

Chinese IUD removal techniques in a Chinese population in central Italy

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Summary

Objective: To describe routine techniques and a newly developed approach to the removal of Chinese intrauterine devices (IUDs). **Methods:** Office records regarding women of Chinese nationality who presented to a tertiary care hospital for IUD removal between January 2007 and March 2012 were retrieved. Their demographic data were reviewed and menstrual/obstetric history, IUD type, and reasons given for removal were recorded. All underwent pelvic transvaginal ultrasound scanning. **Results:** Of 134 Chinese IUDs, 18 (13.4%) were removed successfully in an office setting using a hook or uterine curette without general anesthesia or cervical dilation. Extraction under brief general anesthesia was performed in 55 (41.0%) cases. A further 61 (45.5%) Chinese IUDs were successfully removed in an office setting using a miniature resectoscope. Four types of Chinese IUDs were removed, the most common being the stainless steel ring (55.7%). **Conclusions:** All removal procedures were effective and safe. The mini-resectoscope appears to be a safe and effective tool enabling minimally invasive surgery.

Key words: Intrauterine device; Contraceptives; Extraction; Resectoscope.

Introduction

The intrauterine device (IUD) is the most widely used reversible birth control method, currently worn by about 160 million women worldwide; over-two thirds of these are Chinese [1]. The government of the People's Republic of China (PRC) adopted the so-called "one child policy" in 1979 to stem the nation's population surge.

The most common IUD in the PRC is the stainless steel ring (SSR), which has been available since the 1950s [2, 3]. Despite having the largest number of IUD users in the world, the PRC has been demonstrated to have one of the highest failure rates, ~10% in the first year [4]. This is second only to Brazil's 13% in developing countries; in developed countries the first year failure rate is only 2% [5, 6]. Some studies suggest that the high failure rate is related to the quality of IUDs made in PRC.

In 1993 various types of rings were banned by the Chinese government (China State Family Planning Commission - SFPC) because of excessive pregnancy rates and other side effects compared with more modern copper IUDs [7]. However, even though they are beginning to be replaced by copper devices – whether imported or of Chinese manufacture (TCu220C from Tianjin, TCu380 from Xiping, and MLCu375 from Wuxi) – ring devices are still widely used [2]. Their main advantage is an almost unlimited lifespan and their greatest drawback is removal, which, when necessary, requires specific instruments.

Lack of a visible string requires cervix dilation using a uterine probe. When required, stabilization is achieved with a single-tooth tenaculum applied to the anterior lip of the cervix with the help of a plastic os finder. Once the uterine cavity is entered, its length and direction are noted and a removal hook is inserted [8]. If routine removal fails, partially embedded or retained parts can generally be removed by hysteroscopy under direct visualization [9, 10]. However, hysteroscopy entails complications, most frequently uterine perforation [11]. Gas embolism with air or carbon dioxide is a rare (three per 17,000 procedures) but often fatal outcome [12,13]. The authors describe the routine techniques applied to remove Chinese IUDs and a newly devised method.

Materials and Methods

The present study involved 134 patients of Chinese nationality who presented to the Gynecology and Obstetrics Outpatient Department of "Val Vibrata" University Hospital (Sant'Omero, Italy) from January 2007 to March 2012 for IUD removal. They were attended by three Italian gynecologists with a ten-year experience in office hysteroscopy.

Demographic data were reviewed and specific information including menstrual and obstetric history (pregnancies, live births), type of IUD worn, and reasons for removal was recorded.

Because a new removal method began to be applied in January 2010, patients were divided into a group treated from 2007 to 2009 (group 1) and another treated from 2010 to 2012 (group 2). The relationships between IUD type, obstetric history, age at IUD removal,

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reasons for removal, and technique used were investigated in each group. The patients were then divided in another two groups: group A including patients asking for IUD removal due to gynecological problems (spotting, recurrent infection, pelvic pain, menstrual disorders, IUD + pregnancy) and group B including patients asking for IUD removal in order to conceive. IUD type and location were established by gynecological exploration, examination with a speculum, and pelvic transvaginal ultrasound. All 134 IUDs lacked a string.

