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Review article

Intrauterine contraceptive insertion postabortion: a systematic review☆

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Abstract

Background: This review was conducted to evaluate the evidence regarding the safety and effectiveness of intrauterine device (IUD) insertion immediately following spontaneous or induced abortion.

Study Design: We searched MEDLINE databases for all articles (in all languages) published in peer-reviewed journals from January 1966 through March 2010 for evidence comparing immediate postabortion IUD insertion with either no IUD insertion, insertion at a different time, insertion following first-trimester compared with second-trimester abortion or copper IUD insertion compared with hormone-releasing IUD insertion postabortion. We used standard abstraction forms to summarize and assess the quality of the evidence.

Results: The search strategy identified a total of 990 articles, of which 19 met our inclusion criteria for this review. Studies comparing immediate postabortion IUD insertion with no IUD insertion found that both groups experienced similar rates of pain and infection and a similar number of bleeding days, but one study reported that women with copper IUD insertion experienced a greater amount of bleeding than women without IUD insertion after abortion. Results from studies comparing immediate postabortion IUD insertion and insertion at a time not associated with pregnancy did not report differences between the two groups in the duration of bleeding, pain, expulsions or pelvic inflammatory disease (PID). One study however reported a greater amount of bleeding and another reported more removals for medical reasons among women with postabortion IUD insertion. Evidence from studies that examined immediate vs. delayed postabortion insertion reported minimal differences in bleeding, pain, expulsion and PID between groups. Studies comparing immediate IUD insertion after first- vs. second-trimester abortion reported no difference in removals for pain and bleeding, and an increased risk of expulsion among those women who had insertions after second-trimester abortion. In addition, women with insertions immediately after abortions occurring later in the first trimester had higher expulsion rates than those with insertions after early first-trimester abortions. Studies examining women using a copper IUD compared with a hormone-releasing IUD reported inconsistent results, with one paper reporting more bleeding days in the copper IUD group and another finding higher rates of removal for bleeding in the progesterone-releasing IUD group.

Conclusion: Intrauterine device insertion immediately after abortion is not associated with an increased risk of adverse outcomes compared with use of other contraceptive methods or with no IUD insertion after abortion and compared with IUD insertion at times other than immediately after abortion. Intrauterine device expulsion rates, while generally low, were higher with insertions that occurred after later first-trimester abortion compared with after early first-trimester abortion and higher with IUD insertion after second-trimester abortion compared with after first-trimester abortion.

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Keywords: Abortion; Contraception; Intrauterine device; IUD; Postabortion contraception

1. Introduction

After abortion, many women are in need of contraception to prevent future unintended pregnancies. Currently, around half of women having induced abortions in the United States have already had at least one other abortion, which indicates that the need for contraception after abortion is not being met [1]. Because they are highly effective, long-acting contraceptives such as intrauterine devices (IUDs) may be especially appropriate for women who have just had an abortion. Yet, despite its advantages, only about one third of US abortion clinics are able to offer IUD insertion immediately after abortion [2]. In one study, only 32% of women who chose to have delayed insertion returned for

☆ The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the World Health Organization or the Centers for Disease Control and Prevention.

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insertion in the 6 months following abortion [3]. Intrauterine device insertion immediately following abortion would likely increase rates of usage. Therefore, ensuring the safety of this practice could have an important public health impact in prevention of unintended pregnancy. A previous systematic review found that insertion of an IUD immediately after abortion is safe; however, that review focused on discontinuation and expulsion and did not examine bleeding and pain outcomes [4].

Currently, both the World Health Organization's (WHO's) Medical Eligibility Criteria and the US Medical Eligibility Criteria for Contraceptive Use state that there is no restriction on the insertion of copper or hormone-releasing IUDs immediately after first-trimester spontaneous or induced abortion (Category 1) [5]. After second-trimester abortion, the advantages of using IUDs generally outweigh any theoretical or proven risks (Category 2). Intrauterine device insertion should not be performed after septic abortion because of unacceptable health risks (Category 4) [5]. The objective of this systematic review is to examine and clarify the safety and effectiveness of IUD insertions occurring immediately after spontaneous and induced abortion.

2. Methods

We searched the MEDLINE database for all articles in any language, published from 1966 through March 2010, using the following search terms: (((levonorgestrel AND (intrauterine devices[mesh] OR iud OR iucd OR ius OR intrauterine system OR intra-uterine system OR intrauterine device OR intra-uterine device)) OR mirena) OR ((“Intrauterine Devices”[Mesh] OR “Intrauterine Devices, Medicated”[Mesh] OR “Intrauterine Devices, Copper”[Mesh]) OR intrauterine device OR iud)) AND (“Abortion, Induced”[Mesh] OR “Abortion, Spontaneous”[Mesh] OR “Abortion, Septic”[Mesh] OR “Abortion, Therapeutic [Mesh] OR post-abortal OR postabortion”). Reference lists of identified articles and relevant review articles were also searched for additional citations of interest. Abstracts of conference presentations or dissertations and unpublished studies were not considered. The authors of individual articles were not contacted.

2.1. Study selection

We included studies that reported the following outcomes after IUD insertion: pain, bleeding, infection, other adverse events or expulsion. One study included displacement as an outcome; however, the authors did not define displacement in their study [6]. We were specifically interested in comparisons of IUD insertion immediately after abortion vs. no IUD insertion, postabortion insertion vs. IUD insertion at a time not associated with pregnancy, IUD insertion immediately postabortion compared with delayed insertion after abortion, IUD insertion immediately after first- compared with second-trimester abortion and copper IUD insertion compared with hormone-releasing IUD insertion immediately after abortion. Most studies in the group “insertion at a time not associated with pregnancy” did not clearly define the timing of insertion. The insertions at a time not associated with pregnancy group contains studies that described insertion timing as “post-menstrual” [6–8] or “inter menstrual” [9], described women as “non-pregnant” [10] or stated that insertion occurred after “3–5 days of normal menstruation” [11]. The delayed-insertion group contained studies that described insertions as delayed [12–14], as well as studies that described insertions as “interval” and did not otherwise specify timing [15]. An interval insertion is defined as an IUD insertion that takes place more than 4 weeks after delivery. One study's comparison group contained both delayed postabortion insertions and all other IUD insertions; we included this study in the “insertion at a time not associated with pregnancy” group [16].

We excluded studies that lacked a comparison group. We also excluded studies that did not include at least one group of women using copper IUDs or hormone-releasing IUDs (e.g., studies that only included Lippes loop or Gynefix were excluded). In addition, we excluded studies that reported only demographic factors or overall continuation associated with IUD insertion immediately postabortion.

2.2. Study quality assessment

All authors participated in summarizing and systematically assessing the evidence using standard abstraction forms [17].

2.3. Data synthesis

We evaluated safety outcomes, including pain, bleeding, perforation and infection, as well as outcomes related to effectiveness, e.g., expulsion. We did not calculate a summary statistic for complication rates or a summary graph because of the limited number and the heterogeneity of the studies.

3. Results

The search strategy identified 990 articles. Of these, 19 studies met our inclusion criteria [6–16,18–25]. Most studies used a prospective cohort design [6,7,9–11,14–16,18–20,24], although seven randomized controlled trials (RCTs) were included [8,12,13,21–23,25]. Two studies examined women with spontaneous abortions [14,21], and the rest of the studies included women with induced abortion; none of the studies examined IUD insertion after medical abortion. Both of the studies that included women with spontaneous abortion specified that IUD insertion occurred after evacuation of uterine contents.

