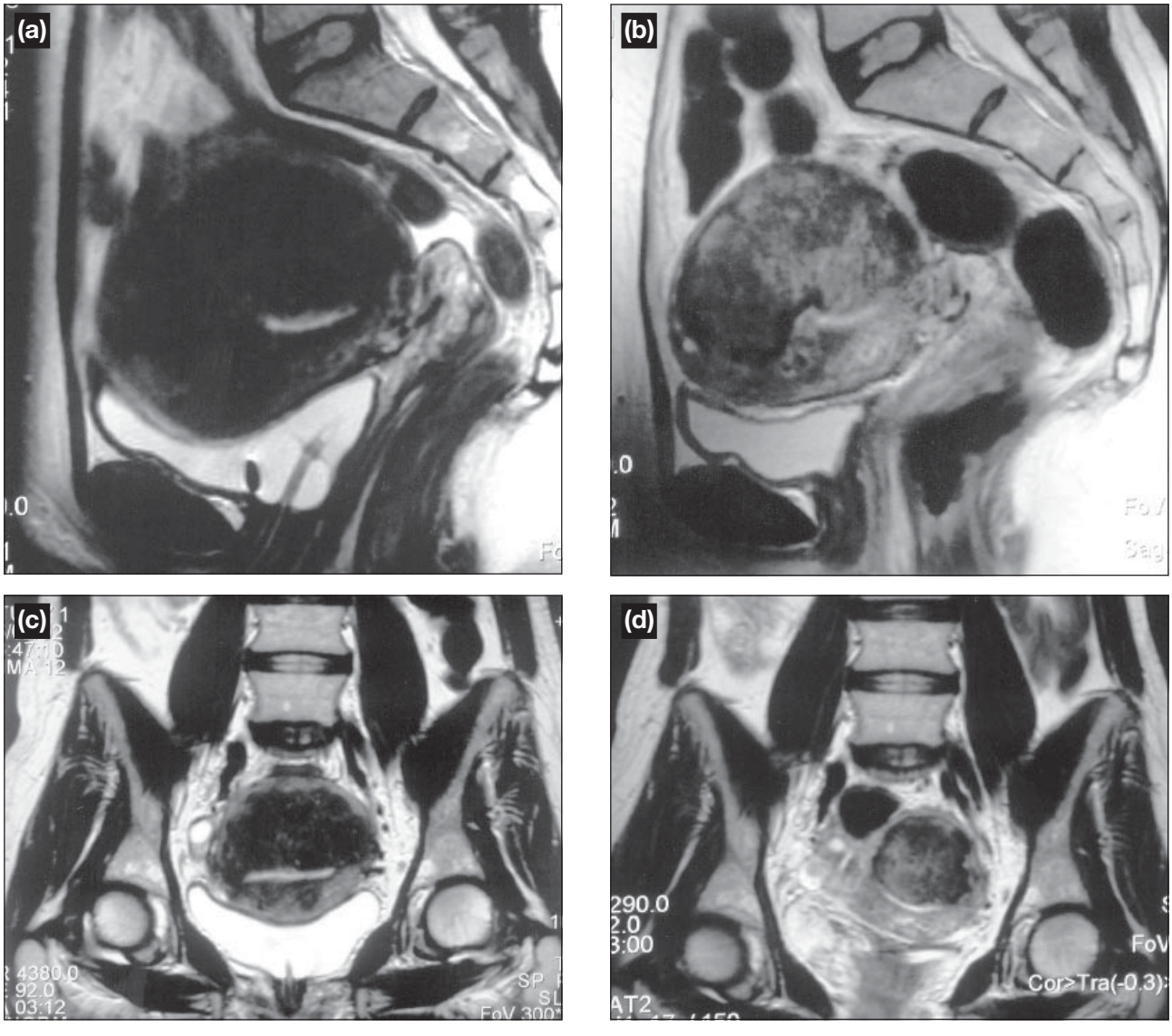

Figure 2. (a) T2-weighted sagittal magnetic resonance imaging performed as part of preprocedural evaluation shows a bulky fibroid uterus. (b) T2-weighted sagittal magnetic resonance image at the same level postembolisation shows considerable interval reduction in fibroid size. The higher signal intensity post-embolisation may be related to necrosis and increased water content. (c) T2-weighted coronal magnetic resonance image preprocedure in the same patient again shows a bulky uterus with a dominant leiomyoma (arrow). (d) T2-weighted coronal magnetic resonance image postembolisation at the same level shows similar changes of decrease in size and increase in signal intensity as Figure 2b.