The techniques used to remove the device are described below.

Each patient gave her written informed consent to be included in this study. With the patient in the dorsal lithotomy position, a speculum was gently introduced to expose the cervix. Occasionally, a single-tooth tenaculum was applied to the anterior lip of the cervix for stabilization. Device removal without sedation was achieved by use of a small curette or an IUD removal hook inserted blindly or under ultrasound guidance, as appropriate. In case of unsuccessful removal (because the cervix was stenotic, the patient complained of excessive pain, or the IUD could not be reached with the hook) removal in hospital under general anesthesia was offered.

To visualize the IUD and confirm the diagnosis, office hysteroscopy was performed with a hysteroscope, which is endowed with a five Fr (1.67 mm) operating channel; 200 ml saline (0.9% sodium chloride) was used for distension at a pressure ranging from 14 to 17 kPa (105-130 mmHg). Anesthesia was induced using a mask (fentanyl 50 µg and isopropylphenol 180 mg). The cervix was dilated to size 5, then a Foerster-Ballenger curved ring forceps (18 cm, 7 in) was introduced into the cavity and used to remove the IUD under the guide of the earlier hysteroscopy. The whole procedure lasted about 15 minutes.

Beginning in 2010 the present authors investigated the feasibility and acceptability of surgical IUD removal without general anesthesia using a miniature resectoscope (16 Fr / 5.3 mm outer sheath and 0° grade optics). Images were viewed on a high-resolution color monitor using a one-chip camera and recorded.

The procedure consisted of four steps: 1) vaginoscopic approach and cavity distension with saline (0.9% sodium chloride infused via a flexible 500 ml bag wrapped in a pressure cuff connected to a manometer and pumped up to 80-120 mmHg); 2) endoscopic evaluation of device type and location; 3) grasping of the IUD with the resectoscope hook (angled 90°) under vision; 4) IUD removal together with the mini-resectoscope under dynamic vision. During the procedure the endometrium was inspected and the tubal ostia were identified. The hysteroscope was then withdrawn toward the internal uterine orifice to obtain a panoramic view of the cavity.

No pharmacological preparations or local anesthetics were administered before examination. Adverse intraoperative events were recorded. Records were reviewed after 14 days for postoperative complications. All procedures were performed in the follicular phase of the menstrual cycle, usually within seven days of the end of menstruation. Prophylactic antibiotics were not routinely given for either office or IUD removals.

Statistical analysis

The χ^2 test was used to estimate the association between categorical variables; Wilcoxon's test was applied to interval and ordinal variables. Continuous variables were compared using Student's *t*-test. A *p*-value < 0.05 was considered significant. SAS software was used for statistical analyses.

Results

The population comprised of 134 Chinese women wearing an IUD; their mean age was 30.3 years \pm standard de-

Table 1. — Reasons given for removal of Chinese IUDs by type of device.

	SSR n (%)	UCD n (%)	Double Ring n (%)	γ Cu 380 n (%)
Menstrual cycle disorders	7 (8.6)	5 (15.2)	1 (20.0)	6 (40.0)
Pain	6 (7.4)	3 (9.1)	0 (0)	1 (6.7)
IUD + pregnancy	2 (2.5)	1 (3.0)	0 (0)	0
Desire to conceive	66 (81.5)	24 (72.7)	4 (80.0)	8 (53.3)
TOTAL	81	33	5	15

SSR: stainless steel ring; UCD: uterine cavity-shaped device.

viation (sd) 4.0 (28.9 \pm sd 3.9 in group 1; *n*=73 and 32.0 years \pm sd 3.5 in group 2, *n*=61).

