



Clinics in diagnostic imaging (I 10)

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Fig. 1 Radiograph of the pelvis.

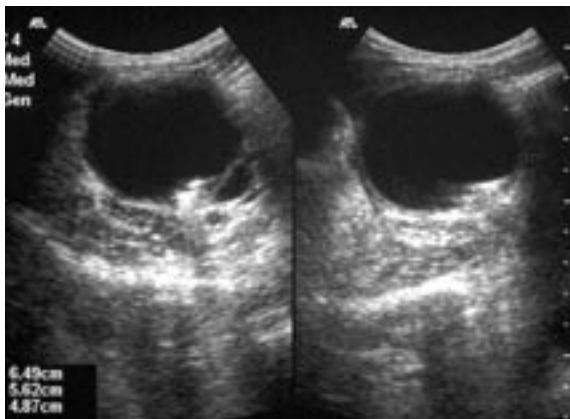


Fig. 2 Sagittal and coronal transvaginal ultrasonographical images of the right adnexa.



Fig. 3 CT image of the pelvis.

CASE PRESENTATION

A 35-year-old Chinese woman, presented with a five-day history of right iliac fossa pain and mass, which was progressively increasing in size. She had no significant past medical history apart from laparoscopic tubal ligation performed years ago. Clinically, she was afebrile. Abdominal

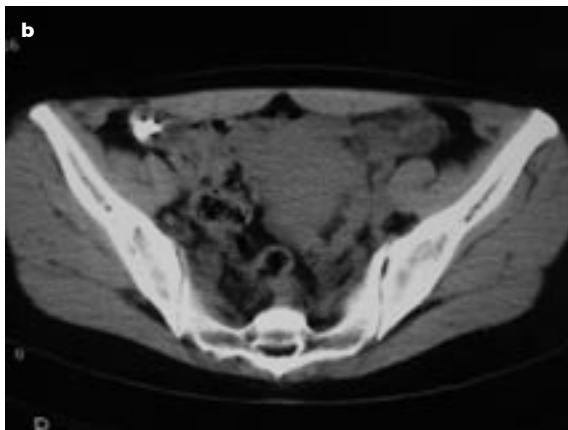
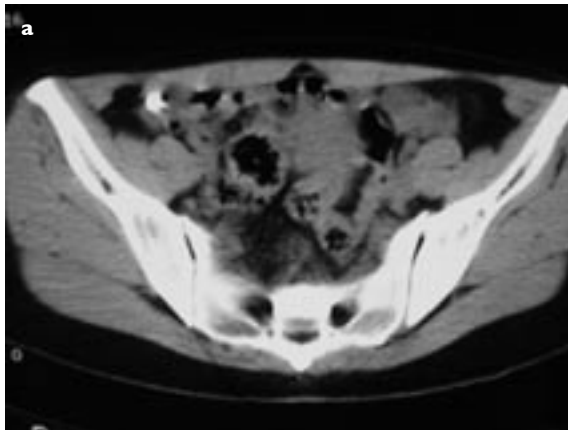
examination revealed a tubular, tender mass in the right iliac fossa. A bulky uterus and a right adnexal mass was found on vaginal examination. Urine pregnancy test was negative. What do the radiograph, ultrasonography (US) and computed tomography (CT) show (Figs. 1-3)? What is the diagnosis?

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Figs. 4a and b Repeat CT images of the pelvis show interval reduction in size of the right adnexal cyst with resolution of surrounding inflammatory changes.

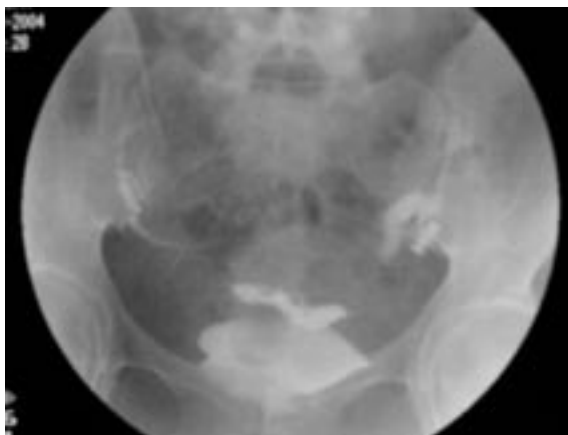


Fig. 5 Hysterosalpingography shows the absence of opacification of the fallopian tubes beyond the sites of the ligation clips bilaterally. The clips are laterally positioned with the clips at the ampulla of the fallopian tubes. No free intraperitoneal spillage of contrast is demonstrated on either side.

