

Intestinal Perforation by a Migrated Intrauterine Contraceptive Device: A Review of This Rare but Important Complication

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Abstract

Intrauterine contraceptive devices (IUCDs) are one of the most popular forms of modern contraception. We present a case of IUCD migration into the sigmoid colon and associated abscess formation, with a literature review to aid surgeons in recognising, investigating and treating this rare complication. This is the most comprehensive known review of this subject to date. PRISMA guidelines were used. All case reports published up until the 15th March 2020 were included, if they described migration of a modern T-shaped IUCD relating to or penetrating intestinal viscera. Fifty-two cases were suitable for inclusion. Abdominal pain (48.9%) and failure of contraceptive effect (42.6%) were non-specific but common presentations. Laparoscopic retrieval was frequently attempted, but with relatively low success rates. Adhesions, visceral involvement and abscesses were associated with failure, conversion to open surgery, bowel resection and stoma formation. Asymptomatic migration was likely to be underestimated and presents an argument for non-operative management, although not currently recommended by national and

international guidelines. Although limited by reporting biases and the small number of cases available, our review highlights that diagnosis requires a high index of suspicion, regardless of menstrual status. It also demonstrates the importance of cross-sectional imaging prior to management, balanced with the risks of radiation exposure, to allow informed consent and avoid failed retrievals.

Keyword

Intrauterine device
Migration
Abscess
Intestinal perforation
Review

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Introduction

Intrauterine contraceptive devices (IUCDs) are one of the most popular forms of modern contraception globally. Of females aged 15 to 49 years, 56.1% worldwide and 84% in the UK use modern forms of contraception [1, 2]. In the UK, 10% of users opt for IUCDs, but this can be as high as 74% elsewhere and is increasing [3]. This is largely due to its efficacy of over 99%, low failure rate, and the minimal level of user-related errors compared to barrier and pharmacological methods [4]. Complications of a copper-based IUCD include failure to prevent conception (0.1–1% at 1 year, 2.2% at 12 years) [5], expulsion (1 in 20) and uterine perforation (1.1 to 2 in 1000) with 15% of these involving viscera (0.8 per 1000) [6, 7], higher in the post-partum period up to 36 weeks [7, 8, 9, 10] and up to six times higher in women breastfeeding and postpartum [9, 11]. Other risk factors for perforation include clinician inexperience [7, 12], a retroverted uterus, past caesarean section, fibroids and uterine malformations [13, 14].

In this article, we review the existing literature to identify trends in the symptoms, investigations and management of intestinal perforation due to migration of an IUCD, with a case to frame this review. Given the rarity of this condition, but the importance of prompt recognition, we hope to provide some clarity for clinicians caring for these patients, based on a synthesis of the available evidence.

Case Vignette

A 40-year-old gravida 3 para 2 Caucasian female presented to our emergency department (ED) with a 2-week history of lower back pain, migrating to the lower abdomen, associated with fevers, vomiting, per rectal bleeding and dysuria. She had a past medical history of hypertension, no past surgical history and two spontaneous vaginal deliveries. On examination, there was lower abdominal tenderness. Laboratory investigations demonstrated a raised C-reactive protein of 294 mg/L and a white blood cell count of $16.7 \times 10^9/L$.

A computed tomography (CT) scan was organised, which showed an IUCD embedded in the sigmoid colon and associated left adnexal tubo-ovarian abscess. She had this inserted 10 years prior to presentation, 6 months after the delivery of her second child. A transvaginal ultrasound (TVUS) scan confirmed this abscess, but not the IUCD. On further questioning, our patient revealed that 6 months after the insertion of the IUCD, she fell pregnant and underwent a planned termination of pregnancy. The device was assumed to have fallen out, and it was unclear exactly when it had migrated.

