

(REVIEW ARTICLE)



Review on immediate and delayed postpartum intrauterine device insertion

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Abstract

Introduction: Intrauterine contraceptives (IUC) are affordable and effective long-acting reversible contraception options in women. Traditionally offered at 6 weeks postpartum, there is an increasing trend towards insertion at time of delivery in both vaginal and caesareans after placental delivery. This literature review analyses current data on differences in outcomes in IUC insertion immediately after placental delivery versus delayed insertion across both modalities of delivery.

Methods: A literature search in the following databases were used for publication dates between 2012 and 2022; Medline, Embase, Cochrane, Google Scholar.

Results: There are multiple studies which show the benefit of insertion of IUC during caesarean section as well as immediately post vaginal birth. With both portraying high patient satisfaction as well as compliance 6 months later. There were low uterine perforation and infection rates when inserted immediately post-partum.

Discussion: Overall, insertion of IUCs at time of delivery in caesareans was associated with lower rates of expulsion in most studies and higher rates of missing strings at follow-up, with vaginal deliveries overall having a higher expulsion rate at both immediate and delayed. Continuation of IUC use varied across all modes of delivery and timing of insertion. New novel techniques of IUC insertion may further reduce the risk of expulsion and uterine perforation.

Conclusion: Providing long acting reversible contraception in the postpartum period helps prevent unintended pregnancies. Women should be educated and encouraged on the use of IUC insertion in the postpartum period

Keywords: Intrauterine IUD; Copper coil; Mirena IUS; Post-partum contraception; Intra-caesarean insertion of coil

1. Introduction

The World Health Organisation recommends an interval of 24 months before attempting the next pregnancy in reducing the risk of adverse maternal and neonatal outcomes (1). Having a shorter inter-pregnancy interval has been associated with increased risk of preterm birth, small-for-gestational age or low birth weights, with maternal associations including an increased risk of pregnancy-related blood pressure issues and gestational diabetes in the subsequent pregnancy (2). The antenatal period provides an ideal opportunity to commence discussions surrounding contraceptive options with women whilst they are receiving regular healthcare appointments, with the postpartum period allowing for the initiation of effective contraception, thus reducing the risk of short pregnancy intervals (2).

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Long-acting reversible contraception (LARC) are highly effective options in preventing unplanned pregnancies and in postpartum family planning. The insertion of Intrauterine Contraception (IUCs) as a LARC choice are frequently being offered to women as part of their routine antenatal care in the UK. This recent focus allows for the insertion of postpartum intrauterine contraception (PPIUC) occurring immediately after the delivery of the placenta or within the first 48 hours in both caesarean sections and vaginal births, instead of traditionally waiting until six weeks after delivery (3).

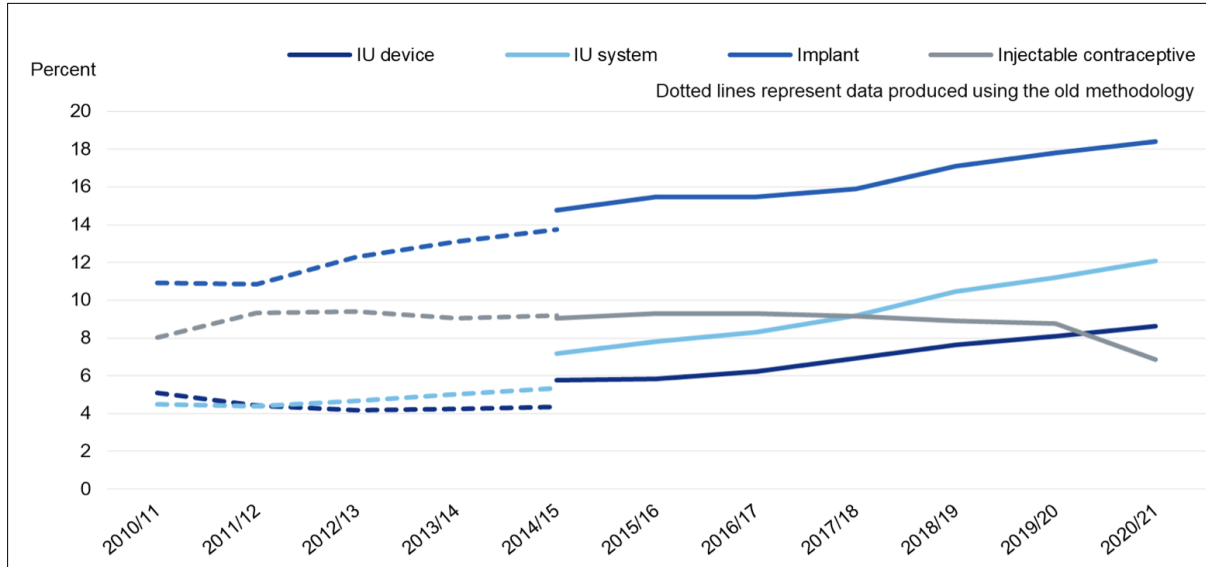


Figure 1 Graph of national use of contraception in the UK. Intrauterine implant being the most common LARC followed by intrauterine devices and systems.(4)