IMAGE INTERPRETATION

Pelvic radiograph (Fig. 1) revealed two tubal ligation clips over the right hemipelvis and one on the left side. The clips appeared to be laterally positioned. Pelvic US (Fig. 2) demonstrated a rounded 6.5 cm × 5.6 cm × 4.9 cm cystic mass with homogeneous internal echoes. A brightly echogenic component was seen, measuring 1.6 cm × 1.3 cm × 0.8 cm.

CT of the pelvis (Fig. 3) showed a rounded low-attenuation mass with an enhancing wall in the right adnexal region. The wall was thickened and it contained high-density objects within, causing streak artefacts. Mild inflammatory changes were also noted in the surrounding soft tissue and adjacent anterior abdominal wall.

DIAGNOSIS

Right-sided tubal ligation clips complicated by the formation of an infected retention cyst.

CLINICAL COURSE

The patient was treated with a course of intravenous antibiotics with resolution of her symptoms. Clinically, the mass was reduced in size. Repeat CT of the pelvis (Fig. 4) confirmed interval reduction in size of the right adnexal cyst and resolution of surrounding soft tissue inflammatory changes. Hysterosalpingography (HSG) was arranged to assess the position of the ligation clips and the patency of the fallopian tubes. It confirmed that the clips were laterally positioned at the ampulla of the fallopian tubes (Fig. 5). No free spillage of contrast into the peritoneum was demonstrated to suggest failure of tubal ligation.

DISCUSSION

Female sterilisation is the most commonly-used contraceptive method worldwide. It is one of the safest operative procedures; complications are rare and occur in less than 1% of all female sterilisation procedures⁽¹⁾. The common techniques for the interruption of tubal patency include the utilisation of mechanical devices, such as tubal rings and clips (e.g. Filshie, Hulka), and electrocoagulation. Ligation and excision are now less popular methods. The standard surgical approaches are laparoscopy, minilaparotomy and laparotomy usually performed at the time of a Caesarean delivery. Complications of female sterilisation can be categorised into perioperative and late complications.

Major intraoperative complications include mortality, visceral (such as bowel, urinary bladder and uterine) injury, vascular injury, infection and conversion from a laparoscopic procedure to a laparotomy. The risk of death is reported to be 1-2 cases per 100,000 procedures, most of which are complications of general anaesthesia⁽²⁾. Infection has an incidence of approximately 1%. Unintended laparotomy occurs with 1-2% of laparoscopic procedures, commonly attributable to technical difficulties; for example, adhesions from

previous surgery, rather than to complications of the procedure⁽²⁾.

The main and most essential late complication is tubal ligation failure, resulting in pregnancy, including ectopic pregnancy. Other complications are occasionally reported and include migration or expulsion of the tubal ligation clips, hydrosalpinx, tubal torsion and necrosis, late infection including abscess formation, and post-tubal ligation syndrome.

Tubal ligation is reported to have a failure rate of 0.1-0.8 % during the first year⁽³⁾. Common causes of sterilisation failure include an undiagnosed luteal phase pregnancy that was present at the time of sterilisation, surgical ligation of a structure other than the fallopian tube (most often, the round ligament), incomplete or inadequate occlusion of the tube, misplacement of the mechanical device and development of a tuboperitoneal fistula⁽¹⁾. Given these causes, methods that can be used to reduce or prevent failures are by scheduling the procedure within the first 7-10 days of the start of the menstrual cycle, and meticulously identifying the fallopian tube by tracing the fimbrial end prior to occlusion. Ligation should be at the proximal tubal segment, approximately 2 cm from the uterine cornua⁽²⁾. The Collaborative Review of Sterilization (CREST), a large prospective study conducted in 16 teaching hospitals in the United States, enrolled 10,685 women who underwent sterilisation from 1978-1986, and followed them up until 1994. It reported a ten-year cumulative failure rate of 1.85% for all methods combined⁽⁴⁾. In addition, recent findings suggest that the risk of pregnancy persists for many years after sterilisation, and that the risk varies by method and patient's age at sterilisation. The pregnancy rate was reported to be higher for women younger than 28 at the time of sterilisation than for women older than 34.