Due to the chronicity of the migrated IUCD, she was admitted and treated conservatively with a 1-week course of co-amoxiclav. Magnetic resonance imaging (MRI) and rigid sigmoidoscopy were performed as an outpatient for further assessment. Ten days later, the patient represented to ED with peritonism, and the abscess had enlarged by 80 cm^3 , refractory to co-amoxiclav. An urgent laparoscopy was organised. Inflammation made access difficult, despite adhesiolysis, and no clear collection was seen for drainage. The procedure was terminated, two intra-abdominal drains were inserted, and she was discharged with a 12-week course of doxycycline and amoxicillin to reduce the pelvic inflammation, with view to colonoscopic retrieval.

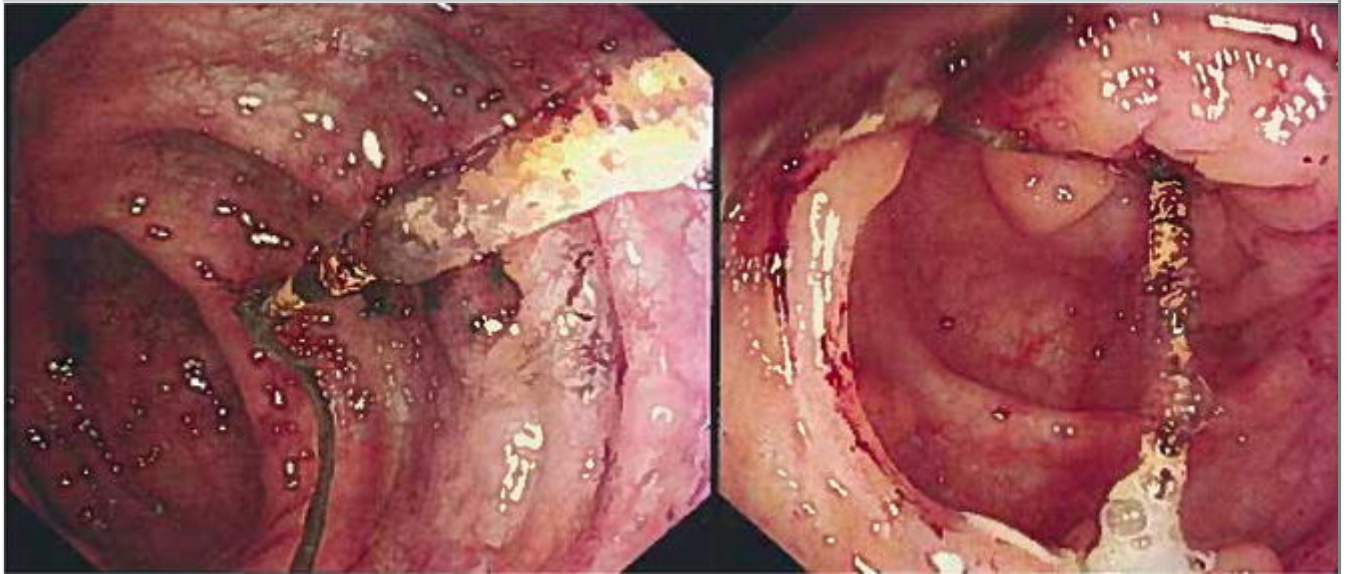
Repeat TVUS and CT scan 2 weeks later showed halving of the abscess volume and stable position of the IUCD. Colonoscopy identified the IUCD in the rectosigmoid lumen, 18 cm from the anal verge (Fig. 1). Endoscopic retrieval was not successful due to the risk of perforation with traction. The site was tattooed, and the patient was electively readmitted in August 2019 for retrieval of the device, in a joint procedure between general surgeons and gynaecologists. Laparoscopic retrieval was attempted, but was abandoned and converted to laparotomy due to the dense inflammatory tissue. Adhesiolysis and a high anterior resection with a stapled side-to-end anastomosis were completed. A diverting loop ileostomy was fashioned due to the chronic pelvic inflammation. Histology showed the IUCD tightly embedded within a 2-mm tract in the bowel wall. The patient made an uneventful recovery with 7 days of co-amoxiclav and was discharged 9 days post-procedure.

