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The management of the malposition of intrauterine devices at the tertiary center

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ABSTRACT

Aims: The malposition of intrauterine devices (IUD) is a major problem in contraception and this study aims to evaluate the surgical procedures used in the management of these cases

Methods: Patients who were operated on for malposition of copper T IUD between 2018-2021 were evaluated retrospectively. The cases were analyzed in 4 groups as followed; instrumental removal, hysteroscopic (H/S), laparoscopic (L/S), and laparotomic (LPT) procedure. The groups were compared in age, obstetric history, IUD insertion time, and intraoperative outcomes.

Results: There were a total of 39 cases and the groups consisted of instrumental removal (n=8), H/S (n=24), L/S (n=6), and LPT (n=1) procedure. In the H/S group, mean age (44±10) and duration of IUD use (10.1±7.5 years) were found to be significantly higher than the other groups (p=0.03 and p=0.001). Six cases (25%) in the H/S group IUD was in the uterine cavity while in 5 (20.8%) it was embedded in the endometrium and myometrium. In the L/S group the duration of IUD use was shorter (1.3±0.8 years) and the mean age (29±10) was lower and all cases were managed laparoscopically except in one case that was extracted after conversion to laparotomy.

Conclusion: Advanced age and prolonged IUD use are risk factors for embedded of the IUD in the uterine cavity in the hysteroscopy group, however, IUDs that reach the abdomen by ruptured uterus are detected at younger ages and earlier in IUD use, and minimally invasive methods are eligible surgical procedures for these cases.

Keywords: IUD, Malposition, Perforation, Hysteroscopy, Laparoscopy

INTRODUCTION

In Turkey, 49% of the women use a modern method of contraception, intrauterine devices (IUDs) are the second most widely used method with a prevalence of 14 %.[1] The term malposition covers a large range of different presentations either inside the uterine cavity such as low-lying, partially expelled embedded, horizontally displaced IUDs, or IUDs expelled outside the uterine cavity into the peritoneal cavity or neighboring organs after perforation of the uterus.[2-5] The malposition of the IUD may cause a serious problem in some cases that requires management with invasive procedures, including hysteroscopy, laparoscopy, and even laparotomy. In this study, the data and experience of a tertiary center are presented. In addition, case reports on the malposition of IUDs are also briefly compiled.

METHODS

The study group consisted of patients who had a malpositioned IUD that could not be removed at the family planning (FP) outpatient clinic of a tertiary center as an outpatient case and were hospitalized for intervention between 2018-2021. All the patients give informed consent approving the use of their medical data anonymously for medical research at admission as a part of the hospital protocol. This study was approved by Etlik Zübeyde Hanım Women's Health Research and Training Hospital Ethics Committee (Date: 26/02/2021, Decision No: 03/04). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

As a part of the routine protocol of the FP when a malposed IUD is encountered in the FP, a gynecological examination and transvaginal ultrasonography are carried out. When the

IUD is found to be in the intrauterine cavity with or without observing the thread of the IUD, it is removed instrumentally with a hook, ring forceps, or alligator forceps. The patients are hospitalized if the IUD can not be removed instrumentally or if they are placed outside the uterine cavity. The patients who had their IUD removed at the FPC without requiring hospitalization or any other intervention were not recruited for the study. The flow chart of the study is presented in (Figure 1).

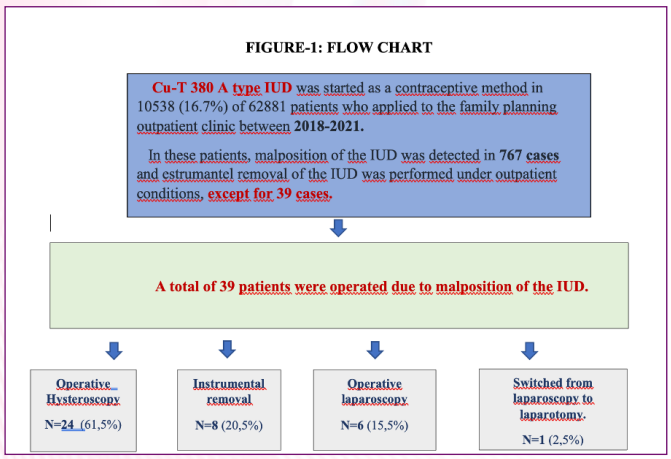

Figure 1: Flow chart of the study

The data about demographic characteristics, medical history, duration of the IUD use, laboratory tests, ultrasonographic findings, and the intervention and treatment protocol were extracted from the patient files.

