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Perforated Intraperitoneal Intrauterine Contraceptive Devices: Diagnosis, Management and Clinical Outcomes

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Abstract

Objective—To describe a series of intraperitoneal perforated intrauterine contraception devices (IUDs) and discuss associated findings, methods for diagnosis, and management of this complication.

Study Design—Retrospective review of surgical database at the University of Texas Southwestern Medical Center between 1998 and 2012.

Results—37 women were found to have a perforated IUD located in the intraperitoneal cavity. Nineteen (51%) copper IUDs, 17 (46%) LNG-IUDs, and 1 (3%) Lippes loop were identified. 20 (54%) women presented with abdominal pain, 16 (43%) were asymptomatic, and 1 (3%) woman was found to have strings protruding out her anus. 26 (70%) women underwent laparoscopy for IUD removal, 6 (16%) underwent hysteroscopy along with laparoscopy. Conversion to laparotomy was needed in 4 (11%) patients. 2 (5%) IUDs caused full thickness rectouterine fistulas requiring laparotomy for repair. Dense adhesions were encountered in 21 (57%) cases; and of those, 15 (71%) were associated with a copper IUD. Copper IUDs were significantly more likely than LNG-IUDs to be linked with dense adhesions ($P = 0.02$).

Conclusions—Perforated IUDs can be asymptomatic or cause short and long-term symptoms. Long term complications include abscess and fistula formation. Copper IUDs cause a greater inflammatory process than LNG-IUDs. Even if asymptomatic, we advocate prompt removal of all IUDs that perforate into the peritoneal cavity once they are identified. Laparoscopic surgical removal of an intraperitoneal IUD is a safe and preferred modality.

Keywords

missing IUD; laparoscopy; intraabdominal; perforated; intraperitoneal

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Introduction

Intrauterine contraceptive devices (IUDs) are the most widely used form of reversible contraception worldwide.(1) In the United States, they are becoming increasingly popular with 5.5% of contracepting women utilizing them. (2), (3) IUDs provide a safe and highly effective form of long acting reversible contraception. Although complications such as expulsion and missing strings may occur in up to 18% of users, (4) uterine perforation is a rare, but serious, complication.

The incidence of uterine perforation is estimated to be between 0.2 and 3.6 per 1000 insertions. (5), (6), (7), (8) Perforation may be asymptomatic or cause pain, abnormal bleeding, bowel or bladder perforation or fistula formation. Case reports of uterine perforation have become increasingly common, likely because of the growing popularity of IUD use. (8),(9), (10) We present a series of intraperitoneal IUDs to discuss associated findings, methods of diagnosis, management and patient outcomes.

Materials and Methods

This is a single center, retrospective study of women who underwent surgery to remove an intraperitoneal IUD. Institutional review board approval was obtained from the University of Texas Southwestern (UTSW) Medical Center before initiation of the review. Pertinent *Physicians' Current Procedural Terminology Coding System*, 4th edition (CPT-4) procedure codes and *International Classification of Diseases*, 9th Revision diagnostic codes were used to identify patients who underwent surgery for removal of a malpositioned IUD between December 1998 and January 2012.

An intraperitoneal IUD was defined as an IUD found in the abdominal cavity or one that partially perforated through the uterine serosa. Only patients in whom either laparotomy or laparoscopy, was performed for IUD removal were included. Cases in which a malpositioned IUD was removed hysteroscopically were not analyzed.

Patient information was collected including age, race, medical history, parity and number of prior cesarean deliveries. Clinical presentation, date of IUD insertion, time intervals from last delivery to IUD insertion, and from IUD insertion to diagnosis of perforation were analyzed. Uterine size and position based on examination and/or imaging, as well as the diagnostic workup and management characteristics were reported. Pelvic ultrasound images were reviewed for uterine size measurements, presence of anatomic anomalies, and uterine flexion and position. (11) The severity of flexion, was examined by measuring the axis of deviation between the cervical canal and the endometrial cavity with a protractor. Intraoperative findings such as IUD type, location, degree of adjacent adhesive disease, and other associated complications were evaluated by reviewing documentation in the operative reports. Details of IUD placement, such as the level of health care provider and insertion technique, were not uniformly available as not all IUDs were placed at our institution.