Fig. 1

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Photographs taken during the endoscopy, showing the IUCD penetrating into the rectosigmoid lumen

AQ2



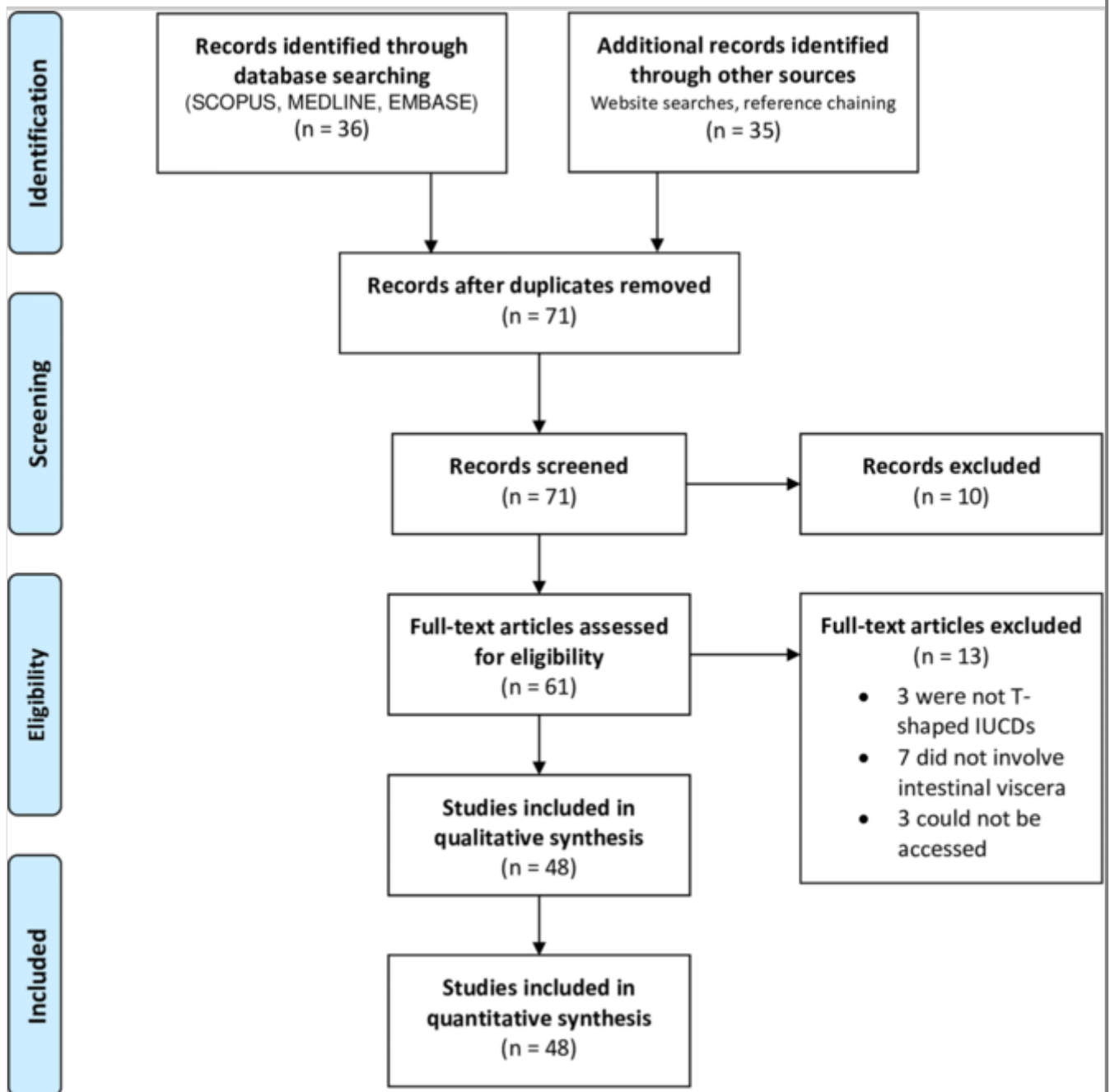
Her ileostomy was reversed 133 days after its formation without any complications, and she was discharged after a 4-day admission. On review in the surgical clinic 2 months later, she was clinically well and was discharged from regular follow-up.