Statistical Analysis

Statistical analysis was carried out with the SPSS 21.0 program. Categorical variables were evaluated with the chi-square test. Parametric and nonparametric tests were applied after the Shapiro-Wilk test was performed for the identification of data with normal distribution. One-way analysis of variance was performed for parameters with normal distribution and the Kruskal-Wallis test was used for nonparametric parameters. In the age parameter since the data were parametric, Tukey and Bonferroni tests, which are post hoc tests, were performed for the relationship between paired groups. For the duration of IUD insertion, since the data were non-parametric, the Mann-Whitney U test was performed in each pair to detect the difference in paired groups. A p-value of < 0.05 was accepted as statistically significant.

RESULTS

Between 2018 and 2021, the malposition of Cu-T 380 A IUD was detected in 767 patients, and removal was performed under outpatient conditions in the FP, except for 39 patients. In total, 39 patients were operated on due to the malposition of the Cu-T 380 A IUD. The patients were analyzed in 4 groups according to the procedure used for removal of the IUD; instrumental removal under anesthesia (n=8), hysteroscopic removal(n=24), laparoscopic removal (n=6), and laparotomy (n=1) groups

A total of 32 cases, had a failed trial of instrumental removal of the misplaced copper T IUD in the FP outpatient clinic. In the other 7 patients, the trial of instrumental intervention was not made at FP as either IUD partially was shown to be embedded in the myometrium by transvaginal ultrasonography or was placed in the abdominal cavity.

The general characteristics of these patients were given in Table 1. When the groups were compared there was no significant difference between demographic variables and obstetric histories such as the number of gravidities, previous cesarean section, spontaneous vaginal delivery, and abortion among the groups ($p>0.05$). The laparotomy group was not included in the statistical analysis, as there was only one case.

Table 1. Demographic characteristics, medical and obstetric history of the patients

Table 1	GROUPS			p value	Switched from laparoscopic to laparotomic procedure	Total cases
	Instrumental removal	Hysteroscopic procedure	Laparoscopic procedure			
	N=8 (20.5%)	N=24 (61.5%)	N=6 (15.5%)		N=1 (2.5%)	N=39
Age (Mean±Sd)	**39±8**	**44 ±10**	**29±10**	**0.03****	**42**	**41± 11**
Gravidae (Mean± Sd)	**3.25± 1.5**	**3.33 ±2.0**	**2.3 ±1.0**	**0.441***	**4**	**3.1± 1.8**
Previous Cesarean Section (Mean± Sd)	**1.8 ± 1.2**	**0.70 ± 0.9**	**0.5 ± 0.8**	**0.54***	**0**	**0.9 ± 1.0**
Previous vaginal delivery (Mean± Sd)	**1.1 ± 1.3**	**1.16 ± 1.6**	**1.5 ± 1.0**	**0.714***	**3**	**1.5 ± 1.4**
Previous abortion (Mean± Sd)	**0.25 ±0.46**	**0.9 ± 1.4**	**0.3 ± 0.5**	**0.214***	**1**	**0.7 ± 1.1**
Duration of IUD (years) (Mean± Sd)	**7.6 ± 3.3**	**10.1 ±7.5**	**1.3 ± 0.8**	**0.001***	**13**	**8.3 ± 6.8**
Radiological imaging	**Dislocated copper T IUD in the uterine cavity on TVUS**	**Dislocated copper T IUD or a part of, in the uterine cavity on TVUS**	**It is detailed in Table 3.**		**Two different copper T IUDs were seen in the uterine cavity on TVUS and in the abdomen on X-ray**	

* Kruskal-Wallis test ** One-way analysis of variance (ANOVA)
p<0.05 was considered statistically significant and the significant ones were bolded.
Abv: IUD; Intrauterine device, TVUS; Transvaginal ultrasonography, Sd; Standard deviation

In the hysteroscopy group, age (mean± SD;44 ±10) and duration of IUD use(mean± SD;10.1 ±7.5, Max-min;36-1 year) were found to be significantly higher than the other groups (p=0.03 and p=0.001, respectively).In the laparoscopy group, the duration of the IUD use was shorter (mean±SD;1.3±0.8, max-min;3-1 years) and mean age (mean±SD; 29±10) was found to be lower (p<0.05). For the relationship between the paired groups in the age parameter, there was a significant difference only in the laparoscopic and hysteroscopic groups (p=0.011), and those in the hysteroscopic procedure group were older. As for the duration from IUD insertion, when examining the difference in paired group, the laparoscopic group had a shorter duration of IUD use than the other two groups (p=0.007 versus instrumental removal, p<0.001 versus hysteroscopic procedure).

