TITLE: Ultrasound-guided retrieval of lost intrauterine devices using very fine grasping forceps: case series.

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ABSTRACT

Aim. To assess the efficacy of a novel ultrasound–guided procedure for the retrieval of intrauterine contraceptive devices (IUDs) when the threads are not visible at the external cervical os ('lost threads').

Methods. This was a prospective cohort study of consecutive women referred for ultrasound examination because of lost IUD threads. The procedures were performed under local anaesthesia in the outpatient setting. A Cusco speculum was inserted first in order to visualise the cervix and the anterior lip was grasped with a vulsellum forceps. A 5Fr hysteroscopy grasping forceps was introduced transcervically into the uterine cavity under continuous transabdominal ultrasound guidance. The IUD was then grasped and removed from the uterus. Patients' demographic data, gynaecological history, ultrasound findings, duration of procedure, success rate and pain score were all recorded.

Results. Twenty-three consecutive women were included in the study. Ultrasound examination showed an IUD correctly sited in the centre of the uterine cavity in 20/23 (87%) women, in 2/23 (9%) women it was partially embedded in the myometrium and in 1/23 (4%) woman the IUD was partially sited in the cervical canal. In 8/23 (35%) women the IUD threads were not visible on ultrasound scan. Removal of the IUD was successful in 22/23 (96%) cases with a median operating time of 3 minutes (IQR 1.25-4.75 minutes). 15/23 (65%) women experienced no or minimal pain (pain score ≤3), 4/23 (17%) reported moderate pain (pain score 4-6) and 4/23 (17%) women described the pain as severe (pain score 7-10). No complications were recorded during or immediately after the procedure.

Conclusions. Ultrasound guided retrieval of lost IUD using fine hysteroscopy grasping forceps is a highly successful technique and is well tolerated by women.

KEY WORDS: Intrauterine device, lost threads, retrieval, ultrasound

KEY MESSAGE POINTS:

- Ultrasound guided retrieval is a novel approach to 'lost' IUD removal.
- Our initial results show that it is more successful and less painful when compared to currently available alternative methods.

INTRODUCTION

Intrauterine devices (IUDs) are among the most commonly used forms of reversible contraception worldwide.[1] Nowadays their use is extended beyond contraception, since the 52 mg progestogen-releasing IUD is often used as the treatment of choice for heavy periods and for endometrial protection in hormone replacement therapy.[2, 3]

Removal of an IUD is usually a simple procedure. It involves grasping the threads with a forceps and applying gentle traction to extract it through the cervical canal.[4] In 5-18% of women, however, the threads cannot be visualised on speculum examination; this occurs either because the threads retract into the cervical canal or uterine cavity, or they become wrapped around the body of the IUD. They can also detach from the body of IUD and be expelled spontaneously during menstrual periods.[4-7] In these women further investigations are required to determine the location of the IUD.[4, 8]

A variety of instruments have been utilised to retrieve IUDs with missing threads from the uterine cavity. They include artery forceps (e.g. Spencer Wells) to grasp the threads in the cervical canal, purposefully designed plastic IUD thread retrievers and extractor hooks and purposefully designed forceps. Procedures using these devices are usually performed blindly with reported success rates of 37-59%.[5] In cases where these procedures fail, women are usually referred for IUD removal under direct vision using hysteroscopy. Although this is a very successful procedure, it has to be performed by highly skilled operators, it cannot be used in pregnant women and it is comparatively costly.[6, 9]

Ultrasound is used routinely for the assessment of women presenting with a wide range of gynaecological complaints and it also provides clear images of an IUD

within the uterus. As a result ultrasound is often used to check the position of an IUD after its insertion.[10] It is also useful for locating an IUD when the threads are not visible.[8] Ultrasound guided procedures are often used in gynaecology, particularly in the field of reproductive medicine and assisted reproduction. Ultrasound guidance may also be used to minimise the risk of uterine perforation and other complications during intrauterine gynaecological procedures.[11] The aim of this study was to assess the feasibility, success rate and women's tolerance of ultrasound-guided retrieval of IUDs with lost threads from the uterus using fine hysteroscopy forceps.

METHODS

Study population

This was a prospective observational study which was conducted at the Department of Gynaecology, University College London Hospital from March 2013 to March 2014.

We included consecutive women who were referred by their General Practitioners or Family Planning Doctors for removal of an IUD when the threads were not visible on speculum examination or when previous attempts to remove the IUD had failed.

Demographic data, clinical history, indications for IUD insertion and duration of use were all recorded.

The inclusion criteria were: IUD located inside the uterus on ultrasound examination and ability to tolerate vaginal speculum examination. A full urinary bladder was not required for the procedure. All women signed written informed consent after receiving information about all aspects of the procedure and the potential risks. Ultrasound guided intrauterine procedures are part of routine clinical practice in our unit and ethical approval for the study was therefore not required.

