

Preoperative Evaluation and Management of Mislocated Intrauterine Devices: Case Series of 25 Patients

¹Nurşen KURTOĞLU AKSOY^a, ²Hakan GÜRASLAN^a, ³Evrime Ebru KOVALAK^a,
⁴Özlem YÜKSEL AYBEK^a, ⁵Şeyma YESİRALIOĞLU ÇİNKARA^a, ⁶Candan VARLIK^b

^aDepartment of Obstetrics and Gynecology, University of Health Sciences Bağcılar Training and Research Hospital, İstanbul, Türkiye

^bDepartment of Radiology, University of Health Sciences Bağcılar Training and Research Hospital, İstanbul, Türkiye

ABSTRACT Objective: The aim of this study is to document the preoperative evaluation techniques of mislocated intrauterine device (IUD) patients and discuss the optimal management of these cases. **Material and Methods:** This study was conducted between January 2016 and October 2021 at an obstetrics and gynecology department of a tertiary center. A total of 25 patients presenting with mislocated IUDs were retrospectively analyzed. Demographic findings, diagnostic and preoperative evaluation methods, and operation notes were collected from the patients' files and hospital patient information programs. **Results:** Every patient had initially undergone a preoperative gynecologic examination and transvaginal ultrasonography (TVUSG). After TVUSG, other preoperative techniques were used alone or in combination according to each finding and need of further technique. Plain radiography, hysteroscopy, computed tomography (CT), magnetic resonance imaging (MRI), and colonoscopy were the techniques used. Of the 25 patients with missing IUDs, it was observed that 23 had successful removal of their IUDs. All but two of the patients were operated on laparoscopically. **Conclusion:** In cases of mislocated IUDs, all patients should undergo a vaginal examination and TVUSG. Although ultrasonography and radiography are the basic diagnostic techniques; radiography, hysteroscopy, CT, MRI, and colonoscopy are the techniques that can be used according to each case's condition. For these patients, laparoscopy was the first line of therapy.

Keywords: Intrauterine device; migration; intrauterine device; uterine perforation; laparoscopy

Intrauterine devices (IUD) are a safe, reversible, effective and generally well tolerated method of contraception. They are used by 14.3% of women of reproductive age worldwide; however, distribution varies country by country. In some countries, the percentage of women using IUDs is <2% and in other countries it is >40%.¹ The most common types of IUD include those that are copper-containing and levonorgestrel (LNG) releasing. Nevertheless, serious complications, such as uterine perforation, are rare. The incidence of perforation is almost 1 in 1,000, and it is most likely happening at the time of insertion (primary perforation) instead of being due to the delayed migration that causes perforation (secondary perforation). Secondary perforation is a late event that is thought to be due to uterine spasms, progressive pressure, and necrosis of the uterine wall.^{2,3}

After perforation, approximately 80% of IUDs are found in the peritoneal cavity. Migration into the surrounding organs becomes a serious complication after perforation and it can cause very severe events such as bowel or bladder perforations, fistulae, abscesses, and adhesions. Complications of surrounding organs are encountered in 15% of uterine perforations.⁴ The World Health Organization recommends surgical removal of the migrated IUD after diagnosis, even when patients are asymptomatic, so as to prevent the occurrence of severe complications such as bowel obstruction or perforation.^{5,6} There is no standard preoperative evaluation for patients with mislocated or migrated IUDs, and the treatment of asymptomatic cases is still controversial.⁵ Occasionally difficulties occur when attempting to locate missing IUDs intraoperatively or guessing high-risk operations such as

Correspondence: Nurşen KURTOĞLU AKSOY

Department of Obstetrics and Gynecology, University of Health Sciences Bağcılar Training and Research Hospital, İstanbul, Türkiye

E-mail: kurtoglu_nurses@yahoo.com



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intestinal injury and resections. IUDs can become embedded in the omentum or another part of the viscera and can change position.⁷ Selecting the appropriate technique, knowing the specialties of certain techniques and, combining them according to the needs of a case are considered to be very important.

In this study we aimed to evaluate the preoperative diagnostic techniques and operation findings for patients with mislocated IUDs in order to understand the optimal approaches to managing these cases with minimal complication and maximal benefit to the patient.