Univariate analyses were conducted Pearson's chi-square test, and when appropriate, Mann-Whitney test were used to compare the findings associated with copper IUDs and levonorgestrel-containing IUDs (LNG-IUDs). When appropriate, Fisher's exact test, was

used. All tests were performed using SAS version 9.2 (SAS Institute, Cary, NC). Statistical significance was established at a $P < .05$.

Results

Clinical Presentation

Between December 1998 and June 2012, we identified 37 surgeries to remove perforated intraperitoneal IUDs in women aged 16–68 years. Nineteen (51%) copper IUDs, 17 (46%) LNG-IUDs, and 1 (3%) Lippes loop were identified (Table 1). Of the total group, 20 (54%) women presented with abdominal pain, 16 (43%) were asymptomatic, and 1 (3%) woman was found to have strings protruding out her anus. Two (5%) patients complained of abnormal bleeding in addition to pelvic pain. Of the patients who were asymptomatic, 12 were noted to have missing IUD strings during routine examination, and 4 had incidental discovery of an intraperitoneal IUD during radiologic imaging studies performed for unrelated symptoms.

21 IUDs (57%) were inserted within 12 weeks of delivery with a mean time interval between delivery and IUD insertion of 6.6 weeks. Four IUDs (11%) were not placed postpartum. We were not able to determine a temporal relationship in the remaining 12 cases. Four (11%) patients became pregnant with the perforated IUD in situ.

Regarding the timing of diagnosis, 5 (14%) women were diagnosed with a perforated IUD within 7 days of insertion, 9 (24%) were found 1–8 weeks after insertion, 6 (16%) were found 2–12 months after insertion, and 17 (46%) were identified more than 1 year after placement. The longest interval from IUD insertion to identification of perforation was a Lippes loop found 43 years after a postpartum placement.

Diagnosis

Pelvic ultrasound was the first imaging modality to be ordered for evaluation in 25 (68%) cases. Of these, the IUD was not visualized in 14 (56%). Notably, the LNG-IUDs were significantly more likely to be missed ultrasonographically than copper IUDs ($P = 0.002$). Plain frontal radiography (KUB) was ordered as the first imaging modality in 6 patients, however it was the most frequently performed adjunctive imaging modality and was successful at localizing the missing IUD in all cases. Computed tomography (CT) was ordered as the first imaging modality in 6 patients. Five of these patients were not suspected of having a perforated IUD and a CT scan was performed to evaluate hematuria, rule out appendicitis, exclude intraperitoneal trauma following a motor vehicle accident and for evaluation of pelvic pain. The sixth patient who received CT imaging, had IUD strings protruding through her anus on physical examination thus the purpose of the scan was to determine the exact IUD location and further evaluate bowel involvement.

Uterine orientation (flexion and version) was examined by pelvic ultrasound which was available in 31 cases: 18 uteri (58%) were anteflexed, whereas 13 (42%) were retroflexed. Fourteen (32%) had an angle of flexion $< 120^\circ$, with angles as acute as 53° . Figure 1. Moreover, 5 (16%) cases had opposing orientations of uterine flexion and version, that is, anteflexion/retroversion or retroflexion/anteversion.

Intraoperative findings and outcomes

Of the total group, 31 (84%) cases of intraperitoneal IUDs were successfully managed laparoscopically. Twenty-six (70%) underwent laparoscopy alone for IUD removal, whereas 6 (16%) underwent hysteroscopy and laparoscopy. Conversion to laparotomy was needed in 4 (11%) patients: 2 for failed laparoscopic entry, 1 for dense adhesions, and 1 to repair a rectouterine fistula. Two (5%) IUDs were removed during planned open procedures: one during total abdominal hysterectomy and the other at the time of emergency laparotomy for peritonitis, ruptured appendicitis, and repair of a rectouterine fistula. Three (8%) patients underwent concomitant proctosigmoidoscopy to confirm colon integrity.