Interventions

A transvaginal ultrasound examination was performed first (Voluson E8, GE Medical Systems, Milwaukee, WI, USA) in order to assess the uterine morphology and position. The presence of any congenital uterine anomaly, fibroids or adenomyosis was recorded. The exact positions of the IUD and of the threads were then ascertained, including any signs of the IUD being partially or completely embedded in the myometrium.

The ultrasound probe was then removed and a Cusco speculum was inserted. The cervix was examined visually for the presence of IUD threads and assessed for any signs of abnormality. It was then cleansed with an antiseptic solution and 1-2ml of 1% lidocaine solution was injected into the anterior lip. A vulsellum forceps was then applied in order to exert traction and correct uterine flexion during the procedure. A second operator used a transabdominal probe to provide continuous ultrasound guidance. The probe's position was such to provide a longitudinal view of the uterus and the cervix at all times. Thus the hysteroscopy forceps could be visualised in its whole length when introduced into the uterine cavity through the cervix.

A 1.67mm (5Fr) hysteroscopy grasping forceps (Karl Storz Endoscopy (UK), Ltd., Slough, UK) was lubricated with gel containing lidocaine hydrochloride 2%, and chlorhexidine gluconate 0.25% (Instillagel®, CliniMed Ltd, Loudwater,UK) (Figure 1). The grasping forceps was then inserted into the cervical canal under continuous transabdominal ultrasound guidance. In women with visible threads an attempt was made to grasp them with the forceps and then to remove the IUD (Figure 2). In women with no visible threads, and in those women in whom the threads could not be grasped, the body of IUD was held with the forceps and the removal was attempted. In women with a rotated IUD and in those in whom traction on the body of the IUD

was unsuccessful, an attempt was made to grasp a plastic arm of the IUD. Once the IUD was successfully grasped it was removed by applying continuous slow traction until the IUD was extracted through the external os. Antibiotic prophylaxis was not used routinely.

The duration and success of the procedure were recorded in each case. The level of pain the women experienced was assessed 10-15 minutes after completion of the procedure using a visual analogue scale between 0 (no pain) to 10 (maximum pain).[12]

Statistical analysis

The primary outcome of the study was the success of ultrasound-guided retrieval of the missing IUD. The secondary outcome was the pain score. The Smirnov – Kolmogorov test was used to test for the normal distribution of data. Women's age, parity, duration since IUD insertion, pain score and duration of the procedure were not normally distributed and they were expressed as medians with interquartile ranges. Proportions were expressed as percentages. A univariate logistic regression was performed using pain score (categorical) as the dependent variable and age, parity (categorical), type of IUD, time since insertion, uterine version, embedment into the myometrium and presence of fibroids as independent variables. A $p<0.05$ was taken as significant. All statistical analyses were carried out using SPSS version 19 (SPSS Inc. Chicago, IL, USA).

RESULTS

Twenty three consecutive women were included in the study. The indications for IUD removal are listed in Table 1. Demographic characteristics and relevant ultrasound data are listed in Table 2.

Table 1 Indications for removal of the intrauterine contraceptive device (IUD) (n=23)

Indication	N (%)
Routine replacement	12 (52)
Abnormal uterine bleeding	3 (13)
Abnormal uterine bleeding and pelvic pain	2 (9)
Desire for conception	2 (9)
Contraception not required	2 (9)
Pelvic pain	1 (4)
Misplaced IUD following insertion	1 (5)

Table 2 Demographic characteristics and ultrasound features of the population at the time of the intrauterine device (IUD) removal.

Age (median, IQR)	41 (37-49)
Menstrual history - N (%)	
- Postmenopausal	9 (39)
- Amenorrhoea	8 (35)
- Luteal phase of menstrual cycle	3 (13)
- Proliferative phase of menstrual cycle	2 (9)
- Irregular vaginal bleeding	1 (4)
Parity	
- Nulliparous N (%)	6 (26)
- Parity (median, range)	2 (1-4)
Previous Caesarean section N (%)	9 (39)

Uterine position N (%)	
- Anteverted	17 (74)
- Retroverted	6 (26)
Uterine morphology N (%)	
- Normal	14 (60)
- Uterus enlarged by multiple IM/SS fibroids	5 (22)
- Uterus with a single IM/SS fibroid	2 (9)
- Single SM fibroid	1 (4)
- Adenomyosis	1 (4)
IUD type	
- Mirena® IUS	17 (74)
- Copper IUD	5 (22)
- Ring IUD	1 (4)
IUD removal attempt before referral N (%)	9 (39)
IUD position N (%)	
- Correctly placed at the centre of the uterine cavity	20 (87)
- Embedded into the myometrium	2 (9)
- Partially expelled into the cervical canal	1 (4)
Threads position N (%)	
- Retracted into the upper half of the cervical canal	10 (43)
- Retracted into the lower half of the cervical canal	6 (26)
- Not visualized	7 (30)

IM= intramural; SS=subserous; SM=submucous; IUS=Intrauterine System

14/23 (61%) women had used their IUD or IUS (Intrauterine System) for contraception, 7/23 (30%) for menorrhagia (IUS), 1/23 (4%) for dysmenorrhoea (IUS) and 1/23 (4%) as a part of hormone replacement therapy (IUS). The median duration between insertion and the removal procedure was 5 years (range 1-15).

