

INTERVENTIONAL RADIOLOGY:

A viable alternative to gynaecological surgery?

Interventional radiological procedures can be used as alternatives to some gynaecological surgery. Uterine fibroid embolisation, ovarian vein embolisation, fallopian tuboplasty and magnetic resonance (MR)-guided focused ultrasound ablation are all promising new techniques.

Fibroid Embolisation

Although hysterectomy is a common treatment for symptomatic fibroids, an increasing number of women are seeking less invasive methods of treating uterine fibroids. Recently uterine fibroid embolisation has emerged as an alternative with a reported success rate of 80 to 95 per cent. This new procedure remains controversial, with many gynaecologists expressing reservations.

Indications

Indications for uterine artery embolisation (UAE) include menorrhagia, pelvic pain or pressure/bulk symptoms (low back pain, urinary frequency and constipation) from fibroids. The most suitable patients for embolisation therapy are:

- those with large symptomatic fibroids who have failed to respond to drug therapy,
- who fear the morbidity of hysterectomy or the complications of myomectomy,
- women who wish to remain fertile and avoid hysterectomy, and
- those wishing to avoid blood transfusions.

UAE is not recommended for adenomyosis and is not a treatment option for infertility.

Contraindications

A viable intrauterine pregnancy is an absolute contraindication to UAE. Chronic endometritis may only be a relative contraindication if antibiotics are given before and after the procedure.

Pre-procedure work-up

If the patient has abnormal menstrual bleeding, the gynaecologist may wish to perform a curette to exclude endometrial carcinoma.

Fibroid size and location also need to be considered in patient selection. Fibroids that protrude into the uterine cavity and have a thin stalk are better removed hysteroscopically. If embolised, these fibroids have a tendency to slough off and could

result in infection, bleeding and significant pain during passage. All fibroids with a submucosal component may have a similar risk of passage with associated symptoms of fever, pain and bleeding. This complication can happen as long as one year post-procedure and is the most common post-UAE complication requiring rehospitalisation.

The size of the dominant fibroid must be considered. Some studies have reported treatment failure to be more likely with fibroids less than eight centimetres (< 8 cm). Although these large fibroids usually undergo an appropriate degree of volume reduction, the residual fibroid may still be large enough in size to result in persistent bulky symptoms.

The uterine fibroids can be imaged by ultrasound or magnetic resonance imaging (MRI). Preliminary blood tests include haemoglobin level, pregnancy test and LH level.

Patient consent

The gynaecologist and interventional radiologist need to explain the potential risks and benefits of uterine artery embolisation (UAE) so that an informed consent is obtained.

Patients need to be counselled about the risks of the procedure, which include a vaginal discharge which may last up to one month, ovarian failure and urgent hysterectomy.

Patients for UAE also need counselling about realistic expectations from the procedure, how the procedure will be performed and pain control after the procedure. The patient needs to be aware that UAE is not a treatment for infertility.

Procedure

Embolisation of uterine fibroids is performed in an angiographic suite under sterile conditions and the patient is prepared as for any routine radiological arteriogram.

The right inguinal region is cleaned with antiseptic solution and local anaesthetic is injected around the common femoral artery and the overlying skin. Access to the arterial system is gained by the Seldinger technique with a guide wire passed through the entry needle. A sheath is introduced over the protruding guide wire. This then allows passage of a pigtail catheter to perform the preliminary aortogram. The aortogram is necessary



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to provide a road map for further catheter manipulation. The aortogram shows the uterine arteries and the capillary blush and mass effect from the fibroid(s). It is important that the pigtail catheter is placed at the L1 level to show the ovarian arteries. Delineation of ovarian artery to uterine artery anastomosis is of practical relevance in avoiding non-target ovarian embolisation and in identifying those who would be at risk of uterine artery embolisation or ovarian failure.

Under fluoroscopic screening and with the aid of the guide wire, a selective catheter is tracked down to the internal iliac artery and uterine artery; usually the left side is performed first. Contrast medium is injected into the selective catheter to confirm its position. It is important that the catheter tip is placed in the ascending portion of the U-loop of the uterine artery to avoid embolisation of the cervical and vaginal branches.

The occluding agents injected are either polyvinyl alcohol (PVA) particles or embospheres (calibrated acrylic microspheres). These agents are injected slowly to occlude the blood flow to the uterus.

At the end of the procedure the catheter and sheath are removed and digital pressure applied to the site for ten minutes. Bed rest and post-procedure nursing observations of the groin are required to prevent a haematoma developing.

Pain control

During the procedure, the patient is under 'conscious sedation' medication using a combination of iv Midazolam and Fentanyl.

The pain usually increases following completion of the embolisation on the second side. Best practice for pain control is for anaesthetists to manage patient-controlled analgesia (PCA) devices to deliver calibrated analgesia over the next 24 hours. This is then converted to oral medication (NSAIDs and analgesia) and the patient is comfortable for discharge at 48 hours.

Follow-up

All patients need to be followed up by their general practitioners and gynaecologists to ensure that there are no complications and check on patient outcome. The literature reports that 80 to 95 per cent of patients are satisfied with their outcome, that is, there is a decrease in symptoms.

