


Venous Intravasation: A Potential Pitfall of Confirmatory Hysterosalpingogram Following Essure Hysteroscopic Sterilization.

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ABSTRACT

Indications for hysterosalpingography (HSG) include evaluation of infertility, spontaneous abortions, postoperative evaluation of tubal ligation, pre-myomectomy evaluation, and more recently, evaluation of tubal occlusion after placement of the Essure Permanent Birth Control System. Here we report a case of venous intravasation during a routine post-Essure HSG, a phenomenon in which contrast transits from the uterine cavity, through the myometrium, and directly into draining pelvic veins. Venous intravasation is a potential pitfall in interpretation of HSGs.

CASE REPORT

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A 32 year old gravida 2 para 2 female presented with desire for permanent sterilization. She had a history of adenocarcinoma in situ of the cervix which was successfully excised via loop electrosurgical excision. She had no other significant obstetric or gynecologic history. At the time of presentation, the patient was using a Mirena intrauterine device for contraception which she opted to have removed in favor of the Essure Permanent Birth Control System (Conceptus; Mountain View, CA, USA). During Essure placement, the initial hysteroscopic exam demonstrated a normal cervix, normal uterine cavity, and patent bilateral tubal ostia. Essure inserts were placed bilaterally without complication.

A routine 3 month post-procedure HSG (Figure 1) demonstrated the inserts to be in appropriate position, but there was extra-uterine accumulation of contrast which was interpreted as positive for free intraperitoneal spill. The patient was then instructed to follow up 3 months later, at which time the HSG demonstrated similar findings (Figure 2a). There was first a lacelike pattern of contrast enhancement within the expected location of the myometrium. Ensuing

images demonstrated transient accumulation of contrast into large tubular structures with subsequent washout. These findings were consistent with intravasation of contrast into venous structures. Given the similar appearance on the prior study, a non-contrast pelvic CT was done immediately after the HSG which confirmed the presence of contrast within the uterus and vaginal vault but also within the bladder and ureters (Figure 2b, c, d), indicating the clearance of contrast from the vascular circulation. No free contrast was seen in the peritoneal cavity.

DISCUSSION

Hysterosalpingography (HSG) is a radiographic method of evaluating the uterus and fallopian tubes. Indications for HSG include evaluation of infertility, spontaneous abortions, postoperative evaluation after tubal ligation or reversal of tubal ligation, and assessment prior to myomectomy. More recently, HSG has been used to confirm tubal occlusion after placement of the Essure Permanent Birth Control System [1,2].

The Essure system is comprised of a micro-insert with a stainless steel inner coil surrounded by a Nitinol outer coil. Polyethylene terephthalate fibers run along the insert, and when inserted hysteroscopically into a fallopian tube, they elicit a local inflammatory response and tissue in-growth, thereby occluding the fallopian tube. The Essure inserts are normally inserted into the proximal fallopian tubes with a small segment of the insert protruding into the uterine cavity. This device should not be relied upon for contraception until after imaging confirmation of tubal occlusion. Proper insert position as well as successful tubal occlusion can both be confirmed by HSG. In the United States, the U.S. Food and Drug Administration (FDA) mandates HSG for all patients 3 months after Essure insertion before it is deemed functional for contraception [2]. At this timepoint, 96% of patients with appropriately positioned coils will demonstrate tubal occlusion. At 6 months post-procedure, 100% of patients with proper coil position will demonstrate tubal occlusion [1,3,4].

Here we present a case of venous intravasation during a routine post-Essure HSG. Venous intravasation refers to the transit of contrast from the uterine cavity, through the myometrium, and into draining pelvic veins. Contrast may also drain into the lymphatic system (lymphatic intravasation). Although it is a relatively rare event, it is important to distinguish venous intravasation from free intraperitoneal spillage of contrast (e.g. from patent fallopian tubes, or uterine perforation).

On HSG, intravasation is characterized first by the opacification of myometrial vessels which appears as a fine lace-like network surrounding the uterine cavity. Subsequently the contrast enters larger pelvic veins and is washed out. This is in contrast to free intraperitoneal contrast spillage which does not demonstrate these characteristics and, in particular, does not washout. Uterine perforation is an important potential differential diagnosis as it can demonstrate similar imaging findings. As with free spillage of contrast through patent fallopian tubes, a uterine perforation results in intraperitoneal contrast which does not wash out. A focal defect in the uterine wall can sometimes be identified as the source of contrast leakage. Because intravasated contrast remains within the circulation, renal excretion of contrast is observed on delayed images. Intraperitoneal contrast persists within the peritoneal cavity and demonstrates negligible renal clearance. Ultrasound may potentially be used to confirm free intraperitoneal spillage of contrast as it is a sensitive modality for detecting fluid. However, this particular application of ultrasound has not been studied, and it is uncertain how much free intraperitoneal spillage of contrast must occur before it is clearly distinguishable from physiologic fluid which is often present at baseline.