3.1. IUD insertion immediately postabortion compared with no IUD insertion

In five studies, data on women who had immediate postabortion IUD insertion were compared with data on women who did not have an IUD inserted postabortion (Table 1) [10,11,18–20]. In two cohort studies, both with small sample sizes and short follow-up periods, the outcomes in women with copper IUD insertion immediately postabortion were compared with outcomes in women with no IUD insertion postabortion. One of these studies, which did not use statistical testing, found that the IUD users had a similar amount of bleeding, fever, pelvic infection and overall complications compared with non-IUD users during the first 8 weeks after abortion [18]. The second study found no statistically significant differences in reports of bleeding or pain (as a composite outcome), or pelvic inflammatory disease (PID) between copper IUD users and women who did not use IUDs [19]. Neither of these studies documented what, if any, form of contraception was used by those who did not have an IUD.

Two cohort studies examined women receiving a copper IUD immediately postabortion and women who started another form of contraception postabortion [10,11]. Neither of these studies reported any statistical tests, and neither specified which methods of contraception were used in the control group. Both of the studies also examined a third group of women who had a postmenstrual IUD insertion without abortion, which will be discussed later in this review. In both studies, pain and infection were not more frequent in the IUD users than in the comparison group. One study found a similar amount of bleeding between groups [11], and the other found a greater amount of bleeding in the IUD users [10].

A final cohort study examined three groups of women choosing contraception after first-trimester abortion: 50 chose a levonorgestrel (LNG)-IUD, 50 chose Norplant and 50 chose either coitus interruptus or abstinence [20]. At 2 weeks of follow-up, the LNG-IUD group had a greater mean number of bleeding days than the Norplant and the withdrawal/abstinence groups ($p<.05$). At 6 weeks, the LNG-IUD group had an increased number of spotting days compared with the other groups ($p<.05$).

3.2. Immediate postabortion IUD insertion compared with IUD insertion at a time not associated with pregnancy

Our search found seven studies that compared postabortion IUD insertion with IUD insertion at a time not associated with pregnancy (Table 2) [6–11,16]. In most of these studies, the authors did not provide a detailed description of the timing of the insertions in the comparison group; generally, they described the timing of IUD insertion as "post-menstrual." Two cohort studies [6,7], which reported removals following complications, examined one group of women with postabortion copper IUD insertion and another group with postmenstrual insertion. One study followed women for 6 months [7], and the other followed women for 5 years [6]. One of these studies found more removals for medical reasons in the postabortion group (13.2% vs. 7.1%) [7], and the other found fewer removals for bleeding/pain in the postabortion group (19.3% vs. 28.4%) [6]. One of these studies found more expulsions in the postabortion group (5.8% postabortion vs. 2.9% postmenstrual [7]), and the other found a similar number of expulsions between groups (4.93% postabortion vs. 5.31% postmenstrual [6]). Neither of these studies reported any statistical testing.

Three cohort studies examined outcomes in women with postabortion copper IUD insertion vs. those with postmenstrual copper IUD insertion; none of these studies reported statistical testing [9–11]. All three studies reported similar amounts of pain and expulsions between groups. Two of the studies reported similar bleeding outcomes, defined as "amount of bleeding" [11] and "bleeding disturbances" [9] between groups, and one study reported a greater amount of bleeding among women with immediate postabortion insertion [10]. Using the WHO criteria, one of these studies reported the occurrence of PID and found that, 3 months after insertion, the rate of PID was 5.8% [95% confidence interval (CI) 2%–13%] in the postabortion group and 0% (95% CI 0%–4%) in the postmenstrual group [10].

Another cohort study reported no differences in pain and infection between women who had postabortion insertion of either Copper T380a or LNG-IUDs and women in the comparison group (delayed postabortion insertions and all other IUD insertions), although no statistical testing was reported [16]. Expulsion rates during the entire 3-year study period were 0.7% for women with interval insertions and 2.1% for women receiving IUDs postabortion.

The final study randomized women within postabortion and postmenstrual groups to either copper (Nova-T) or LNG-IUDs and collected data from bleeding diaries used by women to report bleeding patterns for 1 year after insertion [8]. Although no statistical tests were reported, among women who received a copper IUD, slightly more days of spotting were reported in the first month in the postabortion group, but the findings were similar thereafter. Among women who received an LNG-IUD, there were slightly fewer bleeding days in the postabortion group compared with the postmenstrual group during the first 6 months of follow-up, but the results were similar thereafter.

3.3. IUD insertion immediately postabortion compared with insertion delayed by variable time period of ≥2 weeks

In four studies, the outcomes of copper IUD insertion in women immediately postabortion were compared with outcomes in women for whom insertion was delayed by a variety of time periods that were at least 2 weeks after abortion (Table 3) [12–15]. This group of studies includes some that explicitly state that insertions were delayed after abortion by a specific period of time, as well as studies that

Table 1
Review articles comparing risk of complications associated with IUD (Cu or LNG) insertion immediately postabortion vs. no IUD insertion

Author, year [ref. no.]/ location/sources of support	IUD type	Study design	Population	Outcome	Results	Strengths	Weaknesses
Timonen and Luukkainen, 1974 [18]/ Finland/ International Committee on Contraceptive Research of the Population Council and the Ford Foundation	CuT-200	Prospective cohort study Follow-up: 3 weeks, and if complications arose All patients received 800,000 U of penicillin three times a day for 5 days	154 women with postabortion IUD insertion, mean gestational age=10.5 weeks 144 women having an abortion without IUD insertion, mean gestational age=10.9 weeks	Bleeding, fever, pelvic infection	Complications, readmission to the hospital with at least one complication within 8 weeks after abortion *n* (%) Control group (*n*=144) / IUD group (*n*=154) Bleeding: 2 (1.4) / 1 (0.6) Fever: 10 (6.9) / 8 (5.2) Pelvic infection diagnosed by palpation: 11 (7.6) / 7 (4.5)	Clear reporting of outcome measures	No statistical analyses Differences in age and parity in two groups (26.2 vs. 28.7 and 1.2 vs. 1.7 in comparison vs. IUD groups, respectively)
Tuveng et al., 1986 [19]/ Norway/ not stated	Nova-T, MLCu250, MLCu375	Prospective cohort study Follow-up: contacted by letter after 1 year and were instructed to return to the hospital if complications arose	229 women with IUD insertion immediately after 1st-trimester abortion (ages 17–45) 594 women with 1st-trimester abortion without IUD insertion (ages 14–46) Before abortion, all patients were tested for gonorrhea and chlamydia; antibiotic was not given for prophylaxis	Bleeding, pain, infection, expulsion	Diagnosis at readmission, among women who returned to the hospital in the 8 weeks after abortion *n* (%) IUD Users (*n*=11) / Nonusers (*n*=34) PID: 3 (27) / 8 (24) Bleeding/pain: 8 (73) / 26 (76) Not statistically significant at p<.05		Data were collected only on women who elected to return to the hospital. No routine follow-up took place
Bitsch et al., 1990 [10]/ Denmark/ not stated	Nova-T	Prospective cohort study Follow-up: 1 week and 3 months, and if complications arose, for 12 months after insertion	Study group: 86 women who received an IUD immediately after 1st-trimester abortion Comparison groups: Control I: 95 women who started another form of contraception (type not specified) immediately after 1st-trimester abortion Control II: 83 women (not pregnant) who received an IUD Postabortion participants were screened and treated for gonorrhea and chlamydia prior to abortion; antibiotic prophylaxis was not given	PID, intensity of pain and bleeding after abortion and/or IUD insertion Four-level scale for pain and bleeding, compared with usual menstruation: None=0 Less=1 Equal=2 More=3 compared to usual menstruation	PID within 3 months after beginning new method of contraception *n* (%) Contraception / Suspected PID / PID* Study group: 8 (9.3) / 5 (5.8) Control 1: 9 (9.5) / 3 (3.2) Control II: 3 (3.6) / 0 (0) *Confirmed by WHO definition. Intensity and duration of pain and bleeding following operation and/or insertion of IUD Pain Intensity 0 / 1 / 2 / 3 / Duration (days) Study group: 27 / 24 / 22 / 13 / 3 Control 1: 31 / 32 / 29 / 3 / 2 Control II: 24 / 32 / 21 / 6 / 2 Bleeding Amount 0 / 1 / 2 / 3 / Duration (days) Study group: 05 / 32 / 35 / 14 / 4 Control 1: 16 / 44 / 35 / 00 / 3 Control II: 27 / 41 / 12 / 03 / 3	Follow-up was similar and relatively high in all three groups (>80%)	No statistical analyses were conducted, and no assessment of confounders was done. No information regarding STI screening, treatment or antibiotic use was provided for women with postmenstrual insertion (Control II)