Complete extrauterine perforation (84%) was more common than partial perforation (16%). In 12 (32%) of the total cases, the perforation site was identifiable. Perforation occurred though the uterine fundus in 5 cases, posterior wall of the uterine corpus in 5 cases, and posterior wall of the isthmus in 2 cases. During surgery, IUD location was noted. Ten (27%) IUDs were found near the pelvic sidewall, 8 (21.6%) in the posterior cul-de-sac, 6 (16%) partially embedded in the myometrium, 6 (16%) adhered to omentum, and 2 (5%) adhered to colonic epiploica. Three (8%) IUDs were embedded in the serosa of the sigmoid colon, and 2 (5%) perforated the full thickness of the rectum resulting in rectouterine fistula. Four (11%) IUDs were found within sterile abscesses. In both cases of rectouterine fistula and in all cases associated with pelvic abscesses, the IUDs were copper. Moreover, copper IUDs were significantly more likely than LNG-IUD to be associated with dense adhesions ($P=0.02$). In fact, dense adhesions were encountered in 21 (57%) cases, and of those, 15 (71%) were associated with a copper IUD. All 18 (100%) patients with a longer time interval (>8 months – 43 years) since IUD insertion were found to have adhesions at the time of IUD retrieval, while 12 (68%) patients with a shorter time interval since placement had adhesions. Compared to those with adhesions, patients without adhesions were more likely to have had a shorter time interval (3 days – 8 months) since IUD insertion ($P=0.004$). Notably, the presence or absence of adhesions did not correlate with pain symptoms ($P=0.26$).

All patients had an unremarkable postoperative course, except for one. She had undergone laparoscopic removal of a copper IUD and presented 4 weeks postoperatively with partial small bowel obstruction, which was managed conservatively.

Discussion

Uterine perforation is one of the most serious complications associated with IUDs, and although rare, is likely to become more frequent given the increasing popularity of IUD use. (3) Clinicians should be aware of this complication and its management. In the past, concerns regarding extensive adhesive disease often led to performing laparotomy for IUD retrieval. However, our series demonstrates that laparoscopy is effective and safe for intraperitoneal IUD removal.

Previously reported risk factors for uterine perforation include lactation, recent postpartum status, uterine abnormalities, suspected adenomyosis and clinician inexperience with IUD placement. (6), (7), (12), (13), (14). Women in our series were almost all multiparas, most

with a history of vaginal delivery. Consistent with other series, (6), (7), (15) more than half of the women were postpartum, with an average interval of IUD placement of 6 weeks postpartum. This association may reflect practice patterns of insertion timing rather than actual causality. Lactation status was not known in most cases. The rationale for postpartum status and lactation as risk factors for perforation are attributed to uterine involution and contractility. (7)

Uterine orientation may also be related to perforation. Of our cases, 42% occurred in retroverted uteri, whereas the usual rate of retroversion is between 20 and 25% (16), (17). Another consideration is not only the orientation of the uterus to the vagina (version), but also orientation of the uterine body to the cervix (flexion). If an acute unexpected angle is present at any of these points, there may be a higher likelihood of perforating through either the anterior or posterior uterine walls. Similarly, a severe mismatch of flexion and version may also increase uterine perforation risk during IUD placement, especially if a tenaculum is not placed on the cervix to align the axis for insertion.

Diagnosis/Identification

None of the perforated IUDs were diagnosed at the time of insertion, and most went undetected for several years. Most frequently, patients presented with pain, though one-third were noted to have missing IUD strings during routine examination. If attempts at office retrieval fail, transvaginal ultrasonography is the preferred initial method for locating a missing IUD. (18)

In our series, pelvic ultrasound was the usually first imaging modality to be ordered for evaluation. Of those ultrasounds, more than half (58%) failed to locate the missing IUD. In that setting, the assumption that the IUD has been expelled is inappropriate and plain frontal supine radiography (KUB) should be obtained as adjunct imaging to confirm and locate the extrauterine IUD. On the other hand, abdominal radiography may be a suboptimal first imaging choice, since it is often unable to distinguish between extra and intrauterine IUD location. Marking the uterine cavity with radioopaque material or a uterine sound can help. (18)

LNG-IUDs were significantly more likely to be missed ultrasonographically than copper IUDs, regardless of their position in the pelvis. This is consistent with recent literature that has shown LNG-IUDs to be more challenging to visualize ultrasonographically due to the use of barium sulfate which aids radiographic, but not sonographic visualization. (19) Moschos, et al found that 3-dimensional (3-D) ultrasonography improved both visualization and position evaluation of malpositioned IUDs. (20) Thus, for diagnostic evaluation of a missing IUD, we recommend pelvic ultrasonography including 3-D imaging. If this fails to locate the missing IUD, we recommend obtaining a supine flat plate radiograph of the abdomen to the level of the diaphragm, as an abdominal radiograph limited to the lower pelvis may potentially miss IUDs that have migrated to the upper abdomen. If this modality also fails, and the clinical suspicion for perforation remains high, magnetic resonance imaging or computed tomography should ultimately locate the device.

Once the IUD has been localized intraperitoneally by imaging, some authors have suggested leaving it if the patient is asymptomatic. However, in our series, we found that asymptomatic patients were as likely as symptomatic ones to have adhesive disease and other concerning findings during surgery.(18), (21) 12 out of 16 (75%) asymptomatic patients and 18 out of 21 (86%) symptomatic patients had pelvic adhesions. Moreover, regardless of IUD type, patients with a shorter interval between IUD placement and surgical removal were found to have less extensive adhesive disease. Therefore, once an IUD is noted to be missing, we recommend prompt localization and removal as that may limit the need for a more extensive procedure, and prevent complications such as abdominal abscess and fistula formation.

Studies suggest that up to 15% of perforated IUDs may cause injury to surrounding organs, most frequently the bowel. (14) Notably, the two patients with the most serious complications, rectouterine fistulas, were asymptomatic. One patient with a copper IUD placed 3 years prior to presentation, had been asymptomatic until developing peritonitis the week of surgery. The second patient complained of palpable IUD strings at her anus with bowel movements. She first noted these symptoms 2 years after placement of a copper IUD. Both cases involved dense adhesions and full thickness rectal fistulas that required laparotomy for repair.

Intraoperative Considerations and Recommendations

We and others have found that laparoscopy is a safe and effective modality of retrieving intraperitoneal IUDs.(9), (10), (22) Laparoscopy provides a panoramic view of the peritoneal cavity, which is particularly suited to locating and removing a lost device.

Previous smaller series have challenged the belief that the degree of adhesive disease is related to the type of IUD.(18),(21),(23) However, our series continues to support the relationship between adhesive disease and copper IUDs. The lower proclivity of LNG-IUDs to incite an inflammatory process, and thus adhesions, may explain why a prior case series reported more difficulty localizing LNG-IUDs than copper ones. (23) Without peritoneal adhesions to anchor the IUD in the pelvis, the device may attach to the omentum or move with peristalsing bowel.

Several intraoperative considerations may minimize the risk of failing to locate the IUD and the possible need for laparotomy. These include: (1) optimal localization of the IUD preoperatively, (2) capacity for intraoperative imaging, and (3) surgical planning. By obtaining supine rather than upright radiographic images preoperatively, one avoids the problem of a migrating IUD when the patient is supine in the operating room. (23) Similarly, moving the patient out of Trendelenburg positioning may also shift what appears to be a migratory IUD back into the pelvis. If the IUD is indeed encased in omentum or bowel, intraoperative fluoroscopy may help by providing real-time, imaging. (10), (24), (25) In situations in which fluoroscopy is not available, intraoperative abdominal ultrasound or plain film radiography can help with IUD identification. Simultaneous placement of laparoscopic instruments into the peritoneal cavity during real-time imaging may also assist with localization of the device. Preoperative planning with equipment for cystoscopy and proctosigmoidoscopy and consideration of preoperative bowel preparation for optimal visualization if sigmoidoscopy is required may aid a successful procedure. For two of our

cases, the IUD was unexpectedly embedded into the bowel. Fortunately, a preoperative bowel preparation had been performed, which allowed optimal proctosigmoidoscopy to ensure that bowel penetration was limited to the serosa (Fig. 2, 3).

