Title Page

**Management of the Embedded IUD: A Case Series**

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Abstract

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**Abstract**

**Objective**: Describe the clinical management of an ultrasound-diagnosed embedded IUD.

**Study design**: Retrospective case series of patients with ultrasound diagnosis of embedded IUD.

**Results**: Ultrasound reports from 2010-2014 were queried for terms associated with an embedded IUD. Fifty-seven women were identified. Most (n=33, 58%) IUDs were removed in the office and of those that brought to the operating room, six of ten were removed with gentle traction. In total, 39 (68%) were removed with gentle traction.

**Conclusion**: Based on this case series, practitioners can expect that most embedded IUDs can be removed with gentle traction in the office setting.

**Public health impact**: IUDs are a key tool in the prevention of unintended pregnancy. This case series informs clinical management of complications associated with IUDs and allows for improved patient care as well as health systems’ level cost reduction.

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# Introduction

Unintended pregnancy comes at a significant emotional cost to the family, as well as a financial cost to the population. A 2007 analysis of the cost of unintended pregnancy estimates the direct medical costs of unintended pregnancy in one year is five billion dollars, with an average cost of $1609 per unintended pregnancy [1]. When women are unable to manage their fertility, ramifications affect their physical health and mental wellness. At the individual level, woman denied abortion are more likely to be in and remain in poverty than women who were not denied abortion for four years after the denial. They were also more likely to be unemployed and receive public assistance than women who were able to access abortion [2].

Prevention of unintended pregnancy is a proximal health measure that alleviates the above economic and social consequences. The FDA approved methods of contraception include barrier methods, short acting reversible contraceptives (such as the pill, patch or ring) and long acting reversible contraceptives (such as the intrauterine device (IUD) or implant, commonly abbreviated as LARC.) Recent research in family planning has made a strong case for LARC methods as the forefront of prevention of unintended pregnancy, and has shown that when they are offered without access barriers, women preferentially choose to use LARC devices [3]. While respecting patient autonomy regarding contraceptive choice, LARC usage reduces method-specific failures leading to unintended pregnancy. The economic implications of 10% of women currently on oral contraceptive pills switching to a LARC method would reduce 288 million dollars of cost resulting from contraceptive failure [4].

 Intrauterine devices (IUDs) are a type of LARC device that offers highly effective, long-term and discreet contraception. There are hormonal and non-hormonal options, allowing most individuals to use one regardless of their medical histories. Depending on their method of action, they can provide from three to twelve years of contraceptive efficacy [5, 6]. They can be placed and removed in the outpatient setting and can be inserted by a variety of medical providers, not just physicians [7]. Although complications of IUDs are rare, it is important to consider their optimal management, especially in low-resource settings. In this case series, we examine management of IUD embedment.

Intrauterine devices are diagnosed as embedded by ultrasound if there is “penetration of part of the IUD into the myometrium, but not through the uterine serosa [8].”With the development of 3D ultrasounds, subtle findings, especially side-arm embedment, are becoming more frequent [8]. In a study of 167 symptomatic patients receiving an ultrasound to evaluate their IUD, 16% of these women had a device diagnosed as embedded [9].In a study examining how women communicate socially about IUDs, the most common negative topics discussed included perforation, migration and embedment [10]. Clarifying the clinical course and significance of embedded IUDs will allow for evidence-based counseling and management.

A retrospective case-control study of 182 women recommends removing a malpositioned IUD (defined as displaced, embedded or perforated) if the patient is symptomatic or if the IUD is suspected to be less effective due to location or type of IUD [11]. There is limited evidence to guide the best approach to removal of an embedded IUD, and many patients are taken to the operating room. The average cost of removing an IUD in the operating room (OR) is approximately $3562 USD, including anesthesia and surgeon charges [9]. This study reports on a case series of women with an ultrasound diagnosis of embedded IUD, the method and setting of removal, as well as contraceptive choices made after removal.

# Materials and Methods

This is a retrospective case series of women diagnosed with an embedded IUD by ultrasound. The study was approved by the University of Pittsburgh Institutional Review Board. We queried the Magee-Womens Hospital (Pittsburgh PA, USA) ultrasound database for gynecologic ultrasounds of patients 18-50 years old from 2010-2014. We performed a text query of the ultrasound report for terms associated with the diagnosis of an embedded IUD. These terms included: “embedded + IUD or intrauterine contraceptive device,” "arm + IUD or intrauterine contraceptive device," “myometrium + arm” and "myometrium + IUD or intrauterine contraceptive device." Ultrasounds from outside institutions where we were unable to correlate to clinical medical records were excluded. A total of 57 patients were included in the study.