Venous intravasation has been reported to occur in up to 6% of patients undergoing HSG [5]. In one particular study with a total patient population of 1395 who underwent HSG, 11 cases of intravasation were identified, 5 of which were bilateral and 6 of which were monolateral. Monolateral lymphatic intravasation occurred in 3 cases [9]. Although the precise mechanism by which venous intravasation occurs is not clearly understood, it is thought to occur predominantly as a

consequence of increased intrauterine pressure, which can be associated with forceful injection of contrast or with tubal occlusion. Traumatic disruption of the endometrium and phase of the menstrual cycle have also been implicated [5,6,7]. The process of venous intravasation generally does not cause acute pain. Although intravasation was historically associated with an increased risk of pulmonary embolus due to the use of oil-based contrast agents, negative side effects are rare now as most HSGs are done with water-soluble contrast. Although a relatively rare event, an awareness of uterine intravasation can prevent potential misinterpretation of HSG.

TEACHING POINT

Venous intravasation is a well described phenomenon in hysterosalpingography in which contrast transits from the uterine cavity directly to myometrial vessels, then to draining pelvic veins. This is a potential pitfall in HSG interpretation, particularly in post-Essure confirmatory HSGs, as the intravasated contrast can mimic free intraperitoneal spillage of contrast, e.g. from patent fallopian tubes or uterine perforation.

REFERENCES

1. Smith, RD. Contemporary Hysteroscopic Methods for Female Sterilization. *International Journal of Gynecology and Obstetrics* 2010; 108: 79-84. PMID: 19716128
2. Conceptus. Essure Physician Training Manual: HSG protocol. San Carlos, CA: Conceptus, 2002.
3. Kerin JF, Cooper JM, Price T, Herendael BJ, Cayuela-Font, Cher D, et al. Hysteroscopic Sterilization Using a Micro-Insert Device: Results of a Multicentre Phase II Study. *Hum Reprod* 2003; 18 (6): 1223-30. PMID: 12773450
4. Cooper JM, Carignan CS, Cher D, Kerin. Microinsert Nonincisional Hysteroscopic Sterilization. *Obstet Gynecol* 2003; 102(1): 59-67. PMID: 12850608
5. Ubeda B, Paraira M, Alert E, Abuin RA. Hysterosalpingography: Spectrum of Normal Variants and Nonpathologic Findings. *AJR* 2001; 177: 131-135. PMID: 11418413
6. Eng CW, Tang PH, Ong CL. Hysterosalpingography: Current Applications. *Singapore Med J* 2007; 48(4): 368-373. PMID: 17384889
7. Yoder IC, Hall DA. Hysterosalpingography in the 1990's. *AJR* 1991; 157: 675-683. PMID: 1892018
8. Simpson WL, Beitia LG, Mester J. Hysterosalpingography: A Reemerging Study. *Radiographics* 2006; 26: 419-431. PMID: 16549607
9. Fianza AL, Fachinetti C, Gorone, MSR. Venous-Lymphatic Intravasation During Hysterosalpingography Using Hydrosoluble Contrast Medium. *Journal of Women's Imaging* 2005; 7: 38-43.