The location of the IUDs removed via operative hysteroscopy was given in **Table 2**. IUD was parallel to the longitudinal axis of the uterine cavity in 25% (n=6) of the patients while in four patients (16.6%) it was in the oblique-transverse position. Five of them (20.8%) had IUD observed in the right cornual area while in three (12.5%) it was in the left cornual area. In addition, a total of 20.8% was embedded in the uterine anterior(n=1), posterior (n=2), or isthmic (n=1) wall or inside the endocervical canal (n=1). Out of 24 patients, two patients had retained parts of the IUD that broke up during the instrumental removal of the misplaced IUD at another health center. In one patient, who was referred from another center after a failed trial of operative IUD removal, 3 separate tracts were observed in the uterine cavity during hysteroscopic observation and IUD extraction could not be performed, the patient was scheduled for another operation 3 months later after complete regeneration of the cavity and the IUD was removed successfully.

Table 2. Localization of the IUDs removed via a hysteroscopic procedure

	Number of cases (n)	Percent (%)	Additional features
Uterine cavity	6	25	In the longitudinal position
Right cornual area	5	20.8	IUDs arm or stem is present in two cases
Uterine fundus	4	16.6	In the oblique/ transverse position
Left cornual area	3	12.5	Concomitant uterine septum in one case
Posterior wall	2	8.3	Embedded
Anterior wall	1	4.1	Embedded
Isthmic level	1	4.1	Embedded
Endocervical canal	1	4.1	Embedded
Could not be reached (history of multiple instrumental attempts)	1	4.1	The presence of 3 different tracts in the uterine cavity due to previous operations

Abv: IUD; Intrauterine device

In six cases laparoscopy was required. And the findings in this group are briefly presented in **Table 3**. In case 6, the patient had a history of a spontaneous pregnancy with a misplaced IUD that could not be withdrawn as the string was not observed. This patient had a spontaneous vaginal delivery at full-term. However, the IUD was not expelled during the removal of the placenta after the delivery nor could be traced inside the uterine cavity by ultrasonographic examination. IUD was removed laparoscopically after being visualized abdominal X-Ray during the late post-partum period. During laparoscopy, the uterine wall was intact showing no sign of perforation. Also, radiological imaging results are presented in both **Table 1** and **Table 3**.

Table 3. Briefcase report of the laparoscopy group

Table 3	Results of radiological imaging	Localization of the IUD on laparoscopic observation	Location of the perforation area
Case 1	Hyperechoic appearance adjacent to the uterus on TVUS	A completely discarded IUD from the uterus and adhered to the posterior wall of the uterus	Not detected
Case 2	An IUD extending along the myometrium from the cavity to the serosa on TVUS	The IUD perforates the uterus from the posterior wall, the string is seen through the abdomen, and the remaining part of the partially expulsed IUD is embedded in the myometrium.	Posterior of the uterus
Case 3	There is no IUD in the uterine cavity on TVUS, but it was detected in the abdominal cavity on X-ray.	Embedded in the omentum.	Not detected
Case 4	There is no IUD in the uterine cavity on TVUS, but it was detected in the abdominal cavity on X-ray.	Embedded in the omentum.	The site of rupture was not detected, but the patient has an isthmocele and there was a suspicious area related to the perforation of this region during IUD insertion.
Case 5	An IUD extending along the myometrium from the cavity to the serosa on TVUS	The uterine perforation was observed during insertion and the IUD was removed laparoscopically	A perforated area in the left corneal area and minimal intra-abdominal coagulum were observed
Case 6	There is no IUD in the uterine cavity on TVUS, but it was detected in the abdominal cavity on X-ray.	An IUD that is freely located between the omentum	Not detected

Abv: IUD;Intrauterine device, TVUS;Transvaginal ultrasonography

The case that had a conversion to laparotomy after a failed trial of laparoscopic removal of IUD is presented: The patient was a 42-year-old asymptomatic woman who applied for IUD removal that was inserted 10 years ago and requested a new IUD. Her last delivery was 11 years ago and before that delivery she had an IUD inserted. She could not remember the removal of that IUD and presumably got pregnant with an IUD inutero. The IUD was neither removed during her last pregnancy nor expulsed after delivery. She had a new IUD inserted after this delivery. Based on her obstetric history an abdominal X-Ray was taken and a second IUD was observed in the abdominal cavity 5 cm superior to the left iliac crest. A laparoscopy was performed for IUD removal and tubal ligation as she requested a bilateral tubal ligation. The missing IUD could not be found during laparoscopic observation and

an intraoperative X-Ray was taken that demonstrated the presence of the IUD in the abdominal cavity (Figure 2). The operation was converted to laparotomy and the missing IUD was palpated and embedded into the thickened omentum. The IUD was completely covered with the omentum, IUD was removed from the omentum and the patient was discharged with full recovery.