Methods for Literature Review

Using Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (Fig. 2) [15], we conducted an all-time literature search of Scopus, MEDLINE and Embase until 15th July 2020, including the terms “IUD”, “intrauterine devices” (expanded search), “coil”, “migrat*”, “colon”, “bowel”, and “translocat*”, using “and/or” combinations of the above terms within the titles or abstracts. This was combined with manual searching and identifying further papers from reference lists.

Fig. 2

PRISMA flow diagram for inclusion of case reports



We included cases that described a T-shaped copper IUCD in relation to any part of the gastro-intestinal tract viscera in adults over 18 years old. Loop or wire devices were excluded. Although cases of migration to the bladder, pelvis, omentum and the abdominal cavity and wall have been reported, we focus on migration to intestinal organs only. Duplicate articles were excluded. Two authors identified studies and extracted and analysed data (Antony Zacharias, Stephanie Clark). All authors (Antony Zacharias, Stephanie Clark, Chetan Parmar, Ayo Oshowo) contributed to the discussion, drafting and finalisation of the review.

Results of Literature Review

We identified 48 accessible case reports describing T-shaped IUCDs migrating into, or relating to, the intestine in adults [12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61]. This amounted to a total of 52 described cases. All were at high risk of selection and reporting bias due to the nature of case reports. The mean age of cases was 34.8 years (range 22–64; median 35). All cases were at least primigravid women prior to IUCD insertion. The mean pre-IUCD gravidity was 3.43 (Table 1). Around 75.5% of cases presented in an elective setting (outpatient clinics, general practitioner or other non-emergency routes). The mean time between IUCD insertion and presentation was 3.51 years but varied greatly (range 3 weeks to 31 years) (Table 1).

Table 1

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Basic demographics and characteristics of included patients

Patient characteristics	Mean	Range	<i>n</i>
Age (years)	34.8	22.0 to 64.0	50
Gravida (<i>n</i> , pre-insertion)	3.43	1.00 to 7.00	35
Lag between IUCD insertion and presentation (years)	3.62	0.06 to 31.00	41
Elective presentation (%)	75.5		49

Presenting signs and symptoms were heterogeneous (Table 2). The most common was vague abdominal pain (48.9%) and contraceptive failure (42.6%). The number of asymptomatic cases that were discovered incidentally was 27.7%. Change in bowel habit was present in 17% of cases. Three cases reported an associated abscess [17, 41, 51]. The most common locations of migrated IUCDs were the sigmoid colon, rectum and ileum. Migration to the upper abdomen was described in 3 cases. Penetration into the gastrointestinal tract was reported in 61.5% of cases (Table 3).

Table 2

Presenting signs and symptoms amongst included patients

Presenting signs and symptoms (<i>n</i> =47)	<i>n</i>
Pregnancy since insertion	20
Lower abdominal pain	18
Asymptomatic	13

Presenting signs and symptoms (n=47)	<i>n</i>
Altered bowel habit	8
Upper abdominal pain	5
Per rectum bleeding	3
Sepsis	3
Amenorrhoea	3
Dyspareunia	2
Dysmenorrhoea	2
Back pain	2
Proctalgia	2
Abnormal per vaginam bleeding	2
Vomiting	2

Table 3

Location of migrated devices at presentation

Location of IUCD (n=52)	<i>n</i>	%
Sigmoid colon	28	53.8
Rectum	6	11.5
Rectosigmoid colon	6	11.5
Ileum	6	11.5
Descending colon	2	3.8
Transverse colon	1	1.9
Hepatic flexure	1	1.9
Caecum	1	1.9
Stomach	1	1.9
Penetration of mucosal surface	32	61.5

The investigations employed were specified in 48 cases. The most common imaging modality was a plain abdominal radiograph (AXR) ($n=28$), followed by CT scan ($n=25$) and TVUS ($n=22$) (Table 4). CT scan was most reliable to confirm the extra-uterine position of the IUCD (24 of 25 cases). TVUS was least reliable (6 of 22 cases). Endoscopy reliably identified IUCDs that had penetrated

the bowel mucosa (11 of 15 cases). This is represented graphically in Fig. 3. Internal examinations (either per rectal or per vaginal) were performed in 22 cases, detecting an abnormality in two cases which guided management by removal of the IUCD from the rectum with forceps [44, 52]. Note that data for imaging techniques used less often, such as MRI, barium enema and hysteroscopy, should be interpreted with caution.