The use of IUCs as PPIUC offers a safe, long-acting and effective mechanism in reducing pregnancies and consists of either the levonorgestrel-releasing intrauterine system (IUS) or the non-hormonal copper coil (IUCD) (1). Recent literature suggests that the insertion of the IUCs in the post-partum period have a low rate of infection, expulsion and perforation (3). This literature review aims to compare the outcomes of both IUCs at time of delivery with delayed 6 week insertion; in caesarean sections and vaginal deliveries.

2. Methods

This literature review search was kindly undertaken by the BMA. A literature search in the following databases were used for publication dates between 2012 and 2022; Medline, Embase, Cochrane, Google Scholar.

Search terms were 'caesarean', 'abdominal delivery' or 'c section' were used in combination with 'coil', 'IUD', 'Intrauterine device' or 'contraceptive device' and 'during' or 'intra caesarean'.

Only reports written in English were included in the literature review

3. Results

3.1. Long Acting reversible contraception

The hormonal IntraUterine System (IUS) and the non-hormonal Intra-Uterine Copper Device (IUCD) are two examples for intrauterine LARC. The IUCD is a non-hormonal copper coil that stops conception by creating a toxic environment for the sperm and the egg, preventing fertilisation (5). The IUS is a hormonal intrauterine system that contains progestogens which stops ovulation from occurring (6). Numerous factors might influence a woman's decision between IUCD and IUS, including but not limited to impacts on periods, side effects, previous use, and more. These are two commonly used postpartum types of contraception.

Numerous studies have examined the importance of the effects of each type of contraception after giving birth and have examined complications, satisfaction levels, and adverse effects.

With regards to expulsion rates following insertion, the randomised controlled trial by Marangoni et al. revealed that, regardless of the mode of delivery, IUCD expulsion rates were higher (39.4%) than IUS expulsion rates (22.2%). Of these, 27.1% of IUCD expulsion cases mostly happened in the first 42 days after insertion (7). At the one-year follow-up, IUSs are linked to higher continuation rates, and the primary cause of IUS/IUCD discontinuation in general is expulsion (7). Elsayed Elshamy et al.'s study produced different findings: IUS had a higher expulsion rate (14% vs. 9% for IUCD; $p < 0.05$), but there were no significant differences in the complications of the two devices (8). Moreover, IUS showed higher removal rates than IUCD (9).

In women having a repeat caesarean surgery during singleton pregnancies, the relative consequences of IUS/IUCD misalignment in the uterus were shown to be higher six weeks after insertion in IUSs than in IUCDs (10). Misalignment in IUCDs was also found to be more likely to rectify on its own. Pain and heavy bleeding are among the side effects that women who choose hormonal IUSs experience more frequently. Missing threads is a common result of both contraceptive devices (11,12).

Although there is mixed data about the use of IUDs and IUSs, patients generally tend to have positive opinions about both types of contraception.

3.2. Postpartum intrauterine devices/systems (PPIUD/S)

The use of PPIUD/S carries many benefits but there are always risks involved. Numerous research studies have demonstrated high satisfaction rates and safety of PPIUD/S. A retrospective study revealed that the use of PPIUD/S tripled in women with heart disease, assisting in the reduction of maternal morbidity and mortality (24), which was further emphasised on in another prospective cohort study. In addition, a substantial percentage of unwanted pregnancies—between 5.5% and 60% (23) and occasionally as high as 70% (24)—occur during the first year after giving birth. According to a study, IUD placement post- caesarean section (CS) reduced the number of unplanned pregnancies in the first year following delivery by 0% and 9%, respectively, compared to women without PPIUD (25). Nevertheless, women without PPIUD would still not choose to have one, and those who had PPIUD in the past were the ones who would want the same procedure in the future.

Several publications have indicated that PPIUD/S insertion following CS carries a greater chance of missing threads (26, 27, 28). A systematic analysis demonstrates additional dangers associated with PPIUD/S insertion, citing a ten-fold increase in lactating women's perforation rate, which ranges from 1 in 350 to 1 in 2600 insertions (29). One explanation could be that the lactating women needed less cervical dilatation and less force to insert the device, which made it easier. However, this also meant that the acceptor would feel less discomfort during the surgery and the inserter would sense less resistance (29). Conversely, a study by Abdel-Ghany et al compared the effectiveness of IUD insertion during CS and 6 weeks post CS, there were 0% perforation rate when inserted during C/S in comparison to 5% when inserted 6 weeks post-partum. As well as failed insertion of IUD when inserted 6 weeks after delivery (6 out of 100 women).