Aral, 1993 [11]/ Turkey/ not stated	Cu-T380a	Prospective cohort study Follow-up: 1 week, after 1st menstrual period and after 3 months	Study group: 110 women who had an IUD inserted after 1st-trimester abortion Comparison groups: Group 1: 90 women who chose another form of contraception after 1st-trimester abortion Group 2: 100 women with postmenstrual IUD insertion (no abortion) Postabortion women who received prophylactic antibiotics were excluded	PID, intensity of pain and bleeding after abortion and/or IUD insertion, expulsion Four-level scale for pain and bleeding: Nil=0 Less=1 Same=2 More=3 compared with usual menstruation	PID within 3 months of abortion and/or insertion of IUD Suspected PID / PID* Study group (*n*=110): 3 / 0 Group 1 (*n*=90): 1 / 1 Group 2 (*n*=100): 0 / 0 *Defined by WHO criteria. Intensity of pain after abortion and/or IUD insertion Pain intensity: 0 / 1 / 2 / 3 Study group (*n*=110): 38 / 24 / 35 / 13 Group 1 (*n*=90): 33 / 20 / 29 / 8 Group 2 (*n*=100): 35 / 22 / 36 / 7 (Timing for pain and bleeding results not reported) Amount of bleeding after abortion and/or IUD insertion Amount of bleeding: 0 / 1 / 2 / 3 Study group (*n*=110): 0 / 37 / 51 / 22 Group 1 (*n*=90): 0 / 34 / 40 / 16 Group 2 (*n*=100): 0 / 18 / 62 / 20	Follow-up included physical and gynecological exam, and a questionnaire about bleeding, pain, fever, discharge and expulsion Women who were postabortion and received prophylactic antibiotics were excluded	Small sample sizes, no reported statistical tests, no adjustment for confounders No information on follow-up rates No information on STI screening or treatment
Ortayli et al., 2001 [20]/ Turkey/ not stated. Analgesics provided by Nobel Co. in Istanbul, Turkey.	LNG-IUD	Prospective cohort study Follow-up: 2 and 6 weeks, 6 months and 1 year after abortion	Women with 1st-trimester abortion 50 women with postabortion LNG-IUD insertion 50 women who used withdrawal or no contraception after abortion 50 women who used Norplant after abortion	Bleeding, spotting, pads used, days with pain, painkillers, hematocrit levels and change in BP	Complications at the 2nd week of follow-up Mean±SD LNG-IUD / Norplant / Withdrawal/ abstinence Bleeding days: 8.8±3.7 / 5.0±3.2* / 6.2±4.6 Spotting days: 4.2±3.4 / 3.4±3.2 / 4.4±4.5 Days with pain: 3.9±4.3 / 2.3±3.2 / 3.9±13.0 Painkillers: 3.7±5.8 / 2.7±2.7 / 4.2±13.0 *Significant at p<.05. Complications at the 6th week of follow-up Mean±SD LNG-IUD / Norplant / Withdrawal/ abstinence Bleeding days: 5.0±5.0 / 6.3±5.7 / 5.7±6.7 Spotting days: 6.8±5.2 / 5.7±6.6 / 2.5±3.2* Days with pain: 1.5±3.1 / 1.1±3.2 / 0.6±1.5 Painkillers: 0.4±1.1 / 0.3±1.3 / 0.6±1.6 Hematocrit: 37.4±5.0 / 37.1±4.8 / 36.6±4.2 Blood pressure Systolic: 111.0±9.9 / 111.9±10.2 / 111.9±9.4 Diastolic: 69.9±8.4 / 69.1±7.6 / 1.3±8.8 *Significant at p<.05.	Study included many clinically relevant outcomes and two follow-up periods	Small sample size

Abbreviations: STI=sexually transmitted infection, BP=blood pressure.

Table 2
Review articles examining risk of complications with IUD (Cu or LNG) insertion immediately postabortion vs. insertion at a time not associated with pregnancy

Author, year/location/ sources of support	IUD type	Study design	Population	Outcome	Results	Strengths	Weaknesses
Gupta and Devi, 1975 [7]/ India/not stated	Cu-T200	Prospective cohort study Postabortion group follow-up: 7 days and 1, 3 and 6 months Postmenstrual group follow-up: 1, 3 and 6 months	124 women with IUD insertion postabortion, all but 1 woman had abortions at <12 weeks of gestation 100 women with postmenstrual IUD insertion	Expulsion, removal	**Net cumulative event rates (%) per 100 users by type of termination, after 6 months** Postabortion (*n*=124) / Postmenstrual (*n*=100) Expulsions: 5.83 (3.68*) / 2.9 Removals Medical reasons: 13.20 (6.78*) / 7.05 Personal reasons: 0 / – / 1.97 *Correction for incomplete abortion.		No statistical analyses performed
Skouby, 1976 [9]/ Denmark/ Cu-T 200 from Population Council	Cu-T200	Prospective cohort study Postabortion follow-up: every 3 months for 1 year	71 women with IUD insertion after 1st-trimester abortion 78 with postmenstrual IUD insertion	Expulsion, removal-reasons for removal include: bleeding disturbances (prolonged, heavy or very irregular bleeding), pain, adnexal inflammation, discharge	**Reasons for termination after 3 months* per 100 women** *n* (%) Postabortion *n*=71 / Postmenstrual *n*=78 Expulsion: 3 (4) / 2 (3) Removal: 7 (10) / 7 (9)** *Follow-up time uncertain for postmenstrual group. **Reasons for removal after 3 months* per 100 women** *n* (%) Postabortion *n*=71 / Postmenstrual *n*=78 Bleeding disturbances: 2 (3) / 2 (3) Pain: 1 (1) / 1 (1) Adnexal inflammation: 4 (6) / 2 (3) Vaginal discharge: 0 / 2 (3) *Follow-up time uncertain for postmenstrual group. **Adding the percentages in the removal table results in a value of 10 (rather than 9) due to rounding.		No discussion of loss to follow-up or follow-up procedures for postmenstrual women Nonspecific reporting of bleeding outcomes No statistical analysis
Zhang, 1980 [6]/ China/ not stated	Cu-T200	Prospective cohort study Follow-up: 1, 3 and 6 months, and yearly for 5 years	487 women with postabortion IUD insertion, gestational age not specified 264 who received postmenstrual IUD insertion 105 women who received an IUD while nursing	Expulsion, displacement, removal for bleeding or pain	**Reasons for termination** *n* (%) Postabortion (*n*=487) / Postmenstrual (*n*=264) / Nursing period (*n*=105) Expulsion: 24 (4.93) / 14 (5.31) / 11 (10.48) Displacement*: 5 (1.03) / 7 (2.65) / 4 (3.81) Removal for medical reasons, e.g., bleeding/pain: 94 (19.30) / 75 (28.41) / 23 (21.90) *Displacement was not defined in the article.	Large sample size	No statistical analyses