MATERIAL AND METHODS

This retrospective study received the approval of İstanbul Prof. Dr. Cemil Taşcıoğlu City Hospital Ethics Commission (date: October 10, 2021, no: E-48670771-514.01.02.) and was conducted in accordance with the Declaration of Helsinki principles. Informed consent was obtained from patients. This study was a single center retrospective study of women who received surgery to remove intraperitoneal or mislocated IUDs. Twenty-five patients were identified and underwent surgery to remove their IUDs. All the patients diagnosed with mislocated intraperitoneal IUDs had been operated on even they had no complaints. The patients were identified from surgery notes dated between January 2016 and October 2021 in a tertiary center. The term “mislocated IUD” was used as referring to an IUD found not in the endometrial cavity but in the abdominal cavity, partially perforated through the uterine serosa or embedded in the myometrium. Patient information, including age, medical history, parity, symptoms, time interval between diagnosis and IUD insertion, and IUD type, was collected. Diagnostic work, gynecological examinations, and imaging techniques such as transvaginal ultrasonography (TVUSG), radiography, hysteroscopy, computerized tomography (CT), magnetic resonance imaging (MRI), and colonoscopy notes were also recorded. Operation type (laparoscopy and laparotomy) and intraoperative findings (IUD localization, adhesions and complications) were also documented. These information notes were obtained from hospital patient data programs. The operation findings had been written in detail by the sur-

geons. Operation videos of some patients had been archived by the surgeons and obtained by permission. These findings, especially the imaging techniques, were evaluated by the operation findings to measure the importance of the technique choice according to patient. We did not conduct a statistical analysis.

RESULTS

Twenty-five patients operated on for mislocated IUDs were evaluated and IUD types, symptoms, duration, preoperative diagnostic and operative findings were noted (Table 1, Table 2). Eighteen copper IUDs (72%), six LNG-IUDs (24%), and one (4%) Lippes loop were identified. The patients' mean age was 32.5 (range 22-60). The patients' ages according to IUD type were 22-36 years (mean 27.7 years) for the copper IUD, 37-47 years (mean 42.3 years) for LNG-IUD, and 60 years for Lippes loop. Mean parity was 2.6 (range 1-6). Seventeen patients had vaginal deliveries, seven patients had caesarian sections, and one patient had both. Of the total group, nine patients were symptomatic (36%) and sixteen were asymptomatic (64%). Pelvic pain was the main symptom and was seen in six patients (four copper IUD and two LNG-IUD). The time interval between IUD insertion and diagnosis varied from one day to twenty years. Seventy-two percent of patients were diagnosed in one year of IUD insertion. Of the 25 patients, all underwent vaginal examination and IUD strings were seen in only one patient. The IUDs of twelve patients (48%) were identified using TVUSG and all were found to be copper IUDs. Eight IUDs seen by TVUSG were completely outside the uterus [four in the Douglas pouch, two in the adnexial region (Figure 1a), one above the uterine fundus, and one closed to the urinary bladder (Figure 1b)]. The other four IUDs seen by TVUSG were partially interacting with the uterus (Three were partially embedded in the myometrium and partially perforated the uterine serosa and were soon to migrate to the abdominal cavity. The fourth was embedded in the myometrium). After TVUSG, plain radiography was performed on 18 patients. All the IUDs were identified by radiography. Eight patients underwent hysteroscopy. In the hysteroscopies of three patients, it was seen that some part of the IUDs had protruded

TABLE 1: IUD types and findings.

| | |
|--|---|
| IUD type | <ul style="list-style-type: none"> • Copper IUD 72% • LNG-IUD 24% • Lippes loop 4% |
| Symptoms | <ul style="list-style-type: none"> • Asymptomatic 16 patients (64%) • Symptomatic 9 patients (36%) <ul style="list-style-type: none"> – Pelvic pain 6 (66%) – Vaginal bleeding 3 (33%) |
| Diagnostic techniques | <ul style="list-style-type: none"> • TVUSG (100% of cases; in 48% of them IUDs were seen) • Radiography (72% cases; in 100% of them IUDs were seen) • HS (32% cases; in 37.5% of them IUDs were seen) • CT (56% of cases, in 100% of them IUDs were seen) • MRI (16% of cases; in 0% of them IUDs were seen) |
| Time interval of insertion : 1 day-20 years | <ul style="list-style-type: none"> • <1 year (75%) • >1 year (25%) |
| Type of operation | <ul style="list-style-type: none"> • L/S 23 patients (92%) • L/T 2 patients (8%) |
| Opearation findings | <ul style="list-style-type: none"> • No complications in 10 patients (40%) • Complications in 15 patients (abscess/adhesions/intestinal perforation) (60%) |
| Removal of IUD by opearation | <ul style="list-style-type: none"> • Removed from 23 patients (92%) • Not removed from 2 patients (8%) |