The threads were not visible in the cervical canal on scanning in 7/23 (30%) of cases (Table 2).

The procedure was successful in 22/23 (96%) of cases. In all women the grasping forceps was clearly visible and its position was continuously monitored on ultrasound. Pain experienced during the procedure is presented in Table 3. The median pain score was 3 (IQR 0-5). Univariate analysis did not show any significant association between women's age, parity, type of IUD, time since insertion, uterine position, embedment into the myometrium or presence of fibroids, and pain scores during the procedure ($p>0.05$).

Table 3 Pain experienced during the removal of lost IUD

Pain score (N, %)	
- Painless (pain score 0)	7 (30%)
- Mild pain (pain score 1-3)	8 (35%)
- Moderate pain (pain score 4-6)	4 (17%)
- Severe pain (pain score 7-10)	4 (17%)

There were no intra- or post-operative complications and none of the women reported any clinical signs of infection after the procedure. In 7/23 (30%) women a new IUD was inserted at the end of the procedure.

The procedure was unsuccessful due to inability to identify the external os and the cervical canal in one woman who had previously undergone a cone biopsy for treatment of cervical intraepithelial neoplasia. In her case, the scar tissue was later excised using a loop electrode under general anaesthesia to reveal the entrance to the cervical canal. The IUD was then removed using the same ultrasound-guided technique.

DISCUSSION

Our study has shown that our novel ultrasound guided method was highly successful for retrieving IUDs in women with missing threads. Our success rate of 96% (95% CI 87-100) was significantly better than the findings of the randomised study by Bounds *et al*. who reported success rates of 53% (95% CI 40-65) with Emmett and 59% (95% CI 47-70) with Retrievette retriever devices.[5] However, our results were similar to the success rate of 94.7% (95% CI 84.6-100) reported with the use of outpatient hysteroscopy.[9] Another recent study assessed the efficacy of ultrasound-guided use of a bent Cook catheter or a crochet-type hook when the threads were not retrievable using alligator forceps. The reported success rate was 87% (95% CI 76-98).[13]

The main advantage of our technique is the use of very thin forceps which can be inserted into the uterus easily without the need for cervical dilatation. In comparison, the size of standard IUD retrievers ranges between 3.0x2.5mm and 3.0x0.7mm at the operative end whilst the size of a standard outpatient hysteroscope with an operating channel is 4mm (Gynecare Versascope™, Ethicon, Wokingham, UK). The ease of intrauterine insertion and the level of discomfort tend to decrease with decreasing size of operating devices passing through the cervical canal. The main risk of using a very thin instrument is the possibility of creating a false passage or causing uterine perforation. This is very unlikely to occur; however, when the procedure is continuously monitored by ultrasound scan. Transabdominal ultrasound monitoring could be difficult in overweight women and those with large fibroids and in these cases the procedure should be performed with utmost care in order to avoid complications.

The other disadvantage is the difficulty in grasping the body of the IUD with a thin instrument. However, this is rarely required as the threads, the loop at the end of the

vertical stem or the arms of the IUD could be grasped without difficulty. The same device is used for hysteroscopic IUD retrieval which hitherto has been considered to be the most successful procedure for the removal of lost IUDs. [9]

The majority of women in our study reported either no pain or only mild discomfort and the median recorded pain score was 3. Although the level of pain is a critical factor in determining the acceptability and success of any outpatient operating procedure, only a few publications actually report the level of pain that women experience during retrieval of lost IUDs. In a randomised study assessing the value of intrauterine lidocaine for the pain relief during removal of lost IUDs using Novak's curette, the mean reported pain scores were 6.4 in the placebo and 5.2 in the treatment group.[14] We are not aware of any publications reporting pain experienced during hysteroscopic IUD removal. However, a recent randomised study evaluating preoperative oral paracetamol and ibuprofen administration on the pain experienced during diagnostic hysteroscopy reported mean pain scores of 4.52 in the medicated and 4.71 in the non-medicated groups.[15] These mean pain scores were higher than those in our study. We believe that the narrow diameter of the hysteroscopic grasper and the avoidance of uterine distension are probably the main factors contributing to the low level of pain experienced by our patients.