Bitsch et al., 1990 [10]/ Denmark/ not stated	Nova-T	Prospective cohort study Follow-up: 1 and 3 months; further follow-up if admitted to hospital for gynecologic reasons in the following 12 months	Study group: 86 women who received an IUD immediately after 1st-trimester abortion Control I: 95 women who started another form of contraception immediately after 1st-trimester abortion Control II: 83 women (not pregnant) who received postmenstrual IUD insertion Postabortion participants were screened and treated for gonorrhea and chlamydia prior to abortion; antibiotic prophylaxis was not given	PID, intensity of pain and bleeding after abortion and/or IUD insertion, expulsion Four-level scale for pain and bleeding:* None=0 Less=1 Equal=2 More=3 *Compared with usual menstruation	**PID within 3 months of beginning new method of contraception** Contraception *n* (%) Suspected PID / PID* Study group (*n*=86): 8 (9.3) / 5 (5.8) Control 1 (*n*=95): 9 (9.5) / 3 (3.2) Control II (*n*=83): 3 (3.6) / 0 (0) *Confirmed using WHO criteria. **Intensity and duration of pain and bleeding following operation and/or insertion of IUD** Pain intensity: Pain duration *n* with level (0 / 1 / 2 / 3); No. of days Study group: 27 / 24 / 22 / 13; 3 Control 1: 31 / 32 / 29 / 3; 2 Control II: 24 / 32 / 21 / 6; 2 Bleeding amount *n* with level (0 / 1 / 2 / 3); Duration (days) Study group: 5 / 32 / 35 / 14; 4 Control 1: 16 / 44 / 35 / –; 3 Control II: 27 / 41 / 12 / 3; 3 There were two expulsions in the study group (2.3%) and one expulsion in control group II (1.2%) (percentages calculated by author).	Follow-up was similar and relatively high in all three groups (>80%)	No statistical analyses were conducted, and no assessment of confounders was done. No information regarding STI screening, treatment or antibiotic use was provided for women with postmenstrual insertion (Control II).
Aral, 1993 [11]/ Turkey/ not stated	Cu-T380A	Prospective cohort study Follow up: 1 week, after 1st menstrual period and at 3 months	Study group: 110 women who had an IUD inserted after 1st-trimester abortion Group 1: 90 women who chose another form of contraception after 1st-trimester abortion Group 2: 100 women with postmenstrual IUD insertion (no abortion) Postabortion women who received prophylactic antibiotics were excluded	PID, intensity of pain and bleeding after abortion and/or IUD insertion, expulsion Four-level scale for pain and bleeding*: Nil=0 Less=1 Same=2 More=3 *Compared with usual menstruation	**Number of women with PID within 3 months after abortion and/or insertion of IUD** Suspected PID / PID* Study group (*n*=110): 3 / 0 Group 1 (*n*=90): 1 / 1 Group 2 (*n*=100): 0 / 0 *Defined by WHO criteria. **Intensity of pain after abortion and/or IUD insertion** Pain intensity: 0 / 1 / 2 / 3 Study group (*n*=100): 38 / 24 / 35 / 13 Group 1 (*n*=90): 33 / 20 / 29 / 8 Group 2 (*n*=100): 35 / 22 / 36 / 7 Timing for pain and bleeding results not reported. **Amount of bleeding after abortion and/or IUD insertion** Amount of bleeding: 0 / 1 / 2 / 3 Study group (*n*=100): 0 / 37 / 51 / 22 Group 1 (*n*=90): 0 / 34 / 40 / 16 Group 2 (*n*=100): 0 / 18 / 62 / 20 There were two expulsions in the study group and one expulsion in control group 2 within the 1st month.		Small sample sizes, no reported statistical tests, no adjustment for confounders No information on follow-up rates No information on STI screening
Suvisaari and Lahteenmaki,	Nova-T, LNG-IUD	Randomized multicenter trial (women were not randomized	299 healthy women aged 18–38 years, 95 of whom	Bleeding patterns recorded in diaries	Copper IUD group: There were more spotting days in the postabortion group than in the postmenstrual group in the 1st month, but rates	Detailed data on symptom of high	Relatively small sample size for women who

(*continued on next page*)

Table 2 (*continued*)

<table>
<tr><th>Author, year/location/ sources of support</th><th>IUD type</th><th>Study design</th><th>Population</th><th>Outcome</th><th>Results</th><th>Strengths</th><th>Weaknesses</th></tr>
<tr><td>1996 [8]/ Finland/ not stated</td><td></td><td>by the comparison of interest) Randomization was performed using a set of numbered envelopes prepared centrally for all participating clinics; there was no blinding</td><td>received an IUD after 1st-trimester abortion and 204 who received an IUD postmenstruation Subjects were randomized to receive either a Cu or LNG-IUD at a ratio of 1:2.</td><td></td><td>were similar thereafter.
LNG-IUD group: The number of bleeding days was slightly less in the postabortion group compared to the postmenstrual group during the 1st 6 months of follow-up, but rates were similar thereafter.</td><td>importance for women</td><td>had IUDs inserted postabortion
No statistical analysis for differences in timing of insertion</td></tr>
<tr><td>Goodman et al., 2008 [16]/ USA/FEI Women's Health (now DuraMed), producers of Paraguard T380A</td><td>Cu-T380A, LNG-IUD</td><td>Prospective cohort study
Total study period was Nov 2002–Oct 2005
Period 1: Nov 2002–Feb 2004
Period 2: Mar 2004–Apr 2005
Period 3: May–Oct 2005</td><td>2172 women who received IUDs (1248 copper and 924 LNG-IUDs);
1493 postmenstrual and 679 postabortion insertions
All abortions occurred before 18 weeks of pregnancy
Period 1: control period
Period 2: Postabortion IUD patients were given either prophylactic or treatment dose antibiotics depending on whether their STI test results were known.
Period 3: No prophylactic antibiotics were given</td><td>Complications experienced during follow-up including expulsion, infection, failure, displaced strings, syncope, pain</td><td>Complications experienced during follow-up
Study period 2
Insertion types: n (%)
Postmenstrual (n=600) / Postabortion (n=390)
Expulsion 5 (0.8) / 12 (3.1)
Infection 2 (0.3) / 4 (1.0)
Failure 2 (0.3) / 0
Displaced strings 1 (0.2) / 1 (0.3)
Syncope 0 / 0
Pain 1 (0.2) / 0
Study period 3
Insertion types: n (%)
Postmenstrual (n=443) / Postabortion (n=289)
Expulsion 4 (0.9) / 2 (0.7)
Infection 0 / 1 (0.3)
Failure 0 / 0
Displaced strings 0 / 0
Syncope 1(0.2) / 0
Pain 0 / 1 (0.3)
Expulsion rates during the entire study period were 0.7% in the interval group and 2.1% in the postabortion group.</td><td>Large sample size</td><td>Measurement of outcomes is likely to be biased because of passive reporting through computerized adverse event collection and reporting system. Women may have gone elsewhere for complications, or complications may not have been reported in database.</td></tr>
</table>

describe insertions as interval but do not otherwise specify the timing of insertion.