IUD: Intrauterine device; LNG-IUD: Levonorgestrel releasing IUD; TVUSG: Transvaginal ultrasonography; HS: Hysteroscopy; CT: Computerized tomography; MRI: Magnetic resonance image; L/S: Laparoscopy; L/T: Laparotomy.

into the uterus and perforated the myometrium (Figure 2a). Later in the laparoscopies of these three patients, it was seen that the other parts of their IUDs perforated the intestine (Figure 2b). In the other five patients (two copper IUDs and three LNG-IUDs), the IUDs were not seen intracavitarily by hysteroscopy. CT was performed on fourteen patients (ten copper IUDs, three LNG-IUDs, and one Lippes loop). All the CT views were compatible with the operation findings of the IUD localizations (Figure 3a and Figure 3b, and Table 2). Four patients underwent MRI (two LNG-IUDs, one copper IUD, and one Lippes loop). The IUD views were difficult to interpret with MRI. After the other imaging techniques were performed and respective data were given to radiologists, the IUDs were seen and reported. Although the IUD was seen by MRI, it was difficult to interpret the image and differentiate the IUD from other structures. The view is similar to linear hypointense vascular structures (Figure 4).

Of the 25 patients with missing IUDs who were operated on, 23 IUDs (92%) were successfully re-

moved. Of the two patients from whom IUDs were not removed, one IUD was completely embedded in the uterine myometrium and the other IUD appeared to have perforated the colon and there were dense adhesions. Decisions were made to perform surgery later, after a colonoscopy and evaluation of the patients again. Abscess formation was observed in two patients (8%), both with copper IUDs. Adhesions were seen in fifteen patients (60%) and of the eighteen copper IUD patients, there were adhesions in thirteen patients (72.2%). One copper IUD was found to be embedded in the myometrium (5.5%). There were adhesions in two of six LNG-IUD patients (33.3%). In total, three patients had intestinal perforations from their IUDs (all of which were copper IUDs). All these patients had successful surgical removal of their IUDs. All the operations were performed laparoscopically and only two patients (8%) required laparotomy, one of which was performed due to the patient's intolerance of laparoscopy and the Trendelenburg position. The other patient had begun laparoscopically but switched to laparotomy after seeing the ileum per-

TABLE 2: Type, symptoms, duration, preoperative diagnostic, and operative findings of cases of mislocated IUDs.