FIGURES

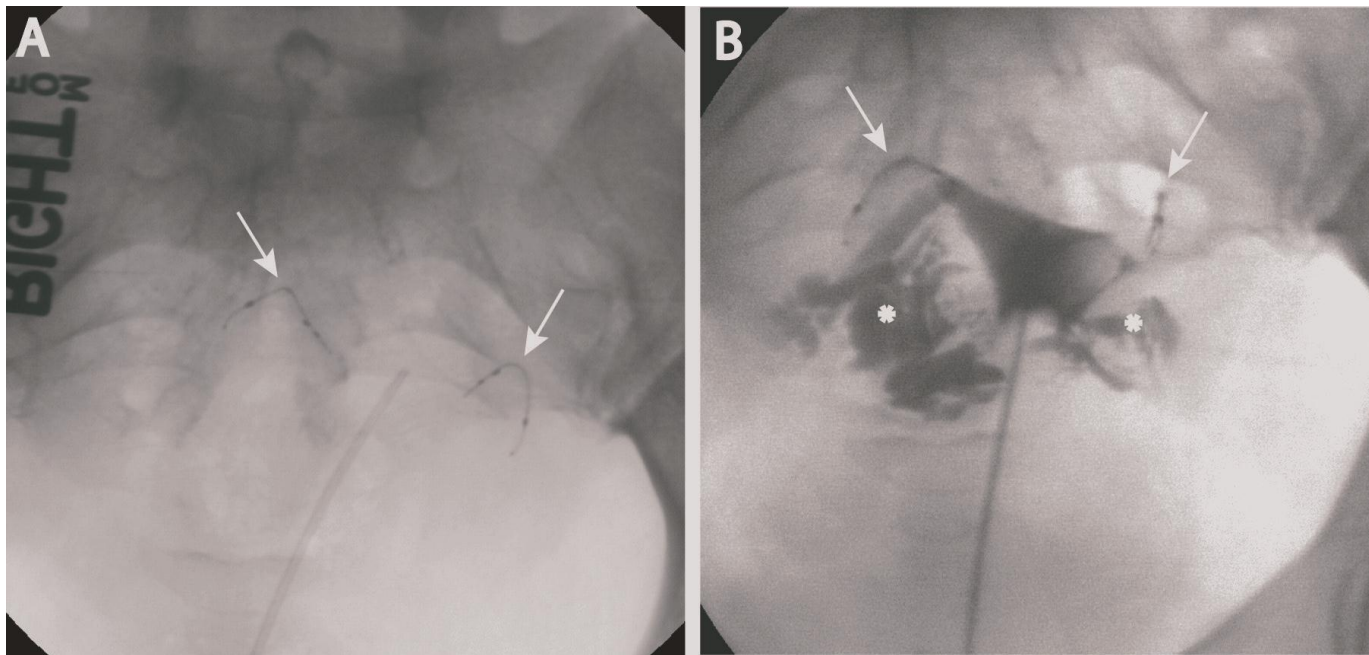


Figure 1: 32 year old female with uterine venous intravasation status post Essure hysteroscopic sterilization. Routine 3 month post-procedure HSG scout view (a) demonstrates the expected appearance of Essure inserts (arrows). After contrast instillation (b) there is extrauterine contrast accumulation (*) initially interpreted as free spill of contrast through patent fallopian tubes.