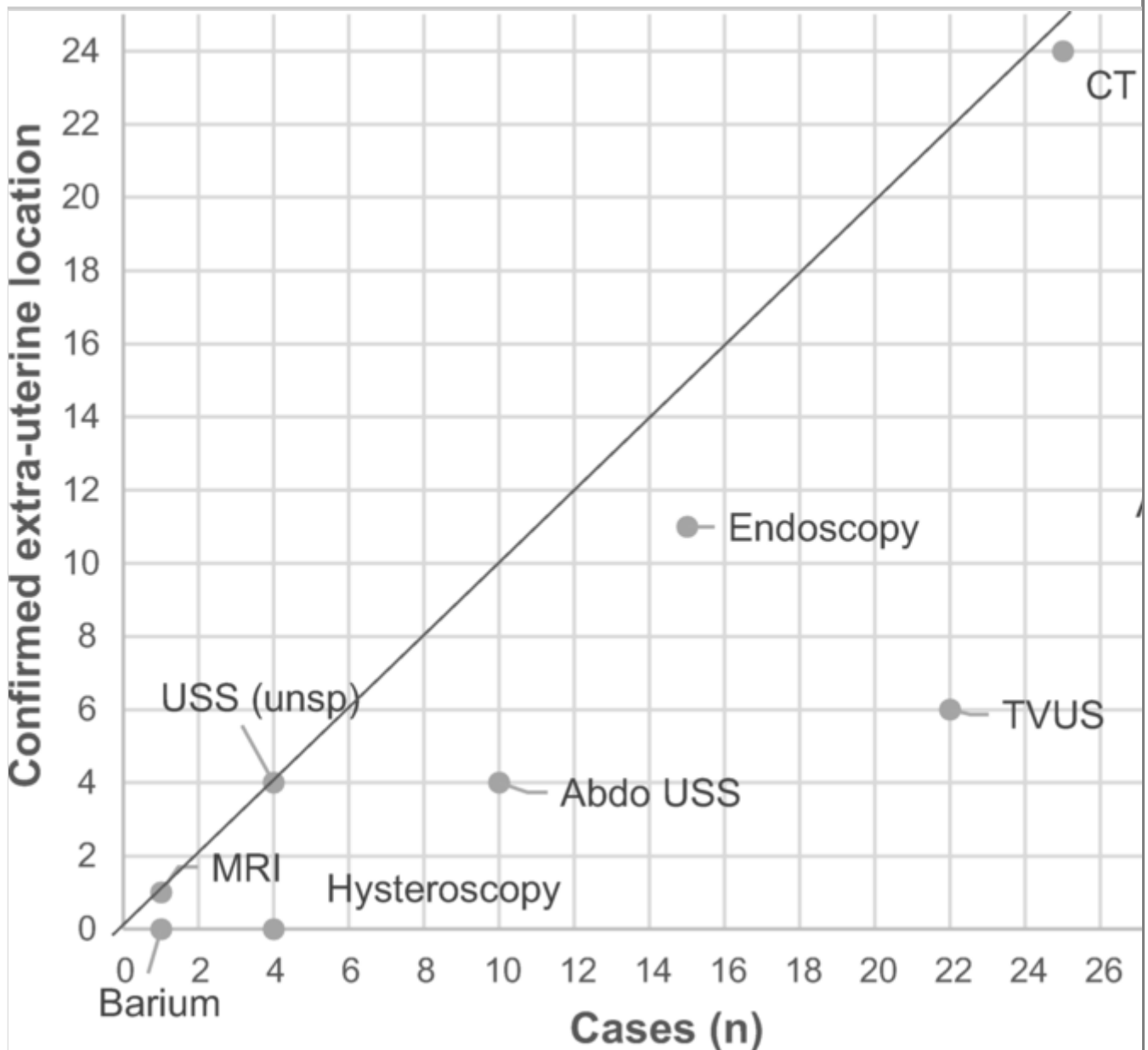
Table 4

Modality of imaging used to identify migration of IUCD

Modality of imaging (<i>n</i> =48)	Cases (<i>n</i>)	Confirming extra-uterine location (<i>n</i>)
Abdominal X-ray	28	13
Computed tomography	25	24
Transvaginal ultrasound	22	6
Endoscopy (flexible sigmoidoscopy or colonoscopy)	15	11
Abdominal ultrasound	10	4
Unspecified ultrasound	4	4
Hysteroscopy	4	0
Magnetic resonance imaging	1	1
Barium enema	1	0

Fig. 3

Scatter plot showing the number of cases using each imaging modality, against the number of cases correctly diagnosed using the same modality. The closer each modality is to the line $y=x$, the more accurate the modality is at diagnosing a migrated IUCD



Seventy-seven methods of management were described across 49 cases (Table 5). Laparoscopy was the most common, followed by open surgery, endoscopy (colonoscopy, flexible sigmoidoscopy, or hysteroscopy), laparoscopy with concomitant endoscopy and finally per rectal removal. Open surgery was the definitive management for most cases (19 of 20 cases), with endoscopy and laparoscopy being the methods with the most “failures” requiring alternative methods (6 of 14 and 14 of 32 cases, respectively). Per rectal removal proved useful in three cases where the IUCD was intra-rectal. Joint laparoscopy with rendezvous endoscopy was employed successfully in four cases. Non-operative management was described in four cases: one was trialled on antibiotics before proceeding with surgical management; one expelled the IUCD without intervention; one was for palliative management; one refused surgery.

Table 5

Method of removal of migrated IUCD, with success rates

Method of management (<i>n</i> = 49)	Cases employing technique (<i>n</i>)	Final method employed (<i>n</i>)	Success rate %
Laparoscopic	32	14	43.8
Open surgery	20	19	95.0
Endoscopy	14	6	42.9
Non-operative	4	3	75.0
Endoscopy + laparoscopy	4	4	100
Per rectal forceps removal	3	3	100

Table 6 presents the reasons for the initial failure of various methods for 14 patients and subsequent definitive management. Some required alteration more than once per case: ten were conversions from laparoscopic to open procedures; four were endoscopic to laparoscopic procedures; two were abandoned laparoscopies with re-do laparoscopic procedures; one was an abandoned open with re-do of the open procedure; one was an endoscopic to open procedure; one was a laparoscopic to endoscopic procedure. Inability to extract the IUCD was a reason for initial failure in six cases, incidentally all laparoscopic. Adhesions were a reason for initial failure in three cases, all of which were also laparoscopic. Risk of perforation was cited in three cases, all of which were endoscopic.

Table 6

Second-line management where initial management failed, with reasons for initial failure

Conversion type (<i>n</i> = 14)	Cases (<i>n</i>)	Reason for conversion (<i>n</i>)
Laparoscopic to open	10	Adhesions (2) Inability to extract (4) IUCD not visualised (2) Perforation (1) Unspecified (1)
Endoscopic to laparoscopic	4	Risk of perforation (2) IUCD not visualised (1) Pain (1)
Re-do open	1	Lack of consent (1)
Re-do laparoscopic	2	Inability to extract (2)
Laparoscopic to endoscopic	1	Adhesions (1)
Endoscopic to open	1	Risk of perforation (1)

Three cases described abscesses [17, 41, 51]. One was initially managed with antibiotics and radiologically guided drainage. Endoscopy was performed which failed due to risk of perforation and was converted to laparoscopy and finally to an open procedure due to inability to extract the IUCD [41]. The second described laparoscopic management and converted to an open procedure due to obscuring adhesions [51]. The final case opted immediately for open management [17]. All three were definitively managed with bowel resection. The two former cases described resection leading to formation of a stoma, and the latter described primary closure of a wedge resection.