| Patient | IUD Type | Symptoms | Duration | TVUSG | Radiography | HS | CT | MRI | Type of operation | Location at operation | Removal | Operation findings |
|---------|-------------|------------------|-----------|---------------------------------------|---------------------|---|--|----------|---------------------------|---|---------|---|
| 1 | LNG-IUD | Vaginal bleeding | 2 months | Not seen | Left pelvic region | Not seen | Inside the mesentery | Not done | US | Inside mesentery | Yes | No adhesion |
| 2 | LNG-IUD | Vaginal bleeding | 1 week | Not seen | Right pelvic region | Not done | Closed the right ovary | Not done | US | On the right tube | Yes | Adhesions |
| 3 | LNG-IUD | Pelvic pain | 5 months | Not seen | Pelvic left side | Not done | Left lateral side of the uterus | Not done | US | Left adnexal region | Yes | No adhesion |
| 4 | LNG-IUD | Pelvic pain | 8 days | Not seen | Right pelvic region | Not seen | Not done | Not done | US | Right lateral of the uterus | Yes | No adhesion |
| 5 | LNG-IUD | None | 1 year | Not seen | Pelvis | Not done | Not done | Not seen | US | Douglas | Yes | No adhesion |
| 6 | LNG-IUD | Vaginal bleeding | 13 days | Not seen | Left pelvic region | Not seen | Not done | Not seen | US | Omentum | Yes | Adhesions |
| 7 | TCu880 | None | 3 months | Partially inside the uterus | Not done | Perforated the myometrium | Close to the sigmoid colon | Not done | US | One part of IUD inside the uterus the other part inside the sigmoid colon | Yes | Colon perforation |
| 8 | TCu880 | None | 8 months | Outside the uterus | Not done | Not seen | Left side of the uterus | Not done | US | Left adnexal region | Yes | Adhesions |
| 9 | TCu880 | None | 1 month | Left adnexal region | Not done | Not seen | Left pelvic region | Not seen | US | Left broad ligament | Yes | Adhesions |
| 10 | TCu880 | None | 1 month | Douglas pouch | Not done | Not done | Between the uterus and the sigmoid colon | Not done | US | On the sigmoid colon serosa | Yes | Adhesions |
| 11 | TCu880 | None | 1 month | Left adnexal region | Left pelvic region | Not done | Between the uterus and the colon | Not done | US (and colonoscopy prep) | Between the uterus and the sigmoid colon | Yes | Adhesions |
| 12 | TCu880 | Pelvic pain | 1 day | Douglas pouch | Pelvic region | Not done | Right lateral of the uterus | Not done | US | Douglas pouch lying through the right side | Yes | No adhesion |
| 13 | TCu880 | Pelvic pain | 1 year | One part inside the myometrium | Not done | Perforated myometrium, T arms were not seen | Not done | Not done | US | Partially perforated the uterus and the sigmoid colon | Yes | Adhesions Colon perforation Uterus perforation (colon resection and primary stulization) |
| 14 | TCu880 | None | 15 months | Right adnexal region | Not done | Not done | Not done | Not done | US | Right adnexal region | Yes | Adhesions |
| 15 | TCu880 | None | 12 days | Not seen | Left pelvic side | Not done | Left side of the uterus | Not done | US | Left adnexal region | Yes | Abscess formation |
| 16 | TCu880 | None | 5 years | Not seen | Left pelvic side | Not done | Not done | Not done | US | On sigmoid colon surface | No | No adhesions |
| 17 | TCu880 | Pelvic pain | 2 years | Not seen | Left pelvic side | Not done | In the left pelvic side between intestinal parts | Not done | US | Omentum in the left pelvic region | Yes | Dens adhesions |
| 18 | TCu880 | None | 5 years | Not seen | Pelvis | Not done | Not done | Not done | US | Douglas | Yes | Adhesions |
| 19 | TCu880 | None | 2 months | Not seen | Pelvis | Not done | Not done | Not done | LT | LT (embolance to Trendelenburg) | Yes | Adhesions |
| 20 | TCu880 | None | 1 months | Not seen | Pelvis | Not done | Anterior of the uterus | Not done | US | Omentum | Yes | Adhesions |
| 21 | TCu880 | Pelvic pain | 1 day | Douglas | Left pelvic region | Not done | Not done | Not done | US | Anterior cut de sac | Yes | No adhesion |
| 22 | TCu880 | None | 2 years | Partially related with uterine fundus | Right pelvic side | Perforated uterus | Not done | Not done | US | Perforated uterus and ileum | Yes | Adhesions ileum perforation ileal wedge resection (LT) |
| 23 | TCu880 | None | 8 years | Embedded in the myometrium | Pelvis | Not done | Not done | Not done | US | Not seen | No | No adhesion |
| 24 | TCu880 | None | 2 months | Above the urinary bladder | Not done | Not done | Left pelvic region | Not done | US | Left pelvic region closed to the sigmoid colon | Yes | Adhesions |
| 25 | Lippes loop | None | 20 years | Not seen | Pelvis | Not done | Closed to the anterior abdominal wall | Not seen | US | On omentum | Yes | No adhesion |

IUD: Intrauterine device; TCu880: Copper IUD; LNG-IUD: Levonorgestrel releasing IUD; TVUSG: Transvaginal ultrasonography; HS: Hysteroscopy; CT: Computerized tomography; MRI: Magnetic resonance image; US: Ultrasonography; LT: Laparotomy.