As the overall risk of sterilisation failure is low, the absolute risk of ectopic pregnancy is lower among sterilised women than among non-sterilised women. When a pregnancy does occur after sterilisation, however, at least one-third are ectopic pregnancies⁽¹⁾. The CREST study reported a ten-year cumulative probability of less than 1% (7.3 ectopic pregnancies per 1,000 procedures) for all methods of female sterilisation combined⁽⁵⁾. This study also reported an association between ectopic pregnancy and the tubal occlusion method. The highest ten-year cumulative probability of ectopic pregnancy occurred among women who had undergone bipolar electrocoagulation (17.1 ectopic pregnancies per 1,000 procedures), while the lowest probability was

found among women who had post-partum partial salpingectomy (1.5 ectopic pregnancies per 1,000 procedures)⁽⁵⁾.

Rare reports of migration of the ligation clips into the bladder, vagina, peritoneal cavity and appendix have been published, as have reports of expulsion from the vagina, urethra and rectum^(6,7). They are usually asymptomatic, but may present with acute or chronic abdominal pain. Hydrosalpinx, fallopian tubal torsion and necrosis can present with abdominal pain⁽⁸⁻¹⁰⁾. Post-tubal ligation syndrome, proposed in 1951, is a controversial constellation of symptoms, including pelvic discomfort, ovarian cystic changes, and menorrhagia, which are suggested to occur as a result of disruption of the utero-ovarian blood supply, with resultant disturbances of ovulatory function after sterilisation⁽¹¹⁾. After extensive study, bilateral tubal ligation apparently causes few, if any, menstrual abnormalities within several years after sterilisation, regardless of the method of tubal occlusion used⁽¹¹⁾.

When a female patient presents with abdominal pain, a thorough history-taking is essential and should include the obstetric and gynaecological history, including sterilisation. Radiographs of the abdomen should include the pelvis, as it is cheap, easy and of relatively low radiation risk. It allows visualisation and rough estimation of the positions of the tubal ligation clips, and excludes migration. As no ionising radiation is involved, US [transabdominal (TA) and transvaginal (TV)] is the modality of choice when obstetric or gynaecological causes are suspected. The uterus, adnexa (ovaries and fallopian tubes) and Pouch of Douglas are evaluated. It is however recognised that the ovaries may not be identifiable in some women⁽¹²⁾. The normal fallopian tubes are also not commonly identified. This region should be carefully surveyed for abnormalities, such as hydrosalpinx, adnexal mass and abscess. Metal ligation clips can be traced as brightly echogenic foci. The Pouch of Douglas should be assessed for presence of free fluid or mass. TA US offers an expanded view of the entire pelvis, including any mass that may lie beyond the endocervical probe, and shows the relationship of the internal structures with one another. Images of TV US are obtained from different orientations, and since its transducer is closer to the area being examined, improved visualisation of the female genital tract is achieved, in particular the adnexa. For example, TV US allows fairly accurate measurement of an ovarian cyst.

When the diagnosis remains a problem, CT can provide additional information as it shows different types of tissues with greater clarity, detail and differentiation. It also offers information on their

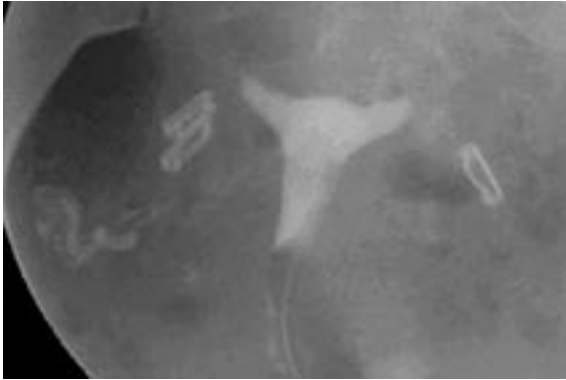


Fig. 6 Hysterosalpingography of a 37-year-old woman to check tubal patency after sterilisation shows opacification of the right fallopian tube beyond the two right ligation clips at the isthmus. There is contrast spillage into the peritoneum indicating tubal patency and hence a failed right tubal ligation. There is no opacification of the left fallopian tube beyond the clip at the isthmus.

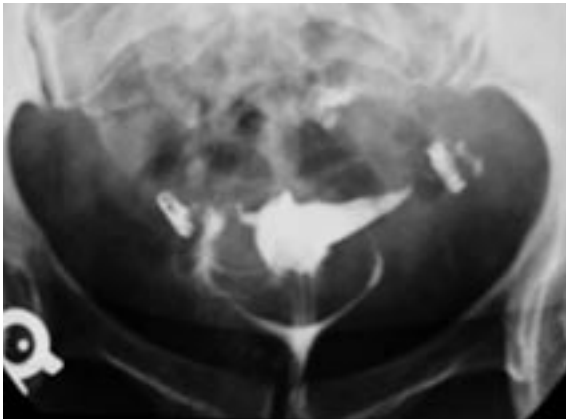


Fig. 7 Hysterosalpingography of another patient with a failed left-sided tubal ligation. This demonstrates opacification of the fallopian tube beyond the ligation clip at the isthmus on the left side. There is associated free intraperitoneal spillage of contrast seen on the left. The right clip is at its expected site of the proximal isthmus with no opacification seen beyond the clip.

precise location and surrounding soft tissue changes. If clinical, laboratory and imaging findings do not assist with the diagnosis, diagnostic laparoscopy needed to be considered.

HSG remains the main examination for the study of the fallopian tubes and should be performed if sterilisation failure is suspected⁽¹³⁾. It is highly sensitive and provides useful, although indirect, information by outlining the uterine cavity and the fallopian tubes. The cervix is catheterised using a small Foley's catheter to allow the introduction of a contrast medium into the uterine cavity. If the tubes are patent, they will be opacified by the contrast medium with subsequent free spillage into the peritoneum (Figs. 6 & 7). The site of the obstruction along the tubes can also be demonstrated. Although it involves low radiation exposure, HSG is a simple and safe procedure that does not require anaesthesia, and is usually performed on an outpatient basis.

ACKNOWLEDGEMENTS

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ABSTRACT

A 35-year-old Chinese woman presented with a five-day history of right iliac fossa pain and mass. She had no significant past medical history apart from laparoscopic tubal ligation performed years ago. Pelvic ultrasonography demonstrated a well-rounded cystic mass with homogeneous internal echoes and a brightly echogenic component, compatible with tubal ligation clips. Right adnexal infected retention cyst secondary to tubal ligation clips was diagnosed. Complications of female sterilisation are rare but nevertheless have been reported and accounted for symptoms of lower abdominal pain, and should be considered as a differential diagnosis.

Keywords: adnexal retention cyst, female sterilisation complication, hysterosalpingography, tubal ligation

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SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

Multiple Choice Questions (Code SMJ 200607B)

True False

Question 1: Regarding female sterilisation:

- | | | |
|---|--------------------------|--------------------------|
| (a) It has a low complication rate of 1% and is hence considered safe. | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) It has a better success rate in women younger than 35 years. | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Complications occur predominantly in both the perioperative and late stages of the procedure. | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Most of the pregnancies encountered are intrauterine rather than ectopic gestation. | <input type="checkbox"/> | <input type="checkbox"/> |

Question 2: Complications of female sterilisation include:

- | | | |
|---------------------------------|--------------------------|--------------------------|
| (a) Ectopic pregnancy. | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Hydrosalpinx. | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Tubal torsion and necrosis. | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Pseudocyst. | <input type="checkbox"/> | <input type="checkbox"/> |

Question 3: Investigations of a female patient who has undergone sterilisation include:

- | | | |
|-------------------------------------|--------------------------|--------------------------|
| (a) A pelvic radiograph. | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) An ultrasound examination. | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) A radionuclide study. | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) A micturating cystourethrogram. | <input type="checkbox"/> | <input type="checkbox"/> |

Question 4: Regarding hysterosalpingogram:

- | | | |
|---|--------------------------|--------------------------|
| (a) It is the imaging modality of choice for the study of the fallopian tubes. | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Tubal patency is identified by tubal opacification and there is no peritoneal spillage. | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) It can diagnose hydrosalpinx accurately. | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) It is contraindicated in pelvic abscess. | <input type="checkbox"/> | <input type="checkbox"/> |

Question 5: The following statements are true:

- | | | |
|---|--------------------------|--------------------------|
| (a) The ligation should be at the distal fallopian tube near the fimbrial end. | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Bipolar electrocoagulation has the highest rate of ectopic pregnancy among the various tubal occlusion methods. | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Ligation clip migration or expulsion usually cause symptoms needing surgery. | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) HyCoSy (hysterosalpingo-contrast sonography) is an alternative method of studying tubal patency. | <input type="checkbox"/> | <input type="checkbox"/> |

Doctor's particulars:

Name in full: _____

MCR number: _____ Specialty: _____

Email address: _____

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1. Photocopy this answer form.
2. Indicate your responses by marking the "True" or "False" box
3. Fill in your professional particulars.
4. Post the answer form to the SMJ at 2 College Road, Singapore 169850.

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1. Log on at the SMJ website: URL <<http://www.sma.org.sg/cme/smj>> and select the appropriate set of questions.
2. Select your answers and provide your name, email address and MCR number. Click on "Submit answers" to submit.

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