



Effectiveness of Manual Vacuum Aspiration (MVA) Device in the Management of Intrauterine Copper Devices (IUCD) with Missing Strings: A Prospective Interventional Study

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Abstracts

Background The cases of intrauterine contraceptive device (IUCD) with missing strings have risen due to increasing popularity of postpartum IUCD in Indian women. This has led to increase in the burden of referral cases in tertiary care centres. Manual vacuum aspiration (MVA) device is a cheap and non-invasive method, well established for surgical abortion in first trimester of pregnancy. This study was undertaken to assess if MVA device can be used in retrieving IUCD in low resource setting, hence, reducing the need for referral or need of expensive and invasive techniques.

Method A prospective interventional study was conducted over a period of 6 months. A total of 50 women who were desirous of IUCD removal with non-visibility of strings at the external cervical os were included in the study. All cases were more than 12 weeks postpartum and had an ultrasound confirmed intrauterine location of IUCD. Women with pregnancy, extrauterine location of IUCD, active pelvic infection and cervical cancer were excluded.

Results The incidence of IUCD with missing strings was 19.4%. Almost a third of the cases (36%) were referred from outside Delhi for IUCD removal to our centre. In 30% cases IUCD could successfully be removed using the MVA device. Majority of the IUCDs were inserted in hospital by a gynaecologist (90%), and most of the insertions were post-placental (62%).

Conclusion Retrieval of IUCD with missing strings with MVA device is a novel method and can be an initial approach in low resource setting before referral to a higher centre for management.

Keywords Copper-T · Intrauterine copper devices (IUCD) · Missing strings · Manual vacuum aspiration (MVA) · MVA device · IUCD removal

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Introduction

Intrauterine contraceptive device (IUCD) is one of the most widely used method of reversible contraception worldwide [1, 2]. Around 14.3% of women all over the world are using this method. The IUCDs have tails in the form of strings visible through the external cervical os which is examined periodically to ascertain their intrauterine location. These strings also help in the removal of IUCDs when it requested by the user. The procedure to remove IUCD is usually easy when these strings are visualized through the external os, requiring simply grasping the IUCD strings and pulling gently to extract the IUCD through cervical canal [3]. However, 5–18% of IUCD users have missing strings, i.e. IUCD strings that are not visible at the external cervical os on examination [4]. Missing strings are an uncommon finding in cases with interval IUCD, but it is commonly found during follow up of PPIUCD cases (postpartum IUCD). Hence,

with the advent of PPIUCD programme, the incidence of patients coming with missing strings has increased [2].

The differential diagnosis of missing IUCD strings includes string retraction into the cervical canal or endometrial cavity, unnoticed expulsion, broken strings, upward displacement due to enlargement of uterus as in pregnancy or fibroid, embedding of IUCD in uterine wall (partial perforation) or complete perforation by entering the abdominal cavity. All of these may occur with or without pregnancy [3, 5–7].

The first suggested step for the removal of IUCD with missing strings is the use of a cervical cytology brush to sweep strings from the endocervix [8, 9]. If the strings cannot be swept with the cytobrush, a pelvic ultrasound or an X-ray examination should be obtained for exact IUCD localisation [10]. A pregnancy test should also be performed.

When intrauterine location of IUCD is confirmed and the patient desires IUCD removal, few tools are available for office removal such as grasping forceps, hook devices, thread retrievers, suction curettes and at present, most commonly used alligator forceps. Removal by suction curettes has been described mainly for ring and loop devices which are not being used nowadays [11].

Since the popularity of PPIUCD insertion after introduction of PPIUCD programme by government of India, the problem of missing threads has compounded. Very few studies in literature have documented the management of missing strings and none of them have studied the use of suction in T-shaped/multiloop IUCD removal. As our hospital is a tertiary care centre, we get a large number of referred cases of misplaced IUCDs. The present study was designed to study the efficacy of manual vacuum aspiration (MVA) device for IUCD retrieval. This study was designed in search of a novel outpatient procedure. MVA device has been with us since 1973, but its utility beyond MTP has not been thought about. The manual vacuum aspirator is a 60-mL syringe in which suction of around 600 mm Hg is created manually (Fig. 1). It is attached to a flexible or a rigid cannula. It is manually operable, cheap and a relatively painless office procedure which is being used in low resource settings for first trimester abortions.

The present study was undertaken to assess the efficacy of MVA device in retrieving IUCD with missing strings as a novel procedure for low resource setting, hence, reducing the need for referral or need of expensive and invasive techniques.