A follow-up ultrasound or MRI can be performed at three months to assess the success of the procedure. MRI is more accurate in measuring the decrease in size of the fibroid and uterus.

Risks

The recent literature indicates that UAE is at least as safe as the surgical procedures. Four deaths have occurred after UAE for fibroids, two from pulmonary emboli and two from pelvic infection. These four deaths from approximately 40,000 cases worldwide (1:10,000) are less than the mortality

rate for hysterectomy for benign disease excluding complications of pregnancy (1:1500).

The most serious major complication is urgent or delayed hysterectomy for pelvic pain or sepsis. The tissue ischaemia following embolisation can cause endometritis and pyometra. The chance of urgent hysterectomy being necessary is one per cent.

If inadvertent embolisation of the ovarian arteries occurs, the patient will develop ovarian failure and premature menopause. This depends on the uterine artery supply to the ovaries and needs to be checked on the pre-embolisation angiogram. Premature ovarian failure after fibroid embolisation is reported to occur in one to two per cent.

Pervaginal expulsion of submucosal fibroids has been documented.

Complications from the angiogram are groin haematoma and contrast-induced nephropathy.

Condoleezza Rice, US Secretary of State, underwent fibroid embolisation at Georgetown University Hospital, Washington DC in November 2004. This required an overnight stay and she returned to work three days later.

Myomectomy vs Fibroid Embolisation

There has been a recent Stanford study which compared the therapeutic efficacy of these two uterus-sparing procedures in controlling fibroid symptoms.

The medical records of 111 consecutive patients who underwent abdominal myomectomy (n=44) or uterine fibroid embolisation (n=67) over the same 30-month period were retrospectively reviewed. Five patients in the embolisation group were excluded because the procedure was performed pre-myomectomy to reduce the risk of bleeding. Similarly, four patients from the myomectomy group were excluded because their primary reason for surgery was treatment of infertility with no other symptoms.

The study concluded that fibroid embolisation is a less invasive and safer treatment option than myomectomy. Menorrhagia is usually better controlled with embolisation but myomectomy may be a better option in patients with mass effect. Both procedures were equally effective in controlling pain.

Other indications for UAE

Historically uterine artery embolisation has been used to treat postpartum haemorrhage. It can also be used to treat haemorrhage from pelvic malignancy and arteriovenous malformations. Pre-operative UAE offers an opportunity to reduce bleeding during myomectomy.

Further reading

Dover R, Torode H, Briggs G. Uterine artery embolisation for symptomatic fibroids. *MJA* March 2000; Vol 172: 233-236.

Razavi MK, Hwang G, Jahed A, Modanloo S, Chen B. Abdominal myomectomy versus uterine fibroid embolization in the treatment of symptomatic uterine leiomyomas. *Am J Roentgenol* June 2003; 180(6): 1571-1575.

Ovarian Vein Embolisation

Pelvic venous congestion syndrome is a diagnosis that is both controversial and often unrecognised. During pregnancy the normally small ovarian veins enlarge and sometimes this persists with valvular incompetence causing reflux. On ultrasound or selective venography, large refluxing ovarian veins are seen, usually only on the left. Patients present either with vulval varices or with chronic pelvic pain. The pelvic pain is of variable intensity which is worse before or during menses and is aggravated by prolonged standing, fatigue or intercourse. Ovarian vein embolisation is the deliberate obstruction of these refluxing veins by catheter-directed coils to collapse the pelvic varicosities.

Further reading

Venbrux A, Lambert D. Current embolisation of ovarian veins as a treatment for patients with chronic pelvic pain caused by pelvic venous incompetence. *Opin Obstet Gynaecol* 1999; 11: 395-399.

Fallopian Tuboplasty

Proximal fallopian tube obstruction accounts for ten to 20 per cent of patients with tubal disease. It is often due to the accumulation of mucus or debris forming a plug. Tubal patency can be restored by either placing a wedged catheter at the cornua and injecting, or passing a thin slippery wire. Actual balloon catheter dilatation is not necessary.

This procedure to correct infertility has developed as an extension of hysterosalpingography. The American Society for Reproductive Medicine has recommended in its clinical guidelines that this procedure be performed before other more invasive procedures.

Further reading

Thurmond A, Rosch J. Non-surgical fallopian tube recanalisation for treatment of infertility. *Radiology* Feb 1990; 174(2): 371-374.

MR Guided Focused Ultrasound Ablation

This is a new interesting technique for treating uterine fibroids. The magnetic resonance scan is used to identify the targeted fibroid, the focused ultrasound produces heat causing a coagulative necrosis and real-time MR also shows thermal mapping to help regulate the dose. Its claimed advantages are that no significant pain is induced and it is an outpatient procedure.

Further reading

Hindley J, Gedroyc WM, Regan L, Stewart E, Tempany C, Hynnen K, et al. MRI guidance of focused ultrasound therapy of uterine fibroids: early results. *Am J Roentgenol* 2004; 183: 1713-1719.

Stewart E, Gedroyc WM, Tempany C, Quade BJ, Inbar Y, Ehrenstein T, et al. Focused ultrasound treatment of uterine fibroid tumours: Safety and feasibility of non-invasive thermoablative technique. *Am J Obstet Gynaecol* 2003; 189 (1): 48-50.