This is a retrospective study at a tertiary medical center. Thus, the true incidence of intraperitoneal IUD perforation cannot be ascertained since the total number of insertions during this time cannot be counted. Furthermore undiagnosed cases of perforation could not be included. Although some missing data limit the study, the availability of imaging studies and operative findings allow us to provide a descriptive analysis and discuss management of this rare complication.

IUDs are a safe, effective form of long acting reversible contraception, but perforations can present diagnostic and management challenges. Given the increasing popularity of this method of contraception, we may see an increase in the rate of this complication. We advocate prompt removal of all intraperitoneal IUDs as most complications were encountered in patients with a remote history of IUD placement and with few if any symptoms. In this series, more than 80% of the cases were successfully managed laparoscopically. Therefore, laparoscopic removal of a perforated, intraperitoneal IUD is a safe and preferred modality.

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Figure 1. Transvaginal ultrasound, sagittal view of an anteflexed, retroverted uterus with a 53° angle of flexion. The IUD was not seen on pelvic ultrasonography because it was embedded in omentum in the upper pelvis near the anterior abdominal wall.

Figure 2.
Transvaginal ultrasound image of Copper IUD pointing out of posterior uterine isthmus.

Figure 3.
Intraoperative image of Copper IUD (from Fig. 2) densely adherent to sigmoid colon.

Table 1.

Clinical and Intraoperative Findings

Characteristic		Number of Patients (%)
Type of IUD	Copper IUD	19 (51.4)
	LNG-IUD	17 (45.9)
	Lippes Loop	1 (2.7)
Age (y)	21	6 (16.2)
	22–35	23 (62.2)
	>35	8 (21.6)
Parity	0	1 (2.7)
	1	7 (18.9)
	>1	29 (78.4)
Number of prior cesarean deliveries	0	25 (67.6)
	1	9 (24.3)
	>1	3 (8.1)
Presenting symptoms	Asymptomatic	16 (43.2)
	Missing strings	12 (32.4)
	Incidental finding	4 (10.8)
	Pain	20 (54.1)
	Strings at anus	1 (2.7)
Time interval between date of IUD Insertion and last delivery (weeks)	<4	1 (2.7)
	4–8	14 (37.8)
	8–12	6 (16.2)
	Not postpartum	4 (10.8)
Time interval between date of IUD insertion and diagnosis of perforation (weeks)	1	5 (13.5)
	>1 to 4	7 (18.9)
	>4 to 8	2 (5.4)
	>2 to <12 months	6 (16.2)
	12 months	17 (45.9)
Uterine version *	Anteverted	18 (48.6)
	Retroverted	13 (35.1)
	Unknown	6 (16.2)
Uterine flexion *	Anteflexion	18 (48.6)
	Retroflexion	13 (35.1)
	Unknown	6 (16.2)
Angle of flexion (degrees) *	<120	14 (37.8)
	> 120	17 (45.9)
	Unknown	6 (16.2)
Type of perforation	Complete	31 (83.8)
	Partial	6 (16.2)
Perforation sit [†]	Uterine fundus	5 (13.5)

Characteristic	Number of Patients (%)
Location of IUD intraoperatively	Posterior wall of uterine corpus
	5 (13.5)
	Posterior wall of uterine isthmus
	2 (5.4)
	Pelvic sidewall
	10 (27)
	Posterior cul-de-sac
	8 (21.6)
	Partially embedded in myometrium
	6 (16.2)
	Adherent to omentum
	6 (16.2)
	Adherent to colonic epiploica
	2 (5.4)
	Embedded in serosa of sigmoid
	3 (8.1)
	Perforating rectum
	2 (5.4)

IUD, intrauterine device.

* Uterine size, flexion and version could not be determined as ultrasonography was not obtained in 6 out of 37 patients

† Perforation sites were only evident in 15 patients.