Materials and Methods

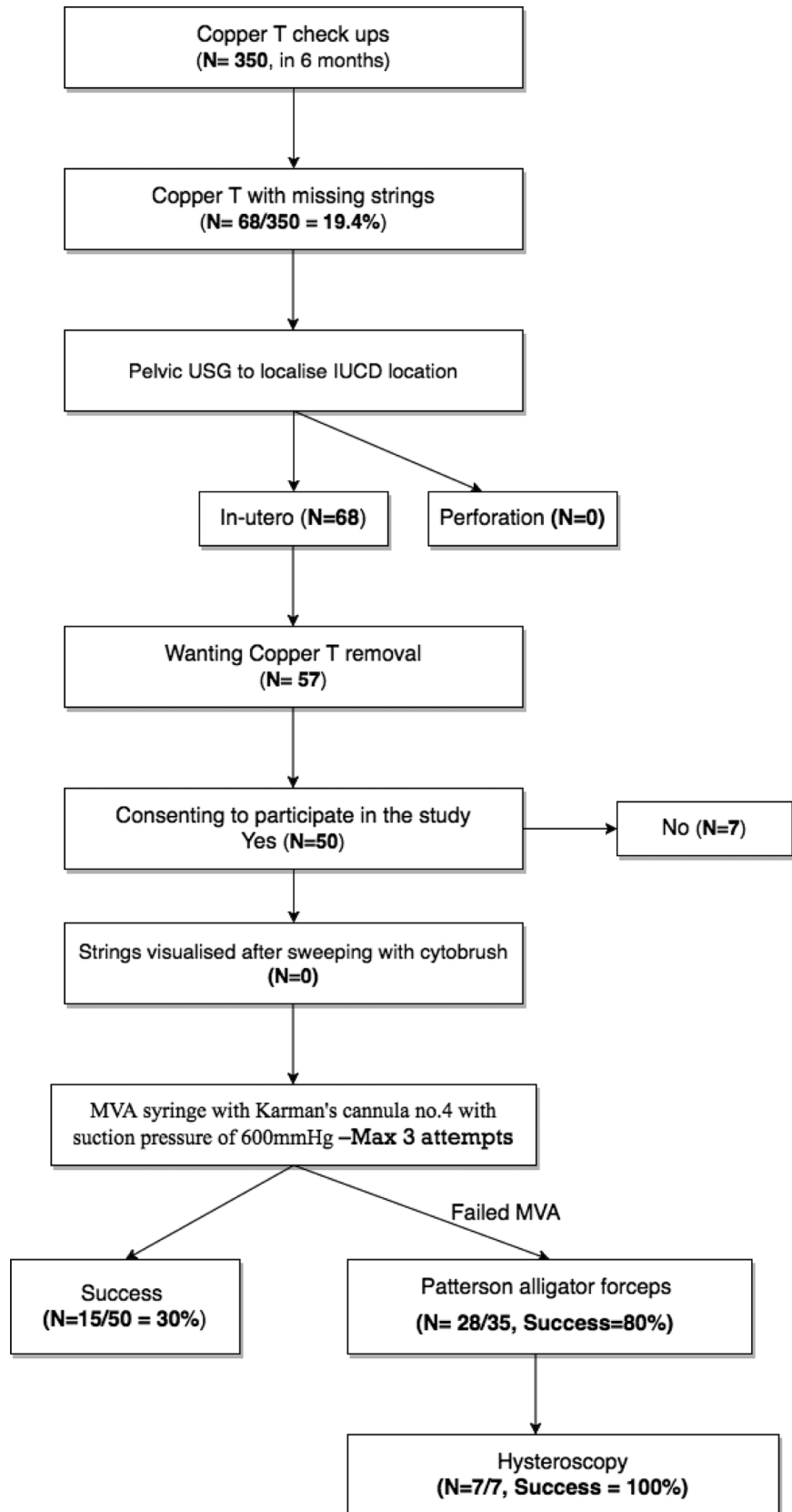
This was a prospective interventional study conducted over a period of 6 months in the Department of Obstetrics and Gynaecology, Safdarjung Hospital, New Delhi from



Fig. 1 Manual vacuum aspiration device

February to July 2020. The inclusion criteria were: women who were more than 12 weeks postpartum desirous of IUCD removal with non-visibility of strings at the external cervical os and had ultrasonography (USG) confirmed intrauterine location of IUCD. Women with pregnancy, extrauterine location of IUCD, active pelvic infection and cervical cancer were excluded from the study. A total of 50 patients attending family planning out-patient department (OPD) of Safdarjung Hospital for IUCD follow up consenting to participate and meeting the inclusion criteria were enrolled in the study after obtaining ethical approval from institutional ethical committee. The study design and enrolment are described in Fig. 2. In patients with missing strings first the cytobrush was rotated three times, if the strings were still not visualized, MVA syringe with Karman's cannula number 4 was used. A total of 3 attempts were made, after which it was declared as a failure with MVA. In MVA failed cases, Patterson's alligator forceps were used. In case of failed retrieval by MVA device and alligator forceps, hysteroscopy was done. Primary outcome was successful visualization of IUCD/IUCD strings at external cervical os or cervical canal with MVA device, and other secondary outcomes like complications with the removal were recorded. Data were analysed using SPSS version 24.0, and correlation coefficient (r) was calculated. Correlation between a variable with its success of removal with MVA was documented as ' r_1 ' and that of a variable with its ease of removal was documented as ' r_2 '. Ease of removal was defined as the successful visualisation of IUCD/IUCD threads at external cervical os after one attempt with MVA syringe. p value was calculated and a value of less than 0.05 was considered significant.