3.3. Immediate vs delayed IUD insertion in CS and vaginal birth (VB)

Immediate insertion is defined as insertion of PPIUD/S within less than 10 minutes after delivery of placenta and up to 48 hours after delivery (30) irrespective of it being CS or VB. Delayed insertion is widely defined as inserting PPIUD between 4-8 weeks after delivery irrespective of it being CS or VB (30), 6 weeks postpartum being commonly used (31,32).

A randomised control trial found that 83% of women with immediate insertion had their IUCD/S in place six months after giving birth, compared to only 54% with delayed insertion. Overall, immediate insertion was 30% higher (32). A systematic review has also demonstrated an increased expulsion rate at delayed insertion (29). Another randomised research has similarly demonstrated higher IUD use in the immediate group (93%) compared to the delayed group (50%) (20). In the immediate group, 100% of women chose to have PPIUCD/S inserted, whereas in the delayed group, only 53% of women did the same (20). Numerous other randomised trials, systematic reviews, and cohort studies have confirmed the higher acceptance and use of PPIUCD/S's shortly following insertion (33, 34).

A randomised control trial on CS deliveries found that the expulsion rate of IUSs was significantly higher in immediate insertion compared to delayed insertion (24% in immediate insertion versus 4.4% in delayed insertion) 6 months postpartum; this expulsion rate included both complete and partial expulsion (35). Another retrospective cohort research also demonstrated this (11). However, since the majority of women desired to replace their IUS, there was no

difference in the usage of IUS six months postpartum between the immediate and delayed groups (35). Different findings with significant differences in expulsion rates have been reported in other systematic evaluations (33, 36). Expulsion rates following delayed insertion were considerably greater than those following immediate insertion in one randomised experiment, with rates of 10.9% and 8.1%, respectively (37).

Only a small number of negative outcomes were observed in either group; they included menorrhagia (11, 13, 14), pain/discomfort (11), uterine perforations (28, 29), and infection (14, 32, 37).

Research has demonstrated that earlier insertion at trans-cs leads to higher patient satisfaction and compliance (14, 20, 32) and lower failure rates (28). While there were more incidences of missing threads in women who had an early insertion, there have been notable reports of unsuccessful insertion and uterine perforation in women undergoing elective caesarean sections with delayed insertion (28). Lester et al., in contrast, discovered no differences in expulsion or infection between patients who had a PPIUCD/S inserted during CS and those who had it inserted six weeks after caesarean delivery. At six months, the immediate insertion group's utilisation was higher than that of the delayed group (83% vs. 54% $P = 0.01$) (20). According to other research, immediate insertion during caesarean sections is linked to greater continuation rates, decreased expulsion rates, and increased satisfaction (20, 32).

The use of IUSs at immediate or 4-6 weeks post-caesarean section was the subject of a randomised trial by Whitaker (35) which confirmed excellent satisfaction rates. IUS use at 12 months follow-up was higher in the immediate insertion group, albeit not statistically significant (60.0% vs. 40.9%, $p=0.35$). The immediate IUS insertion group saw a considerably higher frequency of expulsions (20.0% vs. 0%, $p=.04$) (35).

The rate of device expulsion following intra-CS insertion is varied across the studies ranging from 2-10.1%. The most common findings following PPIUD during C/S insertion is missing threads at 6 weeks check as shown in table 1.

Table 1 Summary of complications of PPIUD insertion during CS across the different studies

Study Name	Device Expulsion rate (%)	Perforation (%)	Missing threads (%)	Infection (%)
Wojik et al, 2022	10.1	0	-	0
Abdel-Ghany et al., 2022	5	0	13	0
Garmi et al, 2022	2	-	-	2
Jakhar et al., 2019	1.5	0	30	0
Rani et al., 2018	2.7	-	14.6	-
Levi et al., 2015	8	-	44	-

3.4. Mode of Delivery and Outcomes

Many research studies have examined how the route of delivery affects the outcomes following IUD insertion rates. According to a prospective cohort study that tracked women who had an IUD inserted either during a planned caesarean section or at the time of a vaginal birth post-placenta, there were no statistically significant differences in expulsion rates, despite the fact that the caesarean section group had a higher rate of missing threads.

Additionally, there were no statistically significant changes in expulsion rates between those who had chosen post-placental vaginal insertion versus an IUCD insertion at the time of caesarean delivery in a 6-month follow-up study. Comparing IUCD CS insertion to post-placental vaginal insertion, infection rates were found to be lower in CS insertion; nevertheless, the group that underwent the caesarean section had statistically significantly greater rates of uterine perforation and missing threads.