One study examined 326 women scheduled for abortion and randomized to receive a Copper T380A IUD either immediately after abortion (n=226) or during the first menstrual cycle after abortion (n=100) [13]. No details on the randomization scheme or allocation were provided. The authors did not find statistically significant differences in the percent of women who experienced abnormal bleeding or expulsion at 2 and 8 weeks after insertion.

Three cohort studies compared the outcomes of women with immediate postabortion copper IUD insertion and women with delayed IUD insertion after abortion. The first study found no statistically significant difference in the number of days of mild, moderate and severe bleeding or pain between groups [14]. This study also found no difference in expulsions between groups; however, they did not present statistical tests for this comparison. Of the other two cohort studies without statistical testing, one found a similar duration of bleeding, fewer removals for bleeding/pain and more expulsions in the immediate insertion group [12]. The other found similar expulsion rates between groups, but more pain and more complaints of dysmenorrhea and menorrhagia in the immediate insertion group [15].

3.4. IUD insertion following first-trimester abortion compared with second-trimester abortion, and early compared with late first-trimester IUD insertions

Two RCTs and two cohort studies examined differences in complication rates between women receiving IUDs following first-trimester abortion and those receiving IUDs following second-trimester abortion (Table 4) [16,21,22,24]. In addition, one of these studies specifically compared complications between women receiving IUDs following early first- trimester abortions compared with late first-trimester abortion. Definitions of the first and second trimester differed between the studies.

A study of women undergoing induced abortion enrolled almost 800 women in each IUD group who were randomized to Lippes loop D, Cu-T220C or Copper 7 IUDs, with insertion occurring immediately after uterine evacuation [22]. Women receiving a Copper 7 IUD after an early first-trimester abortion (<9 weeks) were more likely to have the IUD removed due to pain compared with women receiving an IUD after a later first-trimester abortion (9–12 weeks) (3.8% vs. 0.9%, p<.05). In addition, later first-trimester insertions had higher expulsion rates (6.5% for the Cu-T220C IUD and 18.6% for the Copper 7) than early first-trimester insertions (2.4% for the Cu-T220C and 4.3% for the Copper 7). Both of these differences were statistically significant (p<.05). The cumulative net probability of expulsion was up to 10 times greater for IUDs inserted after second-trimester (defined as ≥13 weeks) abortions than for those inserted after first-trimester abortions (defined as <13 weeks) [22]. For example, the expulsion rate at 120 days after IUD insertion among women who received the Cu-T220C IUD was higher among women who had second-trimester abortions than women who had first-trimester abortions (19.5% vs. 1.9%, p<.05).

A study of women with spontaneous abortion enrolled approximately 350 women in each IUD group who had been admitted to one of the study hospitals for treatment of spontaneous abortion and who were randomized into three IUD groups (Lippes loop D, Cu-T220C and Copper 7) [21]. Cumulative net probabilities of removal for pain or bleeding were greater among women with second-trimester abortions (13–20 weeks of gestation) compared with first-trimester abortions (<13 weeks of gestation); however, these differences were not statistically significant. At both 120 and 750 days after abortion, there were more expulsions in the second-trimester group than in the first-trimester group. The difference in expulsions, however, was statistically significant only at 750 days of follow-up in the Cu-T220C group (10.2% in the first-trimester group and 29.3% in the second-trimester group; p<.05).

A cohort study examined 256 women who chose to receive either a Copper T380A IUD or an LNG-IUD following induced abortion. Of the 256 women, 123 had first-trimester abortions (<14 weeks) and 133 had second-trimester abortions (≥14 weeks) [24]. The median time to follow-up was 8 weeks, with a range from 7 to 544 days. There were no statistically significant differences in the number of women who developed PID or the number of expulsions between groups.

Another cohort study, which is described in more detail in an earlier section of this review, reported differences in expulsions between first-trimester (<12 weeks) and second-trimester (≥12 weeks) abortions among women with insertion of either a Copper T380A or an LNG-IUD [16]. Expulsions were more frequent following second-trimester abortions (7.0% vs. 1.6%, p=.02).

3.5. Copper compared with hormone-releasing IUDs

Three RCTs compared postabortion insertion of copper IUDs and hormone-releasing IUDs [8,23,25]. One trial randomized 95 women undergoing first-trimester abortion to immediate insertion of either a copper IUD (Nova T; n=32) or LNG-IUD (n=63) (Table 5) [8]. The number of bleeding/spotting days was slightly higher in the LNG-IUD group than in the copper IUD group during the first 90 days of follow-up, but bleeding and spotting in the LNG-IUD group decreased rapidly over time. These differences were not significant in the first 90 days, but there was a statistically significant increase in bleeding/spotting days in the copper IUD group during the rest of the yearlong follow-up period (p values not reported).

Another trial randomized women following induced abortion to insertion of either a copper IUD or a progesterone-releasing IUD, the ALZA T (ALZA T IPCS 52). There were 1032 Cu-T220 insertions, 1011 Multiload

Table 3
Review articles examining risk of complications with IUD (Cu or LNG) insertion immediately postabortion vs. delayed by a variable period of time

Author, year/ location/sources of support	IUD type	Study design	Population	Outcome	Results	Strengths	Weaknesses
Gillett et al., 1980 [12]/ Canada/ not stated	Cu 7	Randomized clinical trial Follow up: 1, 4 and 12 months after insertion	144 women with IUD insertion immediately after 1st-trimester abortion 63 women who returned 1 month after abortion for insertion Abortions were completed through the use of vacuum aspiration. No antibiotics were given. While the authors do not report that the exam prior to insertion was used to screen for infection or PID, in one case, insertion was cancelled due to postabortion pelvic infection	Bleeding, cramps, expulsion, removal for bleeding, pain, or other medical reason, PID	**Cramps and bleeding after immediate and delayed postabortion insertion of IUD at 1 month** Duration days (±SEM) of bleeding after insertion Immediate: Bleeding 13.5±0.90; Delayed: Bleeding 10.9±1.81 Amount of bleeding after insertion *n* (%) None: 2 (2.1); 1 (2.4) Spotting: 35 (36.1); 8 (19.5) Menstrual-like flow: 46 (47.4); 19 (46.3) Excessive: 7 (7.2); 5 (12.2) Cramps after insertion Mild: 55 (56.7); 17 (41.4) Moderate: 11 (11.3); 5 (12.2) Severe: 7 (7.2); 5 (12.2) **Net cumulative termination rates** Immediate insertion: 1 month / 1 year; Delayed insertion: 1 month / 1 year Expulsion: 6.6 / 15.4; 0.0 / 2.8 Removal For bleeding/pain: 1.8 / 14.9; 10.3 / 24.9 Other medical reasons: 2.5 / 4.8; 0.0 / 2.9 Three IUDs in the immediate insertion group were removed because of PID, and there were no cases of PID in the delayed insertion group.		No statistical analyses High loss to follow-up after 1 year, 31.9% in the immediate insertion group and 42.9% in the delayed insertion group 43 women assigned to the delayed insertion group failed to return for insertion. No discussion of randomization process
Das, 1995 [15]/India/ not stated	Cu-T200	Prospective cohort study Follow-up: 1, 3 and 6 months and 1 year	Group B: 60 women with postabortion IUD insertion following "early" termination of pregnancy (exact gestational age not specified) Group A: 100 cases of interval IUD insertion No information on screening for PID or antibiotic use	Menstrual complaints and nonmenstrual complaints, reasons for removal, expulsion	**Incidence of menstrual complaints at 1 and 3 months** Complaint: % 1 month (A / B); % 3 months (A / B) Menorrhagia: 8.0 / 8.3; 5.0 / 10.0 Scanty menses: 2.0 / 0; 2.0 / 0 Amenorrhoea: 0 / 0; 0 / 0 Irregular menses: 4.0 / 1.6; 3.0 / 1.6 Intermenstrual spotting: 5.0 / 3.3; 4.0 / 3.3 Dysmenorrhea: 7.0 / 20.0; 7.0 / 15.0 **Incidence of nonmenstrual complaints at 1 and 3 months** Complaint: % 1 month (A / B); % 3 months (A / B) Abdominal pain and backache: 16.0 / 30.0; 7.0 / 13.3		Small sample sizes, no reported statistical tests Exact gestational age not specified