Fig. 2 Study design



Results

Around 350 women presented to gynaecology OPD for follow up post IUCD insertion in 6 months. The incidence of IUCD with missing strings was 19.4% (68 out of 350) in our study. The women were 21–45 years old, average parity being 1.66. The demographic variables and the IUCD characteristics have been summarised in Table 1.

Table 1 Patient demographic variables and IUCD characteristics

Variable	Number (N=50)	Percentage (%)
Age	28.86 ± 6.14 (Mean ± SD)	
<i>Parity</i>		
Nulliparous	3	6
Parity 1	21	42
Parity 2	16	32
Parity 3 +	10	20
<i>Residence</i>		
Delhi	32	64
Outside Delhi	18	36
<i>Place of insertion</i>		
Hospital	36	72
Smaller centres/clinics	14	28
<i>Inserted by</i>		
Gynaecologist	45	90
Other doctor/nurse	5	10
<i>Duration of insertion</i>		
< 5 years	29	58
≥ 5 years	21	42
<i>Type of IUCD</i>		
CuT380A	44	88
ML375	6	12
<i>Purpose for insertion</i>		
Spacing	27	54
Family complete	23	46
<i>Timing of insertion</i>		
Post-placental	31(62%)—28 (intra caesarean) + 3 (vaginal delivery)	
Interval-lactating	14	28
Interval-non-lactating	4	8
Post-abortion	1	2
<i>Uterine position</i>		
Anteverted	39	78
Retroverted	7	14
Midposition	4	8
<i>USG location</i>		
Normally placed	39	78
Malpositioned	4	8
Displaced	4	8
Embedded	3	6

Table 2 Statistical significance ('p' value) and correlation(r) of various parameters with success and ease of removal of IUCD with MVA device

Parameter/correlation	Success of removal(r_1) ^a	Ease of removal (r_2) ^b	p value*
Place of insertion	− 0.1	+0.1	0.35
Person who inserted	+0.1	+0.3	0.048
Duration of insertion	+0.1	− 0.2	0.11
Type of IUCD	− 0.1	− 0.2	0.30
Timing of insertion	+0.1	− 0.2	0.26
USG location	+0.2	+0.3	0.039

^a r_1 - correlation coefficient of various parameters with success of removal. Success of removal is defined as the ability to retrieve IUCD with MVA device. ^b r_2 - correlation coefficient of various parameters with ease of removal. Ease of removal is defined as the ability to retrieve IUCD with MVA device in the first attempt

* p value < 0.05 was considered statistically significant

Correlation with success of removal (r_1) and ease of removal (r_2) is depicted in Table 2. Most IUCDs, 90%, were inserted by gynaecologists, while 10% were inserted by MBBS doctors/nurses and this was statistically significant ($p=0.048$). It had a positive correlation with ease of removal ($r_2=+0.3$). The average duration of insertion of IUCD was 4.4 ± 3.0 years. It had a negative correlation with ease of removal (-0.2). It was noted that IUCDs were tougher to remove in patients with longer duration of insertion, although it did not reach statistical significance ($p=0.11$). The USG location had a positive correlation with both ease of removal ($+0.3$) and success of removal by MVA device ($+0.2$) as the normally placed IUCDs were the easiest to remove. The location of IUCD was of statistical significance ($p=0.039$). Various reasons for requesting removal of IUCD are cited in Table 3.

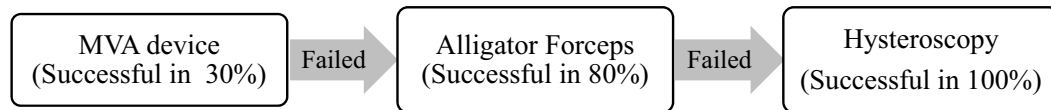
There were no complications at the time of insertion of IUCD in 48 women while 2 women reported mild bleeding and infection. The MVA device was successful in removing 30% IUCDs. Average time of removal was 5.9 ± 3.1 min. Procedural complications were minimal. No patient required analgesia, average pain score on a visual analogue scale