A total of 11/134 (8.2%) women were nulliparous and 27 (20.1%) had had at least one cesarean delivery. In particular, nine (12.3%) group 1 subjects were nulliparous and 16 (21.9%) had had at least one cesarean delivery; two (3.3%) group 2 patients were nulliparous, and 11 (18.0%) had had at least one cesarean delivery. Finally, 48 (65.8%) group 1 and 48 (78.7%) group 2 women had had at least one vaginal delivery.

IUDs had been fitted during the puerperium or within 12 months of delivery. The main reasons for removal were a desire to conceive (*n*=102; 76.2%); gynecological problems (e.g. spotting, recurrent infection, pelvic pain or menstrual disorders like hyperpolymenorrhea: *n*=29; 21.6%), and having become pregnant while wearing the IUD (*n*=3; 2.2%) (Table 1). In group 1 (*n*=73), 49 (67.1%) women were planning a pregnancy, five (6.9%) had menstrual disorders, two (2.7%) had become pregnant while wearing the device, three (4.1%) had pelvic pain, eight (11.0%) had spotting, and six (8.2%) had recurrent infection. In group 2 (*n*=61), 53 (87.0%) women desired a pregnancy, three (4.9%) had hyperpolymenorrhea, one (1.6%) had become pregnant while wearing the IUD, three (4.9%) had lower abdominal pain, and one (1.6%) suffered from irregular vaginal bleeding. Group 2 contained more women aged \geq 30 years (*n*=45; 74%) than younger patients (*n*=16; 26%) (*p* = 0.002).

The IUDs removed more frequently were round-shaped SSRs (known as "Chinese rings") and isosceles triangle, uterine cavity-shaped devices (UCDs) (Figure 1). On ultrasound the SSR had a distinct echogenic ring-like appearance and the UCD was easily distinguishable as a uterus-shaped echogenic area (Figure 2). Other rings consisted of a stainless steel spiral spring enveloping a thin inner ring made in flexible steel (double ring); this was more difficult to identify by ultrasound since it often appeared as a blurred ring-like echogenic area.

The only medicated IUD we removed was the γ Cu-380 (Figures 3, 4), consisting of a γ -shaped stainless steel wire frame with a copper wire in the middle layer. A silicone elastomer bead containing indomethacin is attached at either end of the horizontal arms and a silicone elastomer ring is placed

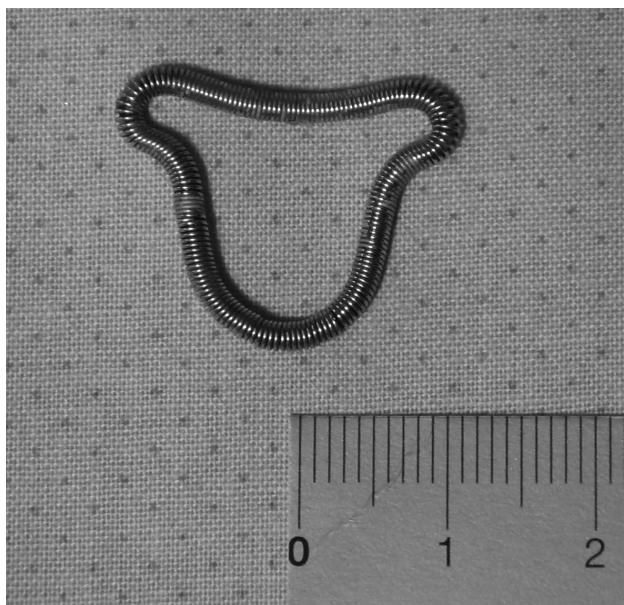


Figure 1. — Uterine-shaped IUD: gross appearance.



Figure 2. — Uterine-shaped IUD: transvaginal sonogram.

in the middle of the device. Sonographically it is a γ -shaped echogenic area resembling the device shape [14].