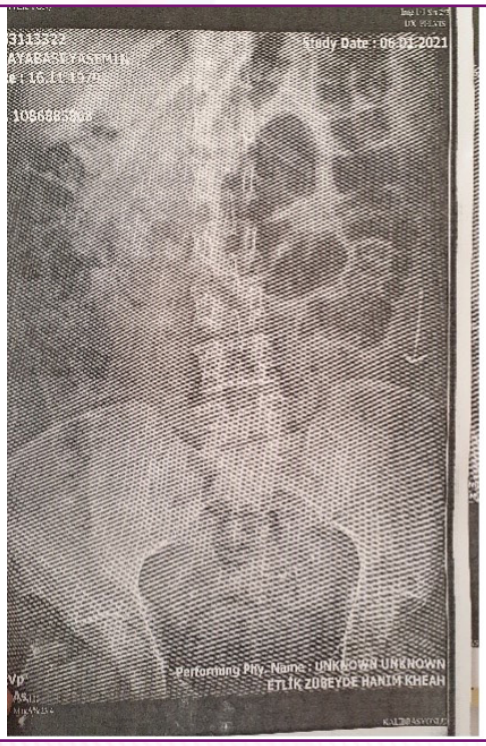

Figure 2. Radiographic appearance of the IUD located in the abdominal cavity

DISCUSSION

The intrauterine device is the most widely used method all around the world providing long-term contraception to around 106 million women and copper-bearing intrauterine devices are the most commonly used version.[6] The failure rate is very low and the IUD can be inserted at any time when the woman is proven to be not pregnant besides during the post-abortive and postpartum period in compliance with the medical eligibility criteria described by World Health Organization.[7]

IUD malposition can be diagnosed in asymptomatic patients during routine ultrasonography or a gynecological examination or when an asymptomatic woman attends the clinic with an unexpected pregnancy. Malposition of the IUD is categorized as expulsion, embedding, dislocation, perforation, and complete expulsion of the IUD from the uterine cavity. Expulsion is usually noticed by women unless it is expelled during heavy uterine bleeding and partial expulsion of the IUD is defined as a downward displacement of more than 2 cm from the uterine fundus.[5,8] Golightly et al.[8] suggested four different approaches for the treatment of an intrauterine misplaced IUD in asymptomatic women, from wait-and-see to removal of the IUD and switching to another method of contraception. The results of the studies about the risk of pregnancy in women with a partially expulsed IUD and clinical symptomatology are contradictory.[2-8] Even if the IUD is partially expulsed, embedded, and dislocated, their management may not always be this easy, and especially misplace IUDs due to uterine perforation may present with serious clinical findings.

Dislocated IUDs parallel to the longitudinal axis of the intrauterine cavity, even with only the string twisted into the endocervical canal, can be removed instrumentally by using a hook, ring forceps, or alligator forceps without the need for an additional surgical procedure.[8,9] Although insertion and removal of the IUD at the outpatient clinic are usually swift and tolerable for women, these procedures are sometimes affected by the patient's perception of pain and anxiety, and the clinician's experience and skills. The risk factors for increased pain scores with gynecological procedures include nulliparity, postmenopausal status, history of dysmenorrhea, anxiety, or expected high pain levels.[10,11] In this study, IUD removal was not performed in eight patients under outpatient conditions, and instrumental removal was required under anesthesia and sedation.