Table 3 Indications for IUCD removal

Indication	Number (%)
Menstrual complaints	3 (6%)
Separated/divorced	5 (10%)
Wants pregnancy	25 (50%)
Wants reinsertion	10 (20%)
Wants ligation	4 (8%)
Pain/pelvic infection	2 (4%)
Others	1 (2%)

Table 4 Sequential methodology for IUCD removal

Method	Number (Success rate%)
Manual Vacuum Aspiration	15/50 (30%)
1 attempt	12/15
2 attempts	2/15
3 attempts	1/15
Patterson's Alligator Forceps	28/35 (80%)
Hysteroscopy	7/7 (100%)
Intrauterine	1
Displaced towards fundus	1
Embedded	5



(VAS) being 1.66 ± 0.74 and average blood loss being 7.38 ± 3.18 ml. Only the patients requiring hysteroscopic removal required cervical dilatation (7 cases). On removal, IUCD thread was present in 29 (58%) cases and absent in 21 (42%). Table 4 describes the sequential methodology for IUCD removal followed in our study.

Discussion

IUCDs are among the most commonly used forms of reversible contraception worldwide [12]. Their removal is an easy procedure involving grasping of the threads with a forceps and applying gentle traction to extract it through the cervical canal [3]. In 5–18% of women, the threads are not visible on speculum examination, defined as ‘missing strings’, as they get wrapped around the stem of IUCD or curled into the cervical canal. Some of the threads may detach from the IUCD stem and get expelled.

In our study, majority of cases were from within the city (Delhi), but 36% were referred from outside Delhi to our centre, which is a significant proportion. In 30% cases, IUCDs could successfully be removed using just the MVA device. This is similar to the success rate of 37–59% reported for other methods used for outpatient removal of IUCDs like Spencer Wells artery forceps, IUCD thread retrievers, extractor hooks and designed forceps [5]. The advantage of our procedure is that MVA device is cheap and readily available in primary health care setups and small clinics equipped to perform an abortion. The other aforementioned instruments (thread retrievers, hooks, extractors, alligator forceps) are expensive and not available at smaller centres.

Suction curettes have been used in the past for removing ring or loop type of IUCDs. There is limited literature on

its use in T-shaped IUCDs [3]. Guillebaud and Kasonde described a case series of 40 non-pregnant women with IUCDs with missing strings. In 36 cases, the IUCD was located in utero, 35 of these IUCD was successfully removed using a 4-mm ‘Rocket’ (i.e. Karman) vacuum aspiration curette combined with hand pump generated suction of up to 500–600 mm of pressure, meanwhile, in 8 cases, supplementary use of a Novak biopsy curette was required [11]. The need for additional instrumentation in these cases raises the question of whether MVA device described in the present study may be better suited for IUCD retrieval, given its ability to consistently generate 600–660 mm of negative pressure with little operator effort compared with older hand pump techniques. Although the literature regarding the use of modern uterine aspiration for retrieval of IUCD is limited, Wu et al. in 2011 successfully used MVA device for removal of IUCD in a case of desired early pregnancy. In their study, they also mention the anecdotal unpublished use of MVA device for IUCD removal in both non-pregnant and pregnant women with undesired pregnancy, requiring elective abortion [13].

The advantage of the MVA device is, that it requires no cervical dilatation with 4 mm Karman’s cannula thus causing little pain and discomfort to the women. In comparison, the standard IUCD retrievers (3.0×2.5 mm to 3.0×0.7 mm) and the hysteroscope (4mm) are rigid making them more painful and uncomfortable. All the women in our study experienced little to negligible pain (average pain score 1.66). In addition, the risk of uterine perforation or that of creating a false passage is negligible in this procedure as compared to other instruments. Also, the use of MVA device can easily be learned and is user friendly. All these qualities make it a suitable device for use in low resource settings, hence, decreasing the need for referral thereby reducing the patient burden and overall cost of management.

A limitation of our study is that the results are based on a relatively small number of women and we did not have a control group. Though the success rate of MVA was low, a prospective randomised control trial would be needed to compare the effectiveness of this new method with other established techniques.

Conclusion

Missing IUCD strings are a common complication of IUCD use. The majority of cases may be managed in the office setting. In conclusion, we believe that our novel method of retrieval of IUCDs with missing strings using MVA device may be a good initial approach in low resource setting. Although our initial experience indicates that our approach is moderately successful and less painful than the alternative methods, these findings should be tested in a prospective randomised trial.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional ethics committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical clearance was obtained from Institutional Ethics Committee, VMMC and Safdarjung hospital for the study titled “Effectiveness of manual vacuum aspiration (MVA) device in the management of IUCD with missing strings: A prospective interventional study” dated 12/02/2020 Ref. No IEC/VMMC/SJH/Project/2020–02/.

Informed consent Informed consent with the consent to publish was obtained from all individual participants included in the study.

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