Number of cases requiring IUD removal by cause

Cause of removal	Number of cases and (%) Group A	Group B
Menstrual disorder	2 (2)	2 (3.3)
Pelvic inflammation	0 (0)	0 (0)
Excessive discharge	2 (2)	1 (1.6)
Desire for pregnancy	7 (7)	2 (3.3)

Expulsion occurred in one case in group A within 1 month and 2 cases in group B within 3 months.

Göcmen et al., 2002 [13]/ Turkey/ not stated. Analgesics provided by Nobel Co. in Istanbul, Turkey	Cu-T380A	Randomized clinical trial Follow-up: 2 and 8 weeks	326 women with an abortion at less than 8 weeks of pregnancy Group 1: 226 with immediate postabortion IUD insertion Group 2: 100 with IUD insertion during the 1st menstrual cycle after abortion No antibiotics were given	Abnormal bleeding, expulsion, PID, perforation	**Complications in immediate and postmenstrual insertion groups**					No information on method of sequence generation, allocation concealment or blinding No information on PID diagnosis criteria

	Group 1		Group 2	
	n	%	*n*	%
Abnormal bleeding	24	10.62	6	6
At 2 weeks	18	7.96	4	4
At 8 weeks	6	2.66	2	2
Expulsion	16	7.08	8	8
At 2 weeks	10	4.42	5	5
At 8 weeks	6	2.66	3	3
PID	1	0.44	0	0
Perforation	0	0	0	0

None of the differences were significant at $p \leq .05$.

El-Tagy et al., 2003 [14]/ Egypt/ Pathfinder, FHI with funds from USAID	Cu-T380A	Prospective cohort study Follow-up: 2, 6 and 10 weeks Pelvic exam at each follow-up	300 women ages 18–40 admitted to two hospitals with 1st-trimester inevitable, incomplete or missed abortions 183 women with immediate IUD insertion 117 women with IUD insertion after 2 weeks Postoperative antibiotics were prescribed in all cases (three 500-mg oral doses of penicillin and one 1000-mg suppository of metronidazole daily for 4 days)	Bleeding patterns as measured by bleeding diaries, expulsion, pain, perforation and PID	**Bleeding reported at the 2-week follow-up visit**			Expulsion evaluated several times during follow-up	Possible selection bias because results available only for women who agreed to return for follow-up

Severity	Immediate	Delayed (Mean days)	p Value
Mild	3.5	3.1	.16
Moderate	2.7	2.3	.08
Severe	3.0	1.4	.09

Pain and expulsion reported during 2-, 6- and 10-week follow-up

	Immediate %	Delayed %	p Value
Pain			
2 weeks	13.9	8.0	.24
6 weeks	18.1	21.3	.76
10 weeks	9.5	17.5	.12
Expulsion			
2 weeks	3.2	2.3	
6 weeks	1.9	1.6	
10 weeks	0	2.5	

No pregnancies, perforations or PIDs were recorded in either group.

Table 4
Review articles examining risk of complications with IUD (Cu or LNG) insertion immediately after first- vs. second-trimester abortion

Author, year/ location/sources of support	IUD type	Study design	Population	Outcome	Results	Strengths	Weaknesses
WHO, 1983 [22]/ Cuba, Yugoslavia, UK, Zambia, India, South Korea, Singapore, Hungary/ not stated	TCu-220C, Lippes loop, CuT-7	Randomized clinical trial (women were not randomized by the comparison of interest) conducted in eight centers Follow-up: 6 weeks, 3 and 6 months, and 1 and 2 years after IUD insertion Assignment to IUD type using sealed envelopes using a computer-generated random table There is no reporting of blinding	790 TCu-220C users, 777 Lippes loop users, 773 Copper 7 users All IUDs were inserted immediately after abortion. 2250 1st-trimester insertions (<13 weeks) and 90 insertions between the 13th and 20th week of pregnancy Early 1st trimester defined as <9 weeks and late 1st trimester defined as 9–12 weeks In one of the eight centers, ampicillin 500 mg 4 times a day was routinely prescribed	Cumulative net probability of removal for pain or expulsion, by timing of abortion	Cumulative net probabilities (SE) of removals for pain at 390-day follow-up, by gestation of abortion TCu-220C: <9 weeks 2.3 (0.73); 9–12 weeks 5.5 (1.91) Copper 7*: <9 weeks 3.8 (0.97); 9–12 weeks 0.9 (0.85) *p<.05. Cumulative net probabilities (SE) of expulsion at 390-day follow-up, by gestation of abortion TCu-220C*: <9 weeks 2.4 (0.72); 9–12 weeks 6.5 (1.91) Copper 7*: <9 weeks 4.3 (0.94); 9–12 weeks 18.6 (3.40) *p<.05. Cumulative net probabilities (SE) of expulsions at 120-day follow-up, by gestation of abortion TCu-220C*: <13 weeks 1.9 (0.52); 13–20 weeks 19.5 (7.83) Copper 7*: <13 weeks 4.5 (0.82); 13–20 weeks 21.3 (7.76) *p<.05.	Clear diagnostic procedures for PID, and description of abortion procedures Large sample size	446 subjects lost to follow-up Abortion procedures were not standardized across centers.
WHO, 1983 [21]/Egypt, UK, Zambia, Philippines, Chile, Singapore/ not stated	TCu-220C, Lippes loop D, CuT-7	Randomized clinical trial (women were not randomized by the comparison of interest) conducted in six hospitals Follow-up: 6 weeks and 3, 6, 12 and 24 months after insertion Assignment to IUD type using sealed envelopes and a computer-generated random table There is no reporting of blinding	353 TCu-220C users, 349 Lippes loop users, 358 Copper 7 users IUDs inserted immediately following evacuation of the uterus after spontaneous abortion 841 women with 1st-trimester (<13 weeks) and 219 women with 2nd- trimester abortions (13–20 weeks)	Cumulative net probability of removal for pain and expulsion, by timing of abortion	Cumulative net probabilities (SE) of removals for pain/bleeding by gestation of abortion At 390 days: TCu-220C <13 weeks 6.2 (1.6); 13–20 weeks 16.9 (5.6); Copper 7 <13 weeks 3.7 (1.2); 13–20 weeks 8.7 (4.2) At 750 days: TCu-220C <13 weeks 8.7 (1.9); 13–20 weeks 19.7 (6.0); Copper 7 <13 weeks 8.5 (2.0); 13–20 weeks 14.7 (5.7) Cumulative net probabilities (SE) of expulsions, by gestation of abortion At 120 days: TCu-220C <13 weeks 6.1 (1.5); 13–20 weeks 13.5 (4.5); Copper 7 <13 weeks 9.2 (1.8); 13–20 weeks 13.4 (4.4)	Clear diagnostic procedures for PID Large sample size	

				At 750 days TCu-220C* 10.2 (2.0) Copper 7	 29.3 (7.5) 14.1 (2.2)	 16.7 (5.4)	

*p<.05.