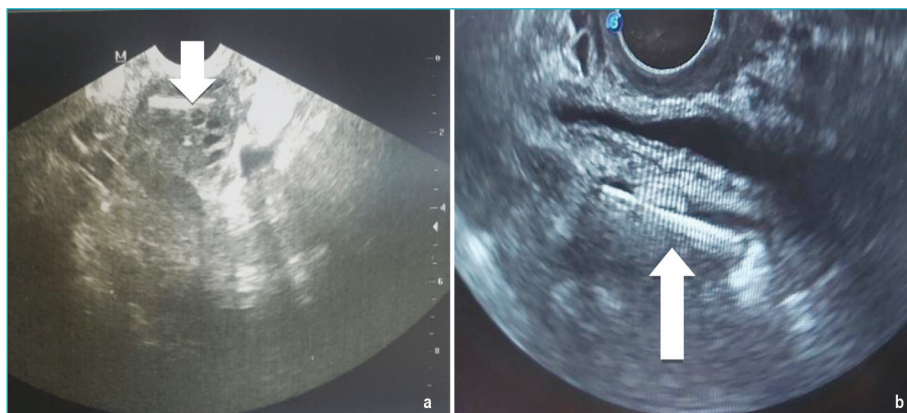


FIGURE 1: a) TVUSG: intraperitoneal copper IUD (showed by arrow) in adnexial region. Ovary and iliac vessels are seen;
 b) TVUSG: IUD showed by arrow is seen closed to urinary bladder.
 TVUSG: Transvaginal ultrasonography; IUD: Intrauterine device.

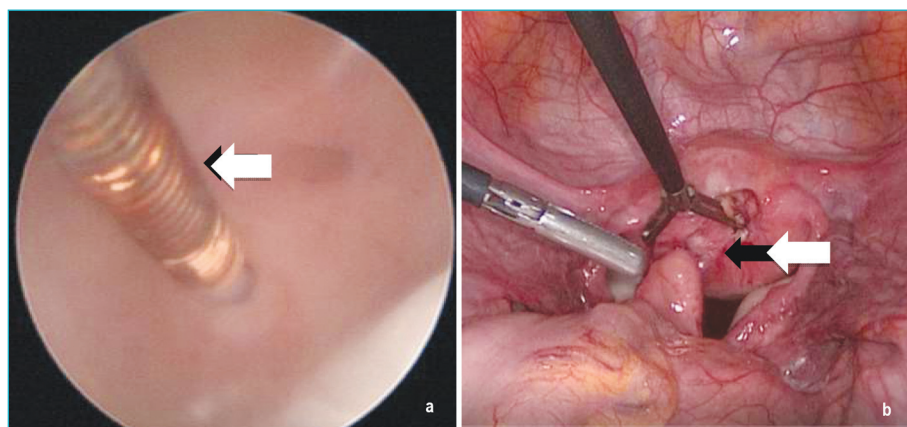


FIGURE 2: a) Hysteroscopic appearance of copper IUD (showed by arrow) perforating uterine wall;
 b) Laparoscopic view of the same patient, copper IUD (showed by arrow) perforating uterus and intestine.
 IUD: Intrauterine device.

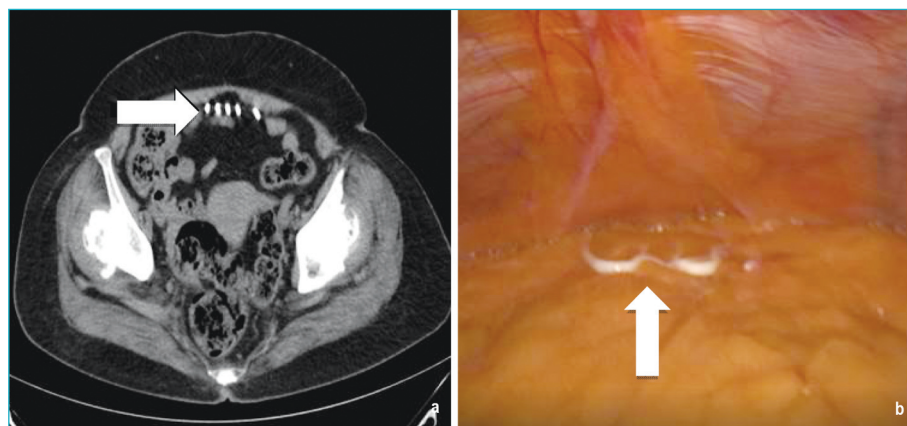


FIGURE 3: a) Lippes loop (showed by arrow) close to the anterior abdominal wall on computed tomography;
 b) Lippes loop (showed by arrow) on omentum surface in the operation.