# Results

A summary of management is presented in Table 1. Of the 57 patients who met inclusion criteria, most women diagnosed presented with symptoms such as pain and vaginal bleeding (n=44, 77%) and had IUD strings or stem of the IUD visible (n=45, 79%). Overall, most (n=39, 68%) patients had their IUD removed with gentle traction only, whether in the OR or office. One woman opted to not have her IUD removed. A final patient was lost to follow up.

Pregnancy was the symptom prompting presentation in nine (16%) of our patients. Two of these were copper-based (Paragard) and the remaining seven were levonorgestrel (LNG). Six of the IUDs were removed easily in the outpatient setting, two were presumed to be removed at the time of delivery and one was removed at the time of surgery for a ruptured ectopic. Regarding pregnancy outcome, there were two elective abortions, one ectopic pregnancy, one embryonic demise, and five term deliveries. Two of the five term deliveries had their IUD removed earlier in the pregnancy.

Contraceptive choices after removal included a new IUD (n=9, 16%), contraceptive implant (n=3, 5%), sterilization (n=6, 10%), short-acting reversible contraceptive (SARC) method (n=18, 32%) , condoms (n=3, 5%) and one patient chose to keep her embedded IUD. The remaining women chose no method (n=9,16%) or had unknown contraceptive plans (n=8, 14%).

Table 1. Method of IUD removal

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Management** | **n** | **%** | **+ Sx** | **%** | **Strings visible** | **Prior office attempt?** |
| **All IUDs** | 57 | 100.0% | 44 | 77.2% | 47 | 45 |
| Office removal w/ gentle traction | 33 | 57.9% | 27 | 47.4% | 33 | 2 |
| Office removal with intrauterine manipulation | 3 | 5.3% | 0 | 0.0% | 0 | 0 |
| OR removal with gentle traction | 6 | 10.5% | 5 | 8.8% | 6 | 4 |
| OR removal with hysteroscopy  | 6 | 10.5% | 3 | 5.3% | 4 | 4 |
| Or removal with laparotomy/LSC | 5 | 8.8% | 3 | 5.3% | 4 | 4 |
| Pregnancy- no removal | 2 | 3.5% | 2 | 3.5% | 0 | 0 |
| No intervention- no removal | 1 | 1.8% | 0 | 0.0% | 1 | 0 |
| LTFU | 1 | 1.8% | 0 | 0.0% | 0 | 0 |

#### 4.0 Discussion

In this study, most IUDs (68%) were removed using gentle traction alone. Based on the findings of this study, practitioners can expect most embedded IUDs to be easily removed and can confidently attempt removal in the outpatient setting first before scheduling a removal in the operating room. In addition 47% (7/15) of patients with failed office removal went on to require laparotomy/laparoscopy for unforeseen IUD perforation; this can be important for comprehensive preoperative patient counseling.

The diagnosis of an embedded IUD can be anxiety-provoking for patients. Being able to offer in-office removal may improve the patient experience and minimizes the costs incurred by this complication. Many women who had an embedded IUD removed continued to choose a highly effective method for birth control. Patients are willing to use contraception even after a complication and thus contraceptive counseling should not be overlooked.

Pregnancy in the setting of embedded IUD is a small but important finding in this study. Each case was diagnosed with an embedded IUD malpositioned in the lower uterine segment or cervix. It is unclear whether the IUDs migrated before or after pregnancy occurred. Currently available evidence suggest malpositioning to be more concerning with a copper IUD instead of a LNG IUD in terms of contraceptive efficacy [12, 13], however our data is contrary with seven out of nine pregnancies occurring with a LNG IUD. None of these pregnancies were window pregnancies as all the IUDs were inserted well before the pregnancies (6-108 months, median 28 months). The retrospective nature of this data collection limits our ability to infer causality however, more research into the role of malpositioning and LNG IUD failure is needed.

Strengths of this study include its sample size and the large breadth from which these cases were drawn. Coming from a large academic institution, these cases of embedded IUD were managed by advanced practice providers, generalist ob/gyn’s as well as family planning specialists and provide a real-world view of management. However, this could also be considered a weakness as each patient was managed in isolation-it is possible that many patients who had removals in the OR could have had their IUDs removed in the office by a more confident or skilled provider.

Based on the findings of this study, we can recommend a stepwise approach to IUD removal, first with attempted office removal with the possibility of intrauterine manipulation. If this fails, patients can be taken to the OR for removal with hysteroscopy. In patients who have failed office removal and proceed to OR removal, consideration should be given to discussion of possible laparoscopy or laparotomy. Following this stepwise approach to clinical care optimizes both the experience of the individual patient, but also improves the healthcare system’s efficiency and cost-effectiveness. Especially in low resource settings, being able to avoid the need for an operating room to manage a contraceptive complication improves the system’s ability to provide and manage their family planning services.

**Public health impact:** IUDs are a key tool in the prevention of unintended pregnancy. This case series informs clinical management of complications associated with IUDs and allows for improved patient care as well as health systems’ level cost reduction.

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