In the UK, 75% of women aged 16-49 use contraception, 8% of whom opt for either a copper or levonorgestrel-releasing IUD.[16] There are 15.1 million women aged 16-49 in the UK, which gives a rough estimate of 1.2 million IUD users.[17] Missing threads tend to be noted in 5-18% of cases at the time of IUD removal,[4,7] which means that a large number of women must experience this complication. Considering that approximately half of such women may require a referral to specialist secondary care services for consideration for hysteroscopy following an unsuccessful attempt to

remove the IUD in the primary care or sexual and reproductive health clinic setting, the cost to the National Health Service of managing these cases is considerable. Our method is significantly cheaper than outpatient hysteroscopy as it does not require the use of expensive consumables.

A limitation of our study is that the results are based on a relatively small number of women. The success rates should be interpreted with caution and a prospective randomised control trial would be needed to compare the effectiveness of this new method with other established techniques.

In conclusion, we believe that our novel method of ultrasound guidedetrieval of missing IUDs may be a good alternative to the standard techniques currently used for this purpose. Although our initial experience indicates that our approach is more successful and less painful than the alternative methods, these findings should be tested in a prospective randomised trial.

Competing Interests

None declared.

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REFERENCE LIST

1. Peri N, Graham D, Levine D. Imaging of intrauterine Contraceptive Devices. *J Ultrasound Med* 2007;26:1389-401.
2. Heikinheimo O, Gemzell-Danielsson K. Emerging indications for the levonorgestrel-releasing intrauterine system (LNG-IUS). *Acta Obstet Gynecol Scand* 2012;91:3-9.
3. Lindh I, Milsom I. The influence of intrauterine contraception on the prevalence and severity of dysmenorrhea: a longitudinal population study. *Hum Reprod* 2013;28:1953-60.
4. Prabhakaran S, Chuang A. In-office retrieval of intrauterine contraceptive devices with missing strings. *Contraception* 2011 83 102-6.
5. Bounds W, Hutt S, Kubba A, et al. Randomised comparative study in 217 women of three disposable plastic IUCD thread retrievers. *Br J Obstet Gynaecol* 1992;99:915-9.
6. Cetinkaya K, Kumtepe Y, Ingec M. Minimally invasive approach to cases of lost intra-uterine device: a 7-year experience. *Eur J Obstet Gynecol Reprod Biol* 2011;159:119-21.
7. Marchi NM, Castro S, Hidalgo MM, et al. Management of missing strings in users of intrauterine contraceptives. *Contraception* 2012;86:354-8.
8. Benacerraf BR, Shipp TD, Bromley B. Three-dimensional ultrasound detection of abnormally located intrauterine contraceptive devices which are a

source of pelvic pain and abnormal bleeding. *Ultrasound Obstet Gynecol* 2009;34:110-5.

9. Konamme SP, Auld BJ, Zaidi J. A novel device for removal of the retained intrauterine device. *J Fam Plann Reprod Health Care* 2006;32:87-8.
10. Thonneau P, Goulard H, Goyaux N. Risk factors for intrauterine device failure: a review. *Contraception* 2001;64:33-7.
11. Scanlan KA, Propeck PA, Lee FT Jr. Invasive procedures in the female pelvis: value of transabdominal, endovaginal, and endorectal US guidance. *Radiographics* 2001;21:491-506.
12. McCaffery M, Beebe A. Pain: Clinical Manual for Nursing Practice. Baltimore: *V.V. Mosby Company*, 1993.
13. Mizia K, Ramsay P. The effectiveness and safety of ultrasound-guided removal of a Mirena(®) intrauterine system when the strings are not visible and conventional office procedures have failed. *Aust N Z J Obstet Gynaecol* 2013;53:386-8.
14. Güney M, Oral B, Mungan T. Efficacy of intrauterine lidocaine for removal of a "lost" intrauterine device: a randomized, controlled trial. *Obstet Gynecol* 2006;108:119-23.
15. Teran-Alonso MJ, Santiago JD, Usandizaga R, et al. Evaluation of pain in office hysteroscopy with prior analgesic medication: a prospective randomized study. *Eur J Obstet Gynecol Reprod Biol* 2014;178:123-7.
16. Office for National Statistics. Opinions Survey Report No 41. *Contraception and Sexual Health* 2008/09. Crown Copyright 2009.
17. Office for National Statistics. Population Estimates for UK, England, Wales, Scotland and Northern Ireland, Mid-2013.

http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population#tab-data-tables [Accessed 23 August 2014].

FIGURE CAPTIONS

Figure 1: 1.67mm (5Fr) hysteroscopy grasping forceps with open jaws.

Figure 2: Longitudinal transabdominal ultrasound view of the uterus with inserted hysteroscopy forceps. The jaws of the instrument are opened before the IUD is grasped and removed.