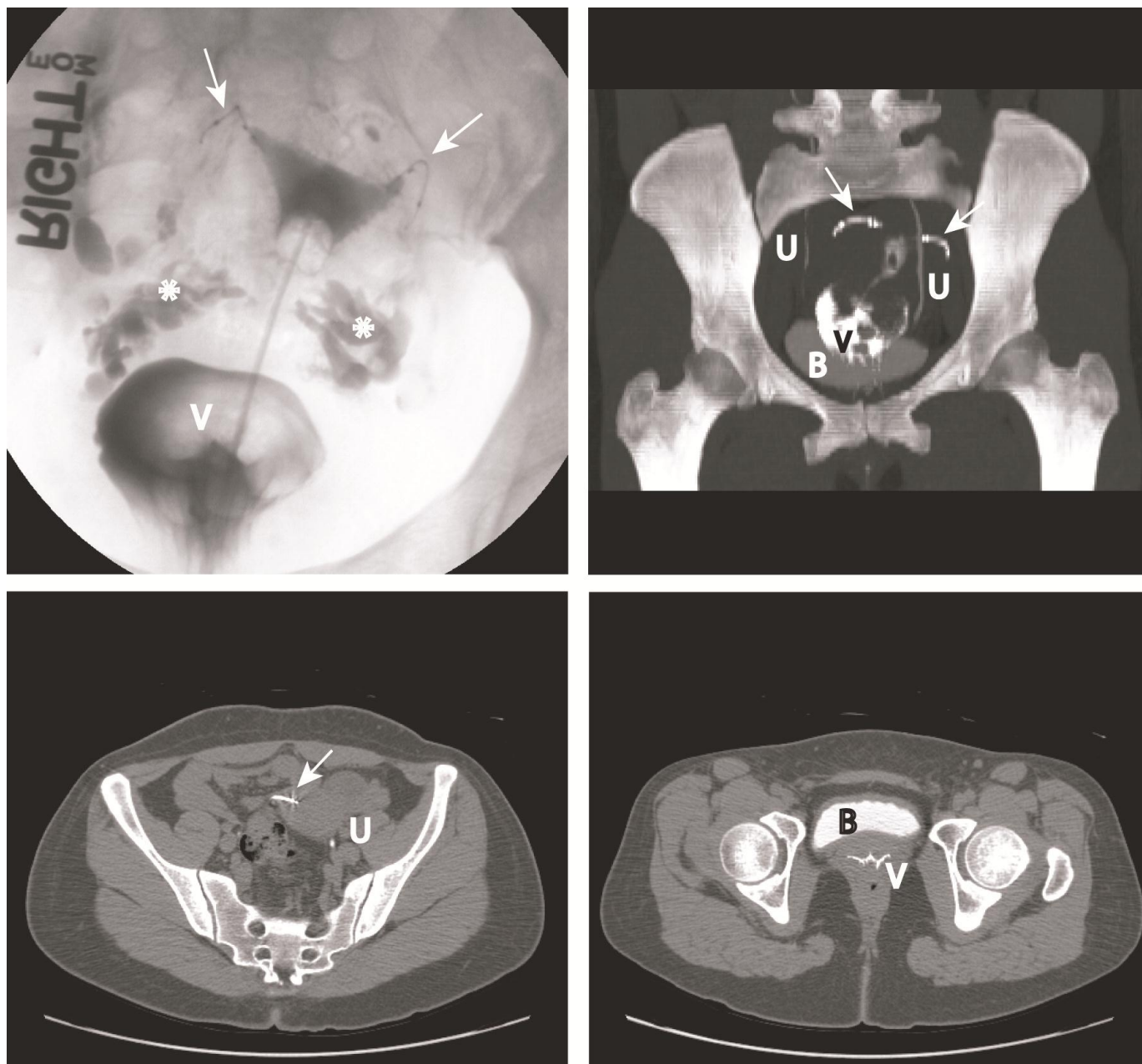


Figure 2: 32 year old female with uterine venous intravasation status post Essure hysteroscopic sterilization. 6 month post-procedure HSG (a) again demonstrates Essure inserts (arrows) and extrauterine contrast accumulation (*). There is also contrast within the vaginal vault (V). Non-contrast pelvic CT (GE 4-slice scanner, 2.5mm axial images, 120 kVp, 204mAs) obtained immediately after the HSG (c,d) demonstrates the Essure inserts (arrow) and contrast within the uterus and vaginal vault (V), but no free contrast spillage in the pelvis. Contrast in the ureters (U) and bladder (B) suggest clearance of contrast from the vascular circulation, consistent with venous intravasation. Coronal 5.0cm thickness maximum intensity projection image (MIP) from the same CT (b) demonstrates these same findings.

Etiology	Increased intrauterine pressure (e.g. forceful contrast injection, tubal occlusion), endometrial trauma.
Incidence	Estimated up to 6% of patients undergoing HSG.
Gender ratio	100% female.
Age predilection	None.
Treatment	None needed.
Prognosis	No significant risk of adverse outcomes with water soluble contrast media.
Imaging findings	Opacification of myometrial vessels in a fine lace-like pattern, which subsequently washes out as contrast drains via pelvic veins.

Table 1: Summary table for uterine venous intravasation

Etiology	Fluoroscopy	CT
Venous intravasation	Following contrast instillation into the uterine cavity, myometrial vessels are opacified, which appears as a fine lace-like network surrounding the uterine cavity. Subsequently the contrast enters larger pelvic veins and is washed out.	Non-contrast CT will show contrast within the uterine cavity and lack of contrast within the peritoneal cavity. Delayed images will demonstrate renal clearance of contrast.
Patent fallopian tubes	Following contrast instillation, the fallopian tubes will be opacified, followed by free intraperitoneal spillage of contrast which appears as amorphous extra-uterine contrast accumulation without evidence of wash out.	Non-contrast CT will demonstrate intra-uterine as well as intraperitoneal contrast. Delayed images will demonstrate negligible renal excretion of contrast.
Uterine perforation	Following contrast instillation into the uterine cavity, extra-uterine accumulation of contrast occurs which appears amorphous without evidence of washout. A focal defect in the uterine wall may be seen with contrast leakage. Opacification of the fallopian tubes may or may not be seen concurrently.	Non-contrast CT will demonstrate intra-uterine as well as intraperitoneal contrast. A defect in the uterine wall may be seen if large enough. Delayed images will demonstrate negligible renal excretion of contrast.

Table 2: Differential diagnosis table for uterine venous intravasation

ABBREVIATIONS

CT = Computed Tomography
 HSG = Hysterosalpingogram
 MIP = Maximum Intensity Projection

KEYWORDS

Essure; hysterosalpingogram (HSG); venous intravasation; tubal occlusion

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