From January 2007 to December 2009 (group 1), 73 Chinese IUDs were removed; 18 (13.4%) were removed in an office setting using the hook or the uterine curette without general anesthesia or cervical dilation from women who had had at least one vaginal delivery. Of these, 14 (77.8%) were SSR and four (22.2) were γ Cu-380 devices.

Extraction under brief general anesthesia was carried out in 55 (41.0%) women, nine (16.4%) nulliparous and 16 (29.1%) subjects with at least one previous cesarean delivery. False passage through the cervix during cervical dilation occurred in 2/55 patients (one nulliparous and one menopausal).

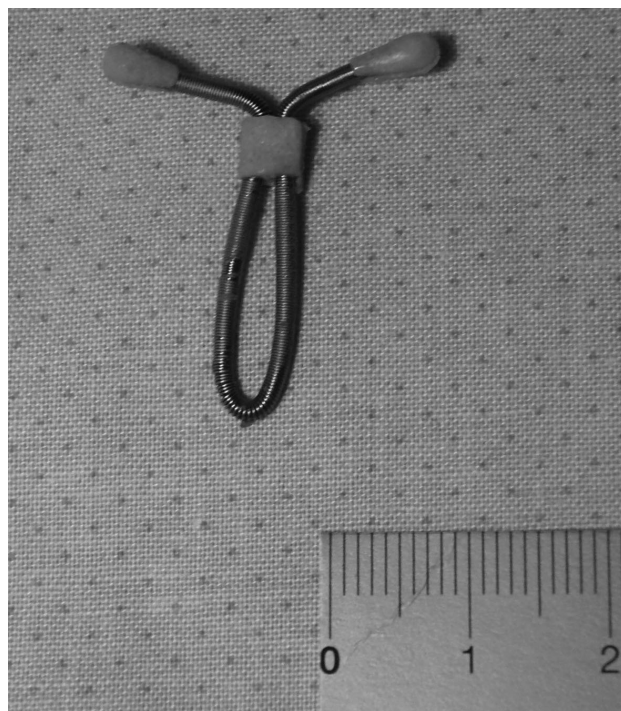


Figure 3. — Gamma Cu-380 IUD: gross appearance.

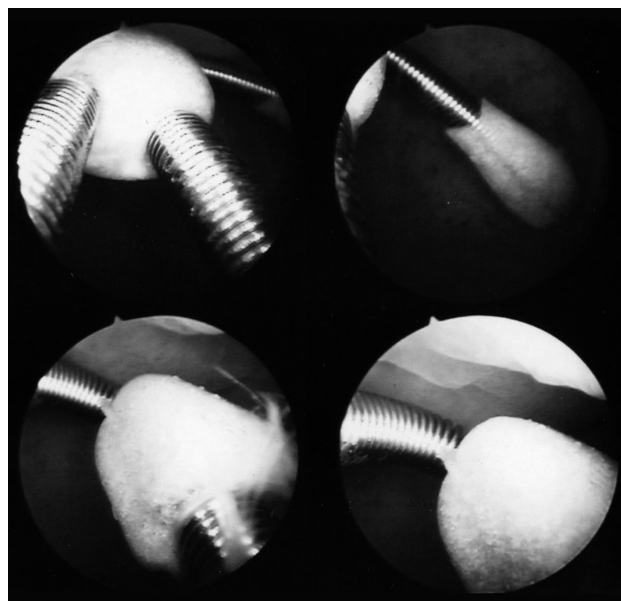


Figure 4. — Gamma Cu-380 IUD: hysteroscopic image.

Overall 33 (60%) SSR, 15 (27.3%) UCD, five (9.1%) γ Cu-380, and two (3.6%) double ring devices were removed.

Adoption of the mini-resectoscope approach in January 2010 involved that all group 2 procedures were performed in an office setting. Two patients experienced a vagal reaction that resolved spontaneously; in all the others removal was

Table 2. — Association between removal technique and reason given for IUD removal before 2010.

