The lost intrauterine levonorgestrel-releasing system in women with adenomyosis: A case report

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Abstract
The intrauterine device (IUD) is one type of long-acting reversible contraception (LARC) method available. The objective of this article was to report the case of a symptomatic partial expulsion of IUD. A 41-year-old woman presented herself to Dr. Cipto Mangunkusumo National General Hospital with the chief complaint of pelvic pain. She had been using intrauterine levonorgestrel-releasing system for the last 4 years as her adenomyosis treatment. On ultrasound examination, there was no IUD visualized. A pelvic x-ray imaging with Copper-T IUD as a marker was done and suspected IUD displacement. The IUD was then removed successfully.

Keywords
IUD, LARC, malposition, adenomyosis

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Introduction
The intrauterine device (IUD) is one type of long-acting reversible contraception (LARC) method available. First described in 1909 for human use by Richter,¹ IUD is gaining popularity as a reversible form of contraception with 159 million uses in 2019.² There are two types of IUDs, copper and hormone-releasing IUDs. Evaluation of IUD position could be assessed with the help of ultrasonography, but there are differences in the imaging results between both types. In this article, we report the case of a missing intrauterine levonorgestrel-releasing system (LNG IUS) undiagnosed by ultrasound examination.

Case illustration
A 41-year-old woman complained of pelvic pain 1 day before admission. She has been using LNG IUS for 4 years before examination for the treatment of pelvic pain caused by adenomyosis in Dr. Cipto Mangunkusumo National General Hospital, Jakarta. She believed the pain was coming from the LNG IUS and preferred to switch to an alternative medication for adenomyosis. During the last 4 years, there was no complaint of pelvic pain and she never went to any hospital to perform ultrasound surveillance. Her last menstrual cycle was 2 weeks before and her chronic pelvic pain has eased since the use of LNG IUS. She never went under any medical interventions.

Physical examination showed normal vital signs. Her body mass index was 37.8 kg/m² (obesity grade II). Gynecology examination showed normal vulva, vagina, and cervix appearance, but the IUD string was not visible. Ultrasound examination was performed on 31 March 2021 by a fetomaternal sonographer, showing a slightly enlarged retroflexed uterus, lesions of endometriosis size 31 × 33 mm in the posterior uterine corpus, right endometrioma size 52 × 48 mm, and left endometrioma with corpus rubrum size 50 × 35 mm. There was no IUD visualized by ultrasound.
(Figure 1). The gynecologist in charge then chose to take pelvic x-ray imaging with Copper-T IUD as a marker. There were two IUDs from the anteroposterior (AP) and oblique pelvic x-ray imaging. The marker Copper-T IUD was in the vertical axis of the uterine projection, and another one was located in the posterior-inferior of the marker in the horizontal axis, suspected IUD displacement (Figure 2). The radiologist then performs a multislice computed tomography (MSCT) scan with contrast to confirm the diagnosis and position of LNG IUS. A result of the MSCT showed two T-shaped IUDs with metal density, one inside the uterine cavity and the other one in the cervical canal (Figure 3). The IUD was then removed by a crocodile forcep.

Discussion

IUD malposition or dislocation can be defined as an IUD abnormal positioning, where it is partially displaced to the cervix, twisted in its axis, implanted in the myometrium, partially or completely inserted through the uterine serosa or the external cervical ostium. The incidence of IUD malposition within 8 weeks of placement is around 16%. Malposition is associated with symptoms of pelvic pain and bleeding, although it can also be asymptomatic. Ultrasonography is the most common examination for IUD surveillance due to its cost-effectiveness, lack of ionizing radiation, and greater detail of pelvic anatomy. The use of coronal plane 3D ultrasound can increase the diagnosis accuracy of IUD malposition, which may not be detected on a 2D longitudinal view.