Drey et al., 2009 [24]/USA/ anonymous (new evidence)	Cu-T380A, LNG-IUD	Prospective cohort study Follow-up: ≥6 weeks after insertion	256 women who had IUD insertion immediately postabortion 123 had abortions at <14 weeks, and 133 had abortions at ≥14 weeks. Patients received routine antibiotic prophylaxis after the abortion (two doses of doxycycline, 100 mg); patients diagnosed with gonorrhea or chlamydia, based on cervical swab collected at abortion, were treated with the appropriate antibiotics	Discontinuation and expulsion, suspected PID	Discontinuation and expulsion rates **Week*** <14 ≥14 p value Discontinuation 6.5 8.3 .6 Expulsion 0.8 3.0 .4 Reasons for discontinuation <14 ≥14 p value Suspected PID 2.4 3.0 1.0 *Values are percentages.		High loss to follow-up (49%) and variable follow-up period ranging from 7 to 544 days (median 8 weeks) Follow-up using phone calls and chart review
Goodman et al., 2008 [16]/USA/ FEI Women's Health (now DuraMed), producers of Paraguard T380A (new evidence)	Cu-T380A, LNG-IUD	Prospective cohort study Total study period: Nov 2002–Oct 2005 Period 1: Nov 2002–Feb 2004 Period 2: Mar 2004–Apr 2005 Period 3: May–Oct 2005	2172 women who received IUDs (1248 copper and 924 LNG-IUDs); 1493 postmenstrual and 679 postabortion insertions All abortions occurred before 18 weeks of pregnancy Period 1: control period Period 2: Postabortion IUD patients were given either prophylactic or treatment dose antibiotics depending on whether their STI test results were known Period 3: No prophylactic antibiotics were given	Expulsion	Expulsions were more frequent following 2nd-trimester abortions (7.0% vs. 1.6%, p=.02).	Large sample size	Measurement of outcomes is likely to be biased because of passive reporting through computerized adverse event collection and reporting system. Women may have gone elsewhere to obtain medical care for complications, or complications may not have been reported in database.

Abbreviation: SE=standard error.

Table 5
Review articles examining risk of complications with copper vs. hormone-releasing IUDs

Author, year/ location/sources of support	IUD type	Study design	Population	Outcome	Results	Strengths	Weaknesses
WHO, 1983 [23]/ Thailand, India/ Pakistan, USSR, Yugoslavia, USA, Zambia, Philippines, Canada, India, Brazil, Chile, South Korea, Singapore, Hungary, Japan, Tunisia/ Alza Corporation Multilan SA	ALZA T IPCS 52, TCu-220C, Multiload 250	Multicenter, two randomized clinical trials Follow-up: 3, 6, 12, 24 and 36 months Subjects were allocated to one of the two or three available devices by paper slips contained in concealed envelopes, indicating which device was to be inserted; the random tables used were computer-generated	985 women received the ALZA T IPCS 52. 1032 women received TCu-220C. 1011 women received Multiload 250. All IUD groups included postabortion insertions. Four women had pregnancies of >12 weeks; all others were ≤12 weeks. All women had a pelvic exam; those with any contraindications were excluded	Discontinuation rates for expulsion, PID and perforation, total medical removals (i.e., for pain, bleeding, PID and other) and removals for bleeding	Cumulative net probabilities of discontinuation at 390 days after insertion (%±SE) Copper n=2043 / ALZA T n=985 Expulsion 2.8±0.4 / 4.0±0.6 PID 0.4±0.2 / 0.2±0.2 Perforations 0 / 0 Significant differences between rates at 390 days after insertion (%±SE) Copper n=2043 / ALZA T n=985 / p Value Total Medical removals 9.6±.7 / 13.2±1.1 / <.01 Removals for bleeding 3.2±.4 / 5.0±.7 / <.05	Large sample size Randomization on IUD type, which is the comparison of interest	Limited number of statistical analyses
Suvisaari and Lahteenmaki, 1996 [8]/ Finland/ not stated	Nova-T, LNG-IUD	Randomized multicenter trial Randomization was performed using a set of numbered envelopes prepared centrally for all participating clinics; there	299 healthy women aged 18–38 years, 95 received an IUD after 1st-trimester abortion, and 204 received an IUD postmenstruation. Subjects were randomized to receive either a Cu or	Bleeding patterns recorded in diaries	The number of bleeding/spotting days was slightly higher in the LNG-IUD group than in the copper IUD group during the first 90 days of follow-up, but bleeding and spotting in the LNG-IUD group decreased rapidly over time. These differences were not significant in the first 90 days, but there was a statistically significant increase in	Detailed data on symptom of high importance for women Random allocation	Relatively small sample size for women who had IUDs inserted postabortion

		was no blinding Mean follow-up was 321 days for the Cu IUD group and 347 days for the LNG-IUD group.	LNG IUD at a ratio of 1:2. All subjects kept daily records of bleeding and spotting using a menstrual diary.		bleeding/spotting days in the Cu IUD during the rest of the yearlong follow-up period (p values not reported). The number of bleeding and spotting days during these periods was not reported.		
Pakarinen, 2003 [25]/ Finland/ not stated	Mirena, Nova-T	Randomized clinical trial Randomization was performed at a ratio of 2:1, using a set of numbered envelopes prepared centrally for all participating clinics; no blinding was used Follow-up: 5 years	438 subjects who were clients of family planning units 305 received a Mirena (LNG-IUD). 133 received Nova T. Both IUDs were inserted immediately following 1st-trimester induced abortion	Discontinuation rates for expulsion, bleeding, amenorrhea, pain, hormonal, PID and other medical reasons	Gross discontinuation rates per 100 women by device at 1 year Reasons for removal / Nova T (*n*=133) / Mirena (*n*=305) Expulsion 8.6 7.1 Bleeding 7.7 5.8 Amenorrhea 0 1.6 Pain 1.0 2.0 Hormonal 0 2.0 PID 1.1 0.7 Other medical 9.0 6.4 Gross discontinuation rates per 100 women by device at 5 years Reasons for removal / Nova T (*n*=133) / Mirena (*n*=305) / p Value Expulsion 15.4 10.5 .38 Bleeding 22.6 13.7 .12 Amenorrhea 0 2.1 .16 Pain 10.8 5.5 .44 Hormonal 3.9 15.9 .01 PID 2.3 0.7 .34 Other medical 25.4 14.8 .12	Large sample size Extended follow-up period	Bleeding and pain were not reported directly, and were only included as reasons for removal. PID diagnostic criteria unspecified