USA), and a 5 Fr arterial sheath (Cordis Corporation, Miami, USA) is introduced over a 150 cm 0.035 inch Cordis guidewire — the sheath facilitates multiple catheter exchanges.

Next, a 5 Fr 65 cm Omniflush catheter (Angiodynamics Inc., Queensbury, USA) is advanced over the guidewire and sited at the aortic bifurcation — an aortic flush is performed. The contrast medium used at St James's Hospital is iomeprol (Merck Pharmaceuticals, West Drayton, UK) 300 mg iodine per ml. The initial contrast flush shows the aorto-iliac anatomy bilaterally, the degree of tortuosity of the uterine arteries and any hypervascularity associated with large fibroids (Figure 1a).

The Omniflush catheter is used to engage the contralateral common iliac artery and a 0.035 inch 180 cm angled Terumo guidewire (Terumo Corporation, Tokyo, Japan) is passed distally. The Omniflush catheter is then exchanged over the hydrophilic guidewire for a 65 cm 4 Fr Cobra 2 (Terumo Corporation, Tokyo, Japan). This latter catheter is generally adequate for selective catheterisation of the uterine artery, in conjunction with the hydrophilic guidewire (with or without a torque device) and roadmapping facilities.

Once selective catheterisation has been achieved the aim is to obtain a secure position 4 to 5 cm within the uterine artery, not beyond the origin of major branches supplying the fibroid, but distal enough to avoid reflux into the other branches of the anterior trunk of the internal iliac artery (Figure 1b). High flow in the uterine arteries supplying fibroids is thought to protect against reflux.[3] If access to a uterine artery cannot be achieved with a catheter such as the aforementioned 4 Fr Cobra 2, some authors advocate use of a coaxial 3 Fr microcatheter.[5]

The choice of embolic material is embosphere microspheres 300 μm to 500 μm, 500 μm to 700 μm, or 700 μm to 900 μm (Biosphere Medical, Rockland, USA). Smaller particles lead to better devascularisation but, conversely, cause more pelvic pain in the post-procedure period.[3] The smallest embosphere particles are mixed with two-thirds strength iodinated contrast for the initial injections, and the particle size is moved up empirically, depending on the observed rate of decrease of flow as the particles are injected using fluoroscopy. Near complete cessation of antegrade flow is the point at which injection is terminated.

Bilateral embolisation is essential as the anastomotic blood supply between both uterine arteries is the cause of unsuccessful outcome in unilateral embolisation.[2] Failure of unilateral embolisation treatment was in fact first noticed in the management of postpartum haemorrhage,[6] and is assumed to be due to the presence of numerous pelvic arterial anastomoses.

The same equipment as outlined above for left-sided embolisation is used to catheterise the right (ipsilateral) side (Figure 1c). The road-map facility is again extremely useful, often in different degrees of obliqueness. Entry into the main trunk of the internal iliac artery is somewhat more difficult on this side (assuming right-sided puncture) because of the acute angle of take-off. The embolisation protocol and technique is identical to the contralateral side. The practice is to confirm adequate devascularisation with a repeat aortic flush postembolisation of the ipsilateral side (Figure 1d). Overall, radiation exposure from the procedure is roughly equivalent to 1 to 3 Barium enema examinations.[7]

Post-procedural Care

Postembolisation pain is almost invariable after embolisation of the second side, is generally severe, and most often requires opiate analgesia, with possible recourse to a patient-controlled pump (PCA). In addition to pain management, patients require standard postangiogram care and precautions. Discharge from hospital is generally possible on the second day post-procedure, and the patient is reviewed by both the radiologist and the gynaecologist prior to discharge.

Follow Up

Both ultrasound and MRI are valid follow-up imaging modalities.[7,8] The preference is for MRI. The accepted practice of comparing the diameter of the largest fibroid before and after embolisation therapy is used to assess size reduction (Figures 2a to 2d).[3]

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