Hysteroscopic removal is a safe procedure for misplaced IUDs located in the uterine cavity in cases where ultrasound-guided removal fails. Asto and Habana[12] presented hysteroscopic IUD removal in 19 patients with a mean age32±9 years and the duration of IUD use was 5±10 years. In the presented study, the mean age (44 ±10) and duration of IUD use (10.1±7.5) were higher in the hysteroscopy group. hysteroscopy is a minimally invasive procedure and offers the advantage of short hospital stay, and minimal early, and late complications.[13] In the presented series, among 24 patients who required a hysteroscopic removal including two cases who had retained parts of the IUD inside the cavity, no complications occurred. While there were a total of 5 (20.8%) cases visualized as embedded in the myometrium during hysteroscopy, IUD was inside the cavity parallel to the longitudinal axis of the uterine cavity in six cases. Apart from these, IUDs were found to be in the transverse axis either in the cornual area (20.8%) or uterine cavity at the level of the fundus (16.6%).

Complete or partial uterine perforation related to IUD insertion is a rare but serious complication as IUD can damage the neighboring organs after being expelled into the abdominal cavity.[14] The incidence ranges between 0.4 per 1000 devices.[15] to 1.6 per 1000 insertions.[15] Among the presented seven cases that required laparoscopy (n=6) and laparotomy for IUD removal from the abdominal cavity, uterine perforation was detected only in three cases (33.3%) during the operations presumably due to the healing of the ruptured area and implying that the uterine perforation was not recent.

Various risk factors for the development of IUD malposition have been investigated by several researchers; the presence of a retroflexed uterus, uterine fibroids,[18] shorter uterine width,[19] and shorter uterine length,[15-19] were among the most frequent risk factors. In our series, only one patient had a uterine septum. However, the duration of the follow-up and the number of women who come for a regular follow-up affect the calculated incidence rate as some of the cases will not demonstrate any symptoms and will not come for regular follow-ups. After uterine perforation, 80% of the IUDs are observed to be embedded in the peritoneal space and 30% of the patients are asymptomatic.[20] In this study, a malposed IUD was found in the intra-abdominal cavity (66.6%) and adherent to the posterior wall of the uterus (33.3%). In the presented series, cases with laparoscopic

removal of IUD with an occult area of perforation had a shorter duration of the IUD use, these patients were younger, and the number of previous pregnancies was lower. Mosley et al.[21] analyzed 30 studies with 129 case reports on elective surgical removal of IUDs and reported that laparoscopy was the method of choice in 93% while in 22.5% of the cases, conversion to laparotomy was required. In the presented case series only one patient out of 7 cases with an intraabdominal IUD required laparotomy for IUD removal as the IUD was completely embedded between the layers of the omentum.

In some cases, uterine perforation and expulsion to the peritoneal cavity are recognized during insertion. The rate of perforation for Cu-IUD after a year of follow-up is 0.41 per 1000 insertions and this figure reached 1.6 per 1000 insertions when the study period was extended.[17-22] Within the first 6 months after delivery, the presence of breastfeeding, or amenorrhea, was the common factor observed in women with uterine perforation related to the IUD.[15,22] However, Braten et al.[2] did not identify early postpartum insertion (6–9 weeks postpartum) as a risk factor for malpositioning, however, the presence of leiomyoma increased the risk while having previous vaginal delivery lowered the risk.

The strength of this study is the clinical experience of a reference center in the treatment of malposition of IUD thus contributing to the literature with limited data on this subject, and identifying differences in minimally invasive approaches in cases where IUD removal failed in outpatient conditions. There are limitations as it is a retrospective study. **Table 2** shows the localizations of the malposition of IUD observed only with the hysteroscopic procedure. Even if the laparoscopic procedure is taken as a second group for the location of the most frequent rupture, statistical analysis could not be performed, since the cases are unique and only half of the group knew where the IUD ruptured and the others could not be detected. Also, due to the study's retrospective nature, conditions related to the timing of insertion, such as postpartum and post-abortion, were not examined.

CONCLUSION

This study emphasized the importance of clinical history and follow-up of women using the IUD, which is a cost-effective, easy-to-apply method, and how the surgical management would be, by presenting cases operated in a tertiary center. However, serious surgical procedures may be required for IUDs when rare complications and unusual conditions arise. This study found that the mean age and duration of IUD use were significantly higher in the hysteroscopy group than in the laparoscopy group. It has been shown that advanced age and prolonged IUD use are risk factors for embedded and dislocation of the IUD in the uterine cavity in the hysteroscopy group in this study, however, IUDs that reach the abdomen by ruptured uterus are detected at younger ages and earlier in IUD use in the laparoscopy group, and minimally invasive methods are eligible surgical procedures for the malposition of IUD

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by Etlik Zübeyde Hanım Women's Health Training and Research Hospital Ethics Committee (Date: 26/02/2021, Decision No: 03/04).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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