Table 6
Summary of findings on the risk of bleeding, pain and expulsion associated with IUD insertion after abortion

	Outcome		Comparison group		
	Postabortion vs. no IUD insertion (n=5)	Postabortion vs. at a time not associated with pregnancy (n=7)	Postabortion vs. delayed (n=4)	After first-trimester vs. second-trimester abortion (n=4)	Copper IUD vs. hormone-releasing IUD insertion immediately postabortion (n=3)
Bleeding	No difference* [11,18,19] More bleeding in IUD group* [10] More bleeding days at 2 weeks in LNG-IUD group [20]	No difference* [9,11] More bleeding in postabortion insertion group* [10] More spotting days in the postabortion group* [8] Fewer removals for bleeding/pain in the postabortion group* [6]	No difference [13,14] Similar duration of bleeding* [12] More complaints of dysmenorrhea and menorrhagia in the immediate group* [15]	No difference in removals for pain and bleeding [21]	No difference in discontinuation due to bleeding [25] More bleeding/spotting days in the Cu-IUD group [8] Fewer removals due to bleeding at 390 days in Cu-IUD group [23]
Pain	No difference* [10,11,19,20]	No difference* [9–11,16] Fewer removals for bleeding/pain in the postabortion group* [6]	No difference [14] Fewer removals for bleeding/pain in immediate group* [12] More pain in the immediate insertion group* [15]	More removals for pain in the early first-trimester group [22] No difference in removals for pain and bleeding [21]	No difference in discontinuation due to pain [25]
Expulsion		No difference* [6,9–11,16] More in immediate insertion group* [7]	No difference [13] No difference* [14,15] More in the immediate insertion group* [12]	No difference [24] More expulsions in later first-trimester group [22] and second-trimester abortion groups [16,21,22]	No difference [25] No difference [23]

n is the number of studies in each category.
* Study did not use statistical testing.

insertions and 985 ALZA T insertions in 9 WHO collaborating centers [23]. This study found lower rates of removal for bleeding at 390 days of follow-up for both copper IUD groups combined compared with the ALZA T group (3.2 vs. 5.0 per 100 women respectively; p<.05). There was also no statistically significant difference between the number of expulsions between the ALZA T and copper IUD groups.

In another trial, 438 subjects who underwent induced first-trimester abortions were randomized to immediate postabortion insertion of a copper (Nova-T; n=133) or LNG (Mirena; n=305) IUD [25]. The main outcome measures were cumulative discontinuation rates measured at 1, 3 and 5 years of use. Statistical testing was only performed using the 5-year data. At 5 years, there were no statistically significant differences in the rates of discontinuation for pain, PID, discontinuation due to bleeding problems and expulsion between groups.

4. Discussion

Overall, the evidence suggests that postabortion IUD insertion did not result in increased likelihood of adverse health outcomes, including pain, bleeding, infection or IUD removals (Table 6). Evidence comes from studies that compared IUD insertion with no insertion among women postabortion, postabortion insertion compared with postmenstrual insertion, immediate compared with delayed insertion, first- compared with second-trimester insertion and copper compared with hormone-releasing IUD insertion. Results from studies examining expulsion rates were not entirely consistent. Generally, studies did not report an increased risk of expulsion associated with immediate postabortion IUD insertion compared with IUD insertion at other times; however, the risk of expulsion was reported to be greater for insertions following second- vs. first-trimester abortions and for later first-trimester vs. earlier first-trimester abortions.

Studies that compared IUD insertion immediately postabortion vs. no IUD insertion after abortion found similar outcomes, including similar days of bleeding and rates of pain and infection between groups, although one study found a greater amount of bleeding in the immediate insertion group [10] and another study found a greater amount of bleeding days at 2 weeks among the LNG-IUD group [20]. Studies that compared immediate postabortion IUD insertion vs. insertion not associated with pregnancy did not find differences in duration of bleeding, number of pregnancies or expulsion. However, one study reported a greater amount of bleeding among women in the postabortion group [10]; another reported more removals for medical reasons [7] among women in the postabortion group; and the single RCT reported that women in the immediate copper IUD group had more days of spotting in the first month than the women in the postmenstrual group [8]. In addition, one study reported that more women in the postabortion group developed PID; however, the sample size in this study was small (n=86 postabortion, n=83 comparison group), and the authors did

not present any statistical tests [10]. Studies that compared immediate postabortion insertion and delayed postabortion insertion did not find any differences in bleeding or PID, although one study reported more pain, dysmenorrhea and menorrhagia at both 1 and 3 months [15] and another reported more expulsions in the immediate insertion group [12]. The only RCT that addressed this comparison did not find any statistically significant differences in abnormal bleeding or expulsions between groups [13]. Studies that compared copper IUD insertion immediately following first- vs. second-trimester abortion did not find statistically significant differences in removals for pain or bleeding [21]; however, both of the RCTs reported a statistically significant increase in expulsions among second-trimester insertion groups [21,22]. In addition, one of the RCTs found more expulsions among women with insertion after late vs. early first-trimester abortions [22]. Studies comparing copper vs. hormone-releasing IUDs did not find differences in expulsion rates. However, one study found more days of bleeding among the copper group [8], and another found higher rates of removal for bleeding in the progesterone-releasing IUD group [23].

Several methodological issues should be considered when examining this body of evidence. One issue is that, with the exception of the three large RCTs [21–23], most of the studies have very small sample sizes, which limit statistical precision. In addition, many of the older studies did not report any statistical testing. A second issue is the large loss to follow-up in several of the studies, which is likely to yield biased results [12,24]. This issue is particularly problematic in studies that compared immediate vs. delayed postabortion insertion. Passive reporting through computerized systems [16] or patient-initiated readmission to hospitals [18,24] may miss women with bleeding and pain after insertion. A third important issue is the inconsistency of outcome measures across studies. The studies used different metrics and different time periods to measure outcomes. For example, while most of the studies reported some measure of bleeding, the specific measurement of bleeding (e.g., amount of bleeding, days of bleeding, severity of bleeding, bleeding and/or spotting) varied across studies, and the follow-up periods range from 2 weeks to 1 year or more after insertion. In addition, some studies reported percentages of an outcome over the follow-up period, while others reported rates of events.

While it is not a medical complication, the need for repeat abortion may be reduced by the use of an effective contraceptive method following induced abortion. One study that modeled rates of pregnancy and repeat abortion among women choosing IUDs immediately postabortion vs. at a delayed interval found that immediate postabortion IUD insertion prevented 52 pregnancies per 1000 women over the following year [26]. Another study that followed women who chose immediate postabortion IUD insertion vs. women who chose other non-IUD contraception on the day of the abortion found that women who received an IUD had fewer repeat abortions (34.6 abortions per 1000 woman-years) than women who initiated another form of contraception (91.3 abortions per 1000 woman-years) [27]. Therefore, increasing the availability, postabortion, of IUDs would likely have an important impact for women wishing to reduce future unintended pregnancies and repeat abortions.

5. Conclusions

Intrauterine device insertion immediately after abortion is not associated with an increased risk of adverse outcomes compared with use of other contraceptive methods or with no IUD insertion after abortion and compared with IUD insertion at times other than immediately after abortion. Intrauterine device expulsion rates, while generally low, were higher after late first-trimester compared with early first-trimester abortions and after second-trimester compared with first-trimester abortions.

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