Discussion

Risk Factors and Demographics

IUCDs are an effective and popular method of contraception [1, 4]. Like almost all medical interventions, they are not without risk. Multiple high-powered studies report parity in 93.3% to 95.3% of cases with IUCD migration [10, 62]. IUCDs tend to be used more frequently by parous women, which may partially account for the greater number of cases in this group [7]. However, this also may demonstrate a causation-and-effect cycle where parous women are more likely to use IUCDs, which are also more likely to migrate. In our review of the literature, all cases were in females who had previously conceived, with mean gravidity of 3.43. This aligns with our case, where the IUCD was inserted after her second pregnancy.

Presentation

One large retrospective study determined that half of all cases present 1 year after insertion [7]. The time to presentation in our case was 10 years, far longer than the average time of 3.62 years. The literature describes a triad of symptoms: fever, chronic abdominal pain and intermittent diarrhoea [46, 63]. However, the most common in our review was device failure (42.6%) and lower abdominal pain (38.3%), as also seen in our case, or no symptoms (27.7%). In contrast, change in bowel habit was only reported in 17% and fever in 6.4% of cases. This is further reflected in other large international studies, where asymptomatic cases range from 18 to 48%, with failure of contraception being reported in over a quarter of cases [14, 62, 64]. Additionally, migrated IUCDs often only come to light when either symptomatic or discovered incidentally. Hence, the quoted rate of perforation is likely to be an underestimate. This reiterates the importance of including a comprehensive contraceptive history in all females presenting with abdominal or pelvic symptoms, regardless of menstrual status. Although rare, a

“lost” IUCD in itself is common, and migration is an important differential to consider in this group.

Investigations

Of the investigations included in this review, CT was most accurate in confirming the extra-uterine position of an IUCD, as seen in our case, and is regarded to be the best at assessing complications associated with migration [65]. However, risk associated with radiation exposure should be balanced with the benefits [6, 65, 66], especially in these often young females to which radiation poses most risk [67, 68, 69]. TVUS was useful in confirming the absence of the device in utero, but could only confirm the migration in 6 of 22 cases in our review, and also failed to do so in our case. Some cases even stated that TVUS provided false reassurance [17, 23, 24, 46]. In contrast, AXR can confirm whether an IUCD is present, although its two-dimensional nature means it can usually only suggest a migrated IUCD if it is far lateral or superior to the pelvic brim [6, 57, 65]. Other reviews support our findings and are reflected by UK national guidance [70], suggesting that AXR may confirm expulsion or migration if the device cannot be located by TVUS [6, 65]. This is in contrast to WHO guidance recommending the use of ultrasonography to confirm migration [71], although this guidance is based on data from 1988, and imaging techniques have improved over the last 30 years. Additionally, endoscopy identified the migrated IUCD in 11 of 15 cases, but this is only possible if the device has migrated intraluminally; hence its use should be guided by colonic symptoms. In contrast, per rectal or per vaginal examinations are simple bed-side investigations, and in three cases in our review, the IUCD was ultimately removed with forceps under anaesthetic after this [30, 44, 52].

Management

Laparoscopic retrieval of migrated IUCDs was a popular method of management in our review, but the success rate was relatively low (43.8%). Three cases reported the need to terminate the laparoscopy to complete further imaging or convert to laparotomy [42, 44, 51]. Another opted for immediate laparoscopic management without imaging, necessitating abandonment because they found visceral involvement and the patient was not consented for resection [24]. This refutes opinions that symptomatic women missing IUCDs should receive laparoscopy first over imaging [14]. As in our case and review, as well as other reviews, adhesions and chronic inflammation seem to predict conversion to open procedures [14, 58]. Prior accurate imaging can mitigate the risks and distress to patients of abandoning procedures.