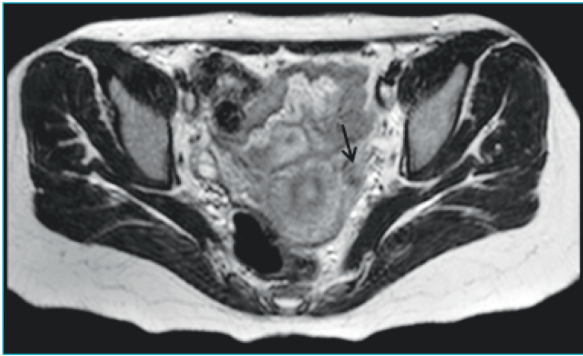


FIGURE 4: T2 weighed axial magnetic resonance imaging view of a patient with a missing copper intrauterine device (showed by arrow).

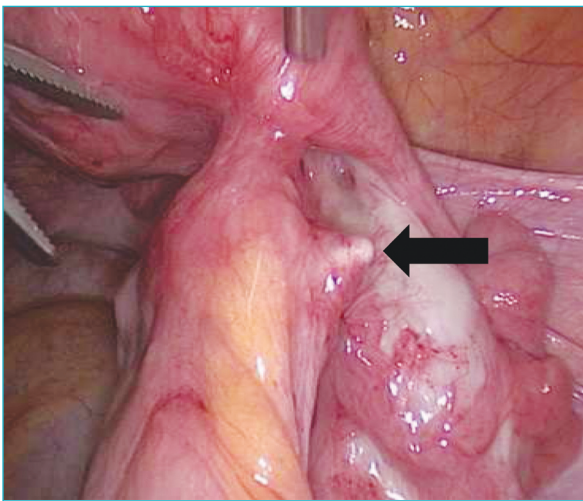


FIGURE 5: Ileum perforated by copper IUD with the uterus at the right cornual region and ileum; part of the IUD (showed by arrow) has migrated inside the ileal lumen.

IUD: Intrauterine device.

forated by the IUD to perform a wedge resection and end-to-end anastomosis (Figure 5).

DISCUSSION

IUDs are used commonly worldwide and are very effective and safe. Perforation of the uterus is very rare but it can lead to severe consequences. The mean time between IUD insertion and uterine perforation diagnosis is recorded in the literature is one year in 90% of cases.⁸ In our study, 72% of cases of mislocated IUDs were diagnosed in the first year of insertion. Uterine perforation can cause pain and vaginal bleeding after insertion; however, it can be asymp-

tomatic. Because mislocated IUDs can be asymptomatic, in some studies regular check ups 6-12 weeks after IUD insertion and then once every two years are recommended to find any possible complications.⁹ In our study, the earliest recognized case was one day after insertion with the patient experiencing pelvic pain. The latest recognized case was 20 years after insertion with the patient also being asymptomatic. Clinicians should mention the complaints of patients and suspect the perforation or migration of IUDs and should moreover know that these can exist without any symptoms.

During routine examinations, missing IUD strings raise suspicions of IUD expulsion, perforation, migration, or dislocation. However, observing the strings does not guarantee the correct intrauterine localization of the IUD. In the literature, there are case reports of mislocated IUDs despite threads at the cervix.¹⁰ In our study, one of the mislocated IUD patients had IUD strings at the cervix despite the IUD being found in the Douglas pouch. After vaginal examinations, TVUSG should be used for the initial imaging. In our study, ultrasonography seemed to be very useful in identifying mislocated IUDs, especially copper IUDs in the pelvic region, adjacent to or partially connected to the uterus or embedded in the myometrium. In our study, mislocated IUDs were seen by TVUSG in 48% of cases. These mislocated IUDs were all copper IUDs, no LNG-IUDs were detected by TVUSG. Copper wire is radiopaque and it appears to be hyperechoic in ultrasonography (US). The frame of an LNG-IUD contains barium sulfate, which aids in visualization in radiography but not in US. It appears as acoustic shadowing between its echogenic proximal and distal ends and it can be difficult to interpret the correct localization.¹¹

Plain radiography is needed if an IUD is not seen by ultrasonography in order to understand whether IUD expulsion has occurred and the patient has no IUD in her body. Because LNG-IUDs are not clearly seen by ultrasonography, radiography may be necessary to show whether an IUD is still present in the patient. Although radiography can prove the existence of IUDs, it cannot differentiate whether the IUD is intrauterine or extrauterine.