Technique	Reasons		<i>p</i> value
	Group A ³ n (%)	Group B ⁴ n (%)	
Hook or uterine curette ¹	8 (33.3)	10 (20.4)	0.36
Curved ring forceps ²	16 (66.6)	39 (79.6)	
Total	24 (32.9)	49 (67.1)	

¹Without general anesthesia or cervical dilation; ²General anesthesia and cervical dilation; ³patients asking for IUD removal due to gynecological problems (spotting, recurrent infection, pelvic pain, menstrual disorders, IUD + pregnancy); ⁴patients asking for IUD removal in order to conceive.

Table 3. — Association between IUD removal technique and age before 2010.

Age groups (years)	Techniques		<i>p</i> value
	Hook or uterine curette n (%)	Curved ring forceps n (%)	
< 30	10 (55.5)	34 (61.8)	0.846
≥ 30	8 (45.5)	21 (38.2)	

Table 4. — Association between reason given for IUD removal and age.

Age groups (years)	Reasons		<i>P</i> value
	Group A ¹ n (%)	Group B ² n (%)	
< 30	8 (25.0)	52 (50.9)	0.01
≥ 30	24 (75.0)	50 (49.0)	

¹Patients asking for IUD removal due to gynecological problems (spotting, recurrent infection, pelvic pain, menstrual disorders, IUD + pregnancy); ²patients asking for IUD removal in order to conceive.

completed successfully and was well-tolerated, with pain described as inferior or equal to menstrual pain. The devices removed were 34 (55.7%) SSRs; 18 (29.6%) UCDs; three (4.9%) double ring and six (9.8%) γ Cu-380s. SSRs were 58% in group 1 and 42% in group 2. The difference was not significant ($p = 0.231$). No other complications occurred. No postoperative fever was noted. The difference between IUD type and GROUP was not significant ($p = 0.55$) (data not shown). The technique used and the reasons for IUD removal were not significantly different between the groups ($p = 0.36$) (Table 2). The technique used and patient age were not significantly different between the groups ($p = 0.846$) (Table 3).

To evaluate the association between the reasons for IUD removal and age before 2010, the 134 patients were divided into two age groups: < 30 years ($n=60$; 44.8%) and ≥ 30 years ($n=74$; 55.2%). The two groups were comparable in frequency ($p = 0.23$). A significant association was found between reasons for IUD removal and age ($p = 0.01$) (Table 4). More women aged < 30 years ($n=52$; 86.7%) underwent IUD removal because they sought a pregnancy compared with women aged ≥ 30 years ($n=50$; 67.6%). IUD type, years wearing the device, and obstetric history did not affect the removal technique.

Average operating time with the resectoscope, from the beginning of vaginoscopy to IUD removal, was 2.3 minutes.

Discussion

This study reports on three techniques adopted to remove various types of Chinese IUDs in Italy. The present findings showed that the SSR was the IUD worn by the majority of our Chinese patients (60.5%), followed by UCD (24.6%), γ Cu-380 (11.2%), and double ring (3.7%) devices.

The SSR (Shanghai ring) was first produced in Shanghai in 1970. The ring is one-inch (2.54 cm) in diameter, flexible, springy, string-free, and designed not to be removed easily, due to China's "one child" policy. It was used for immediate post-placental insertion. The rings are fitted using a "fitting fork" or "fitting pliers". To date the technique used most frequently to remove them has been the hook. If the ring cannot be released, it is cut in two using two hemostat forceps before taking it out. This is preceded by cervical dilation.

A review of the literature disclosed no relevant information about the removal of these devices in Faculty of Family Planning and Reproductive Health Care (FFPRHC) and Royal College of Obstetricians and Gynecologists (RCOG) guidance documents, National Guidelines Clearing House or the WHO publication *Improving Access to Quality Care in Family Planning - Selected Practice Recommendations for Contraceptive Use, 2002* [15].

One study recommends using three-dimensional ultrasound to locate and identify the IUD type and reports successful removal in 26-28 cases by hysteroscopy, laparoscopy or laparotomy [16].

The present authors noted that γ Cu-380s, UCDs, and double rings were removed more frequently without sedation using the mini-resectoscope (γ Cu-380s removed with the mini-resectoscope, six; with hook or uterine curette, four; with curved ring forceps, five; UCDs removed with the mini-resectoscope, 18; with hook or uterine curette, 15; with curved ring forceps, zero; double rings removed with the mini-resectoscope, three; with hook or uterine curette, two; with curved ring forceps, zero).

A number of reasons may explain why IUDs fitted in the PRC tend to be more difficult to remove than those commonly used in America and Europe. Poor familiarity with the many different types of Chinese IUDs can make physicians uncomfortable about attempting removal in an office setting [8]. In addition, all 134 IUDs removed in the present study had no string, thus requiring some degree of intrauterine manipulation for removal.

Previous vaginal deliveries did not affect the removal technique, even though the mini-resectoscope was applied more frequently in women who had already had a child (48%) than in nulliparous women or patients who had had a cesarean delivery (18.1% and 40.7%, respectively).

The mini-resectoscope was used more often in women aged ≥ 30 ($n=45$; 74%) than in younger patients ($n=16$; 26%) ($p = 0.002$); instead patient age did not significantly correlate with the technique applied before 2010 ($p=0.846$).

Currently, IUDs are used by almost 50% of women of reproductive age in China. Many ask to have their IUD removed following menopause. In general, an IUD should be removed within 12 months, preferably at six months from the last menses, when removal is usually simple because the cervix is still soft. Declining estrogen levels more than one year into menopause typically leads to atrophy of the vagina, cervix, and uterine body, and the cervix may become stenotic. In one study only 56.1% of women had their IUD removed successfully two years after menopause [17]. Zhang *et al.* [18] reported that uterine atrophy, cervical adhesions, cervical hardness, and IUD deformation were the major factors hampering removal.

In China a variety of drugs such as mifepristone and misoprostol are administered to post-menopausal women prior to IUD removal to induce cervical ripening and facilitate the procedure, reducing the risk of complications. Estrogen regimens may be used when neither drug can be used [19]. These medical agents were never used in the present authors procedures.

The mini-resectoscope appears to be an acceptable tool for hysteroscopic surgery and can be used for IUD removal without general anesthesia [20]. Thanks to its small diameter, dilation of the cervical canal is not required, resulting in shorter operating time and preventing unnecessary tissue damage. The diameter narrow shaft also minimizes the risk of intra- and post-operative complications.

The vaginoscopic approach without a speculum and tenaculum avoids discomfort to patients and ensures complete compliance. Other small hysteroscopes (total diameter < five mm) used in office settings can be introduced in the internal cervical os without a speculum or tenaculum by the vaginoscopic approach, but only the resectoscope hook can catch or grasp the IUD and it pull out. Extracting a ring is more problematic than extracting an IUD with a tail. Hysteroscopy appears to be useful to remove a missed or retained IUD, since it offers direct visualization of the endometrial cavity [21] and allows surgical removal of foreign bodies [22].

None of the procedures using the mini-resectoscope had to be interrupted due to severe pelvic pain [23], uterine bleeding obscuring visualization, extended operating times or inadequate wall distension, nor were major complications such as uterine perforation, hemorrhage or postoperative infection reported either intraoperatively or after patient discharge. Two patients experienced a vagal reaction that resolved spontaneously. The hysteroscopic approach is therefore especially useful to treat the most numerous patient group, i.e. women asking for IUD removal to become pregnant.

In conclusion, all Chinese IUD removal procedures described were effective and safe. The mini-resectoscope, recently introduced on the market, appears to be a useful and minimally invasive tool.

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