All four cases using the laparoscopic technique with rendezvous endoscopy reported successful retrieval. This may be because of careful patient selection or improved ability to visualise the bowel. This was also the case for per rectal forceps removal, likely due to better accessibility and visualisation. Some authors recommend against this technique due to the risk of perforation and sepsis [13], although this was not found in our review. In contrast, endoscopy alone failed in 5 of 14 cases, mostly owing to the risk of perforation or inability to visualise the device, as was also seen in our case. However, it can still be useful for both diagnostic and concomitant therapeutic reasons.

Abscesses similar to that described in our case were identified in three reports [17, 41, 51]. In our case, although radiological drainage coupled with endoscopic extraction of the IUCD may have been a preferable approach, the chronicity of the perforation and associated frozen pelvis, along with no clear collection being seen on the initial CT or at laparotomy, precluded this approach. This is mirrored in all three cases in the literature, with two also initially describing failure of endoscopic and laparoscopic methods due to obscuring adhesions and subsequent inability to extract the device. It can be deduced that abscesses, as well as visceral involvement, make inflammatory complications more likely. As these appear predictive of unsuccessful laparoscopy, this should be reflected in the preparation and consenting process.

The literature also discusses conservative management of migrated devices. Up to 85% may not cause major complications [29], with many being asymptomatic as previously discussed. In contradiction to previous thoughts [6], some authors suggest that IUCD-related adhesions are delicate and unlikely to cause complication and can even prevent further device migration [57, 72, 73]. Removal may cause further adhesions and augment risk of post-surgical complications with little tangible benefit [57]. However, WHO and UK guidance advocate removal of the device even if it is asymptomatic [70, 71], presumably due to significant potential health and medico-legal repercussions. The articles that advocate conservative management are also based on cases with no visceral involvement. As with any medical conundrum, personal considerations and patient preferences should guide management.

Limitations

There are limitations to this literature review. Firstly, not all data were presented in each case report, especially true for abstracts, and were often due to ambiguity, for example, “migration to bowel” or “resection”.

Although we performed both manual and database searches for relevant literature, some case reports may have been missed from our review, as well those that met our exclusion criteria. Thus, conclusions drawn from this review may not apply to all cases of IUCD migration. Moreover, as with all case reports, there is a high risk of reporting bias due to preferential publication of “interesting” cases, and follow-up was not reported in the majority of cases. This is particularly pertinent when considering the discussions around the management of asymptomatic cases, as acute presentations are more likely to be published and subsequent complications are not captured.

Additionally, our cases span a period of 1988 to 2019, where significant advances in surgical and imaging techniques have occurred. Hence, recommendations made by some reports may be less relevant to current practice and skew conclusions. However, no significant relationship was observed between year of publication and method of removal, especially as the majority of cases (85%) have been published in the last 15 years.

In spite of these limitations, this is the most up-to-date review to our knowledge.

Conclusions

This case report and literature review add to the growing body of evidence in the case of IUCD migration involving abdominal viscera. Asymptomatic migration is likely to be underestimated and presents an argument for non-operative management, although not currently recommended by national and international guidelines. Although limited by reporting biases and the small number of cases available, our review highlights that diagnosis requires a high index of suspicion, regardless of menstrual status. It should be reiterated that this is a rare occurrence; migration can amount to great risk, but it should not deter from the use of these highly effective methods of contraception. We hope this review provides some grounding for surgical colleagues who may be presented with a patient with a complicated migrated IUCD and offers some guidance on the recognition, investigation, consenting process and ultimately management of these, often young, women.

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Author contribution

AZ and SC identified studies and extracted and analysed data. All authors (AZ, SC, CP, AO) contributed to the discussion, drafting and finalisation of the review.

Data availability

Not applicable

Code availability

Not applicable

Declarations

Ethics approval Not sought – literature review with case only

Consent to participate Full consent given by patient, including for use of procedural photographs (consent form available on request)

Consent for publication Full consent given by patient, including for use of procedural photographs (consent form available on request)

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Conflict of interest The authors declare no competing interests.

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