In our study, it was observed that hysteroscopy is especially useful when LNG-IUDs are seen not by TVUSG but by radiography to be certain whether an IUD does not have an intrauterine location. Furthermore, when an IUD is seen partially related to the uterus, then hysteroscopy seems to be very helpful to understand the localization and the extent of the dislocation of an IUD. CT is not essential for diagnosis and in our study, nine of eleven mislocated IUD patients not having had CT underwent successful operations with IUDs being extracted. In some studies, none of the patients had CT and were operated on for extrauterine IUDs.¹² Although CT is not essential for diagnosis and cannot show adhesions, it is helpful to understand the severity of perforations and useful for evaluating complications such as bowel obstruction, IUD perforation into other structures, abscess formation, and relations to the other organs. CT helps in the optimal localization of IUDs, in surgical planning and in determining any possible complications. In our study, one of the three intestinal IUD migration patients had preoperative CT and a mislocated copper IUD was seen very near to the colonic surface. If the IUD appears to be attached to, to be embedded into, or to have perforated the bowel, preoperative bowel preparations should be done to make proctosigmoidoscopy optimally possible to ensure that bowel penetration is limited to the serosa.¹³

MRI is not routinely used to evaluate a mislocated IUD, however, it can be helpful especially in the evaluation of its relation to the uterus.¹⁴ If MRI will be used, the correct clinical information about mislocated IUDs must be shared with the radiologist.

The management of asymptomatic intraperitoneal IUDs remains controversial. WHO recommends the removal of intraperitoneal mislocated IUDs after diagnosis to prevent complications, including cases that are asymptomatic.⁶ A number of authors suggest that management of an asymptomatic intraperitoneal IUD remains controversial and removal may not be necessary.⁵ In our study, one patient's operation was postponed after observing dense adhesions and a suspected intestinal perforation by an IUD during laparoscopy. The patient still does not accept having surgery again and is still asymptomatic.

For intraperitoneal IUDs, laparoscopy is a first line extraction technique. In some complications, such as intestinal perforation, dense adhesions, intraperitoneal abscess or fistula formation, laparotomy may be necessary to remove IUDs and treat any complications.¹⁵ With the increase in experience and the development of laparoscopic techniques, most patients can have their IUDs removed through laparoscopy in addition to complications being managed laparoscopically. In our study, fifteen intraabdominal adhesions, two of the three intestinal perforation patients and a total of two of the abscess formation patients were operated on successfully using the laparoscopic technique. Hysteroscopy and colonoscopy can be combined with laparoscopy to facilitate the operation and any possible injury to the uterus, intestines and abdominal cavity can be safely and effectively evaluated.¹⁶

STRENGTH AND LIMITATIONS

The main strength of our study is that it included 25 patients and all preoperative techniques and complications were analyzed separately. There are also some factors that weaken the study. It is a retrospective study, patients were evaluated by different surgeons and there was no standart preoperative evaluation of the patients to compare the results.

CONCLUSION

In conclusion, one of the most serious complications of IUDs is uterine perforation, which usually occurs at the time of insertion, and which should be performed by experienced staff. We agree with the suggestion of regular IUD checks with ultrasonography and we believe that vaginal examination, TVUSG, and plain radiography are basic diagnostic methods for mislocated IUDs. CT is especially important to evaluate IUDs and the other intraabdominal organ relationships or to show complications such as abscesses or fistula formation. Hysteroscopy and colonoscopy can be combined with other techniques. The treatment is the surgical removal of mislocated IUDs with laparoscopy appearing to be the first line of treatment.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Nurşen Kurtoğlu Aksoy; **Design:** Nurşen Kurtoğlu Aksoy, Hakan Güraslan; **Control/Supervision:** Nurşen Kurtoğlu

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