Patient satisfaction, continuation rates, and IUS problems following vaginal and caesarean insertion were examined in a retrospective analysis. Results revealed that patients who had a caesarean section had a statistically significant higher 12-month continuation rate (54.4% versus only 39.1% in vaginal births) and fewer cases of device expulsion (10.1% versus 34.1% in VB). As a result, patients were 2.72 times more likely to experience expulsion with insertion post-vaginal birth compared to caesarean section. (38)

Other studies have shown higher expulsion rates in vaginal deliveries (43.8%) compared to caesarean sections (15%), with higher rates seen in women who had had one or three and more previous deliveries at the time of insertion when compared with two deliveries (8). In Cooper's study, midwives were trained to insert IUDs within 48 hours of vaginal deliveries, with higher continuation rates at one-year follow-ups following vaginal insertion versus caesarean sections. However, vaginal deliveries had overall higher rates of expulsion (39).

In a retrospective study conducted over three years in a contemporary tertiary centre, Wojcik et al. discovered greater rates of partial and complete expulsion with immediate postpartum placement in vaginal births (34.1%), but no cases of perforation with IUD insertions at caesarean sections (11). Wojcik et al. also examined satisfaction rates, finding that 60.8% of women who had caesarean sections and 56.3% of women who gave birth vaginally were satisfied with their choice to have an IUD placed right away, and the majority of them showed up for their postnatal follow-up appointments with their general practitioners so that thread checks could be performed (11).

As we can see there is conflicting data on mode of delivery and success of PPIUD but overall patient satisfaction was high with PPIUD insertion regardless of mode of delivery.

3.5. Novel Insertion technique

New novel techniques for intraoperative placement of IUDs have been developed and show lower expulsion and displacement methods than non-fixation techniques. The hang up-technique was described by Abo-Taleb (40) to anchor the IUD to the fundus to prevent expulsion at the time of trans-caesarean section placement, with no cases of expulsion found in this randomised controlled trial at 6 months in comparison to the traditional non-fixation technique. The hang-up technique was first introduced in 1967, involving suturing the IUD to the fundus of the uterus, although there have been few studies since, that detail the exact method of insertion.

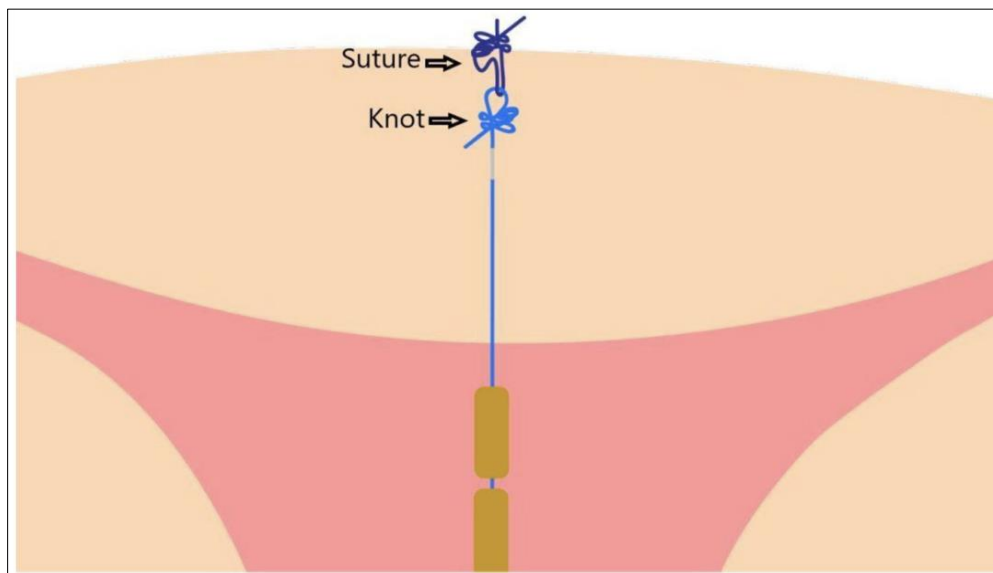


Figure 2 Dual Anchoring Technique (41). The myometrium is transpierced until the anchor knot is visible on the serosa, which is then threaded with a biodegradable suture to form the suture knot, with the anchor knot then retracted below the serosa

A non-comparative, open-label study conducted by Kutlucan (41) utilised an innovative insertion method of a frameless IUCD using a dual anchoring technique (DAT) that requires the uterus to be exteriorised. DAT involves two surgical knots - one as an anchor knot in the myometrium and the second knot in the serosa which is formed when an absorbable suture is fed through the anchor knot to hold the IUCD, allowing for the device to be suspended *in utero*. This specific IUCD differs to regular copper coils, in that it has a biodegradable cone body below the anchoring knot to retain the device in the fundus, as well as a novel inserter device to transpierce thick myometrium at the time of caesarean. Of the 21 women included, nil cases of device displacement nor expulsion were found, with confirmