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CLINICAL ARTICLE

Surgical removal of intra-abdominal intrauterine devices at one center in a 20-year period

Kenan Ertopcu [a], Cenk Nayki [b], Pasa Ulug [b], Umit Nayki [b], Emre Gultekin [a], Aysegul Donmez [a], Yusuf Yildirim [a,b,*]

[a] Department of Gynecology and Family Planning, Aegean Obstetrics and Gynecology Education and Research Hospital, Izmir, Turkey
[b] Department of Obstetrics and Gynecology, Erzincan University School of Medicine, Erzincan, Turkey

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ABSTRACT

Objective: To review 20 years of experience of the removal of intra-abdominal intrauterine devices (IUDs) and to compare the surgical methods used. *Methods:* In a retrospective study, charts dating from between September 1, 1992, and August 31, 2012, were reviewed. Patients were eligible for inclusion when they had an IUD surgically removed by minilaparotomy or laparoscopy at a tertiary referral center in Izmir, Turkey. *Results:* Among the 36 eligible women, 18 (50%) had undergone laparoscopy and 18 (50%) had undergone minilaparotomy. Mean operation length was 55.3 ± 6.3 minutes in the laparoscopy group and 29.1 ± 4.2 minutes in the minilaparotomy group ($P = 0.008$). Conversion to full laparotomy was necessary in 4 (22%) women in the laparoscopy group and 1 (6%) in the minilaparotomy group ($P = 0.02$). Perioperative complications were observed in 5 (14%) women, with no difference in frequency between groups ($P = 0.09$). Total cost of medical/surgical procedures was US$436.4 ± 35.4 for the laparoscopy group and $323.4 ± 21.3 for the minilaparotomy group ($P = 0.04$). *Conclusion:* Minilaparotomy seems to be an important alternative to laparoscopy for the removal of intra-abdominal IUDs. This procedure should be an integral part of gynecologic surgical training.

1. Introduction

An intrauterine device (IUD) is a long acting, highly efficient, and reversible method of contraception. Use of an IUD is one of the most common female contraceptive methods, especially in low-income countries, where nearly 15% of women of reproductive age have an IUD [1–3]. Currently, IUDs containing copper (e.g. T380A [1]) are usually preferred.

Although the mechanism of migration into the abdominal cavity is not always clear, an IUD can penetrate and subsequently perforate the uterine wall. The rate of perforation varies from 0.1 to 3.0 per 1000 applications depending on applicant experience, and is between two and ten times higher for postpartum insertions because of the softening of the uterus [2–4]. However, perforations can also occur on insertion immediately after an induced abortion or on insertion a few weeks later. Perforation at the time of insertion can cause symptoms such as lower abdominal pain and vaginal bleeding, but many patients are asymptomatic [4,5]. Additionally, it is believed that perforation can occur after insertion [6,7]. A partial perforation during insertion (i.e. part of the IUD becomes embedded in the cervix or the uterine wall) can eventually lead to a complete migration of the device following repeated uterine contractions [8]. The most common locations of intra-abdominal IUDs have been reported as the pouch of Douglas, omentum, retropubic space, colon, mesentery, small bowel, bladder, parametrium, uterine wall, gastric serosa, appendix, ovary, and retroperitoneum [7,9–17].

Whatever the mechanism by which IUDs pass into peritoneal cavity, such migration can have serious complications, especially in the case of copper devices. Depending on the location, serious complications (e.g. bladder and bowel damage or peritonitis) occur in about 15% of cases of IUD perforations [6,9,10,13–20]. Therefore, many clinicians prefer to remove the IUD even if the patients are asymptomatic. Several case reports and retrospective case-controlled studies have focused on the removal of intra-abdominal IUDs by various surgical methods, including laparoscopy, minilaparotomy, and laparotomy [2,5,7,9–15]. The main objective of the present study was to review 20 years of experience of the removal of intra-abdominal IUDs, with an evaluation of the demographic, clinical, and treatment-related characteristics of the patients. An additional aim was to compare intra-abdominal IUD extraction by laparoscopy and minilaparotomy in terms of various clinical and surgical properties and cost-effectiveness.

2. Materials and methods

In a retrospective study, charts dating from between September 1, 1992, and August 31, 2012, were reviewed. Patients were eligible for inclusion when they had had an IUD surgically removed during the study period at the Family Planning Center of the Aegean Obstetrics and Gynecology Education and Research Hospital in Izmir, which is a

* Corresponding author at: Anadolu Cad, No 40, Tepekule Kongre ve Is Merkezi, Daire 701, Salhane, Bayrakli, 35580, Izmir, Turkey. Tel.: +90 232 486 79 95; fax: +90 232 462 15 00.
E-mail address: dr.yusufyildirim2@yahoo.com.tr (Y. Yildirim).

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tertiary referral center for other health centers in Izmir and the Aegean region of Turkey. The center's institutional review board approved the study. Because the study was retrospective, informed consent was not obtained.

When the string of the IUD was not seen in the gynecologic examination, forceps were used to check whether it was inside the cervical canal. When the string could not be found by visual inspection, vaginal or abdominal ultrasonography was performed. An abdominal radiograph was performed in all patients. Patients for whom ultrasonography, radiography, or both showed that the IUD was located in the abdominal cavity underwent surgery for removal.

The decision about whether to perform minilaparotomy or laparoscopy was based on the preferences of the patient and the surgeon, and whether there was any contraindication for laparoscopy. Minilaparotomies were performed under local anesthesia (20 mg/mL 2% lidocaine [Jetokain, Abdi Ibrahim, Istanbul, Turkey]; maximum dose 80 mg) and intravenous anesthesia (10 mg/mL 1% propofol [Lipura, B. Braun Irengun, Istanbul, Turkey]; maximum dose 100 mg). Laparoscopies were performed with intubation anesthesia, using propofol in conjunction with suxamethonium chloride (2% Lysthenon, Fako, Istanbul, Turkey). All IUD removals were planned as outpatient procedures and were carried out by the same team. Most patients received one dose of 1 g cefazolin Na (Sefazol, Mustafa Nevzat, Istanbul, Turkey) intravenously 30 minutes before surgery for infection prophylaxis. Patients who underwent enterotomy received 750 mg cefuroxime twice a day for 5 days.

Minilaparotomy was performed by the suprapubic method, with an incision of 2.0–3.5 cm. At least 10 mL of 1% lidocaine drawn into a 20-mL syringe was injected along the planned incision line, including the subcutaneous, fascial, and peritoneal layers of the abdominal wall. Two minutes later, the skin incision was made and the subcutaneous fatty tissue was dissected bluntly. A transverse incision was made in the rectus fascia, and the inferior and superior portions of the fascia were grasped with Allis forceps. The retractors were placed under the fascia to expose the linea alba. The rectus muscles were bluntly separated vertically at the linea alba and the peritoneum was opened sharply using scissors. After entering the abdominal cavity, adhesions and conglomerations were first resolved meticulously, and inflammatory bowels were opened carefully. Then, full exposure of the intra-abdominal IUD was provided. In the case of uncontrolled bleeding or unsuccessful visualization, full laparotomy was performed, for which a Pfannenstiel incision was used. The procedure was deemed to have failed if it was interrupted for any reason or if transition to full laparotomy was necessary.

Demographic characteristics, duration of IUD use, intra-abdominal location of translocated IUD, type and length of operation, rates of conversion to classic laparotomy, and total complication rates were recorded. Descriptive statistics are presented and comparative statistics (Mann-Whitney U and Pearson χ^2 tests) were performed using SPSS version 16 (SPSS Inc, Chicago, IL, USA). $P \leq 0.05$ was considered to be statistically significant.

3. Results

A total of 36 cases were eligible for the study. Other than one patient who had undergone IUD insertion at the study center, all patients had been referred to the Family Planning Center by primary healthcare units because of suspected IUD migration (strings not found). Eighteen (50%) patients underwent laparoscopy and the other 18 (50%) underwent minilaparotomy. All IUDs removed were T380A models and had been applied in the study period. One (3%) patient in the minilaparotomy group underwent enterotomy.

Table 1 shows the patients' characteristics. Mean age was 29.4 ± 4.3 years (range 18–40). Mean parity was 2.4 ± 0.7 (range 1–9) and mean number of induced abortions was 0.33 ± 0.1 (range 0–2). Mean duration of IUD use was 31.1 ± 7.3 months (range 2–144). Three (17%) patients who underwent laparoscopy and 4 (22%) who underwent minilaparotomy had a history of pelvic surgery, including appendectomy, myomectomy, or cesarean ($P = 0.33$).

The most common intra-abdominal location of the IUDs was the pouch of Douglas (Table 1). The proportion of women whose IUDs had migrated to the pouch of Douglas did not differ by group ($P = 0.14$). Among the 10 (28%) symptomatic women, the most common symptoms or physical findings were pain (affecting 2 [6%] women) and abdominal-pelvic tenderness (2 [6%]). The proportion of women who were asymptomatic did not differ by group ($P = 0.68$).

Mean operation length was 55.3 ± 6.3 minutes in the laparoscopy group and 29.1 ± 4.2 minutes for the minilaparotomy group ($P = 0.008$). In the laparoscopy group, laparotomy was necessary in 4 (22%) women because of uncontrolled bleeding from the surgical site (one case) or unsuccessful visualization (three cases). In the minilaparotomy group, laparotomy was necessary in only 1 (6%) woman because of unsuccessful visualization of the IUD. The frequency of procedure failure differed significantly between groups ($P = 0.02$).

Peri-operative complications were observed in 5 (14%) women. There were 3 (8%) early readmissions to the hospital (within 30 days) and 7 (19%) hospital stays of more than 24 hours. Blood product transfusion, admission to the intensive care unit, and re-operation were not necessary in any patients, and no deaths were recorded. There was no statistically significant difference between the groups in terms of total complication rate ($P = 0.09$), longer hospital stay ($P = 0.16$), or early readmission to hospital ($P = 0.07$) (Table 1).

The total cost of medical/surgical procedures, including preoperative preparation, drugs used, surgical intervention, and postoperative care, was US$436.4 ± 35.4 for the laparoscopy group and $323.4 ± 21.3 for the minilaparotomy group ($P = 0.04$).

4. Discussion

The present study identified 36 cases of IUD removal in a 20-year period at the Family Planning Center of the Aegean Obstetrics and Gynecology Education and Research Hospital. All patients except one had been referred to the center because IUD strings could not be found. Most patients were asymptomatic, so radiological methods were often used for precise diagnosis. The most common location of the IUD was the pouch of Douglas. The intra-abdominal IUDs were successfully removed in all 36 women. However, surgery time, frequency of procedure failure, and costs were significantly higher in the laparoscopy group than in the minilaparotomy group.

Transvaginal ultrasonography should be the first method used to locate an IUD. However, IUDs that have migrated to extrapelvic locations cannot be detected by ultrasonography alone, and therefore, single or bidirectional abdominal radiography is frequently undertaken. If necessary, the exact anatomical location and visceral relationships can then be demonstrated by a computed tomography scan [18]. Hysterography, hysteroscopy, and laparoscopy can also be used as diagnostic methods [16], although they are more invasive. At the Family Planning Center, even if transvaginal ultrasonography was negative, all patients were evaluated by bidirectional abdominal radiography. No patients required the invasive diagnostic methods. When IUD strings cannot be found, migration should be ruled out before checking for dislocation to avoid serious complications, particularly in view of the high proportion of asymptomatic cases (72% in the present series).

At the Family Planning Center, removal of a copper IUD is planned after a perforation is detected. Although some researchers claim that an observational approach can be applied [21], the preferred treatment method for such perforations is surgical removal because of the potential risks of intra-abdominal adhesion formation and damage to adjacent organs [4,17,19,20].

Minilaparotomy has been widely used for 40 years for female surgical sterilization [22], and frequency of major morbidity does not differ after sterilization by minilaparotomy or laparoscopy [23]. A growing