For patients with symptomatic IUD malposition, it is necessary to remove the IUD and replace it with a new IUD if the patient wishes, and this procedure is usually done under ultrasound guidance. Meanwhile, for asymptomatic patients who accidentally find a malpositioned IUD in the uterus, which does not enter the cervical canal (such as in the lower uterine segment, is twisted in its axis, or is partially implanted in the myometrium), it is not recommended to remove the IUD, where the IUD is still effective. In this case, an MSCT showed both IUDs were still inside the uterine cavity; hence, a partial expulsion IUD was diagnosed. The second IUD was left in situ and acts as a of contraceptive method. One of the highest risk factors for IUD malposition is the presence...
of any uterine anomalies, particularly that may lead to cavi-
tary distortion, such as fibroids and adenomyosis. Few pos-
sible causes of the expulsion in our case may be due to parity
and the present of adenomyosis. We recommend patient who
uses an IUD to do a regular check-up to anticipate any dislo-
cation or malposition of the IUD.

One example of LNG IUS is Mirena (Bayer Health Care
Pharmaceuticals, Pittsburgh, PA, USA), which consists of a
T-shaped polyethylene frame (T-body) with a steroid reser-
voir (hormone elastomer core) around the vertical stem. The
polyethylene of the T-body is compounded with barium sul-
fate, which makes it radiopaque. Meanwhile, the reservoir
consists of a white or almost white cylinder, made of a mix-
ture of 52 mg levonorgestrel and covered by a semi-opaque
silicone (polydimethylsiloxane) membrane (Figure 4). The
other type of IUD, the copper T IUD, has a straight shaft and
crossbars that form the shape of a T. Although the T frame is
made of polyethylene, a total of 380 mm$^2$ of copper wire is
coiled around the stem, and two horizontal crossbars, which
enhances sonographic visualization.

The difference between both IUDs makes the sonographic
identification of the Mirena device to be problematic due to
only the proximal and distal ends of the shaft and a central
shadow of the intersection of the stem and arms can be seen
in the sagittal and transverse planes.

2D ultrasound has some limitations in the imaging tech-
nique for the visualization of IUD, mainly due to the limited
longitudinal and transverse plane and does not allow for
assessing the coronal plane. The advantage of 3D technol-
ogy is the capacity of obtaining a volume, with a subsequent
reconstruction in the coronal plane that allows clearer infor-
mation about the position and the structure of the IUD. In
Figure 3. Multislice computed tomography scan imaging.
some cases, computed tomography (CT) is used for the assessment of IUD positioning, although it is essential to make the diagnosis. CT has benefits for the evaluation of complications associated with intraabdominal IUDs, such as visceral perforation, abscess formation, and bowel obstruction. In our case, the LNG IUS in our patient is undiagnosed on 2D and 3D ultrasound. The Fetomaternal sonographer may not be used to perform ultrasound on LNG IUS, thus missing the IUD malposition.

A similar case was reported by Tsimpanakos et al., a 46-year-old woman with a nonvisible Mirena thread failed to be visualized with transabdominal and transvaginal ultrasound. It was identified on x-ray imaging located in right hemipelvis. Shambhu and Pappas also reported a case of a 33-year-old woman with non-visualized Mirena in ultrasound examination. The Mirena was considered fallen out and the patient underwent a vaginal hysterectomy because of the problematic bleeding pattern. The lost Mirena was visualized incidentally on x-ray and CT scan imaging 1 year after.

**Conclusion**

Ultrasoundography is one of the most common evaluations for IUD surveillance, but the components in the LNG IUS make sonographic identification more difficult than copper IUD. Experienced gynecology sonographers could detect the LNG IUS in 2D ultrasound, but most gynecologists or fetomaternal sonographers may need the use of 3D ultrasound. X-ray imaging is very helpful to visualize both LNG IUS and copper IUDs because both IUDs are radiographically radiopaque. The CT scan has advantages in malpositioned IUD cases with suspected complications, like perforation.

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ERG—conceptualization, funding; AVS—data curation, writing; MZ—data curation, editing; GPA—data curation, editing; TP—supervision; NFF—editing, corresponding author.

**Availability of supporting data**

Data on this article are from personal documentation of the authors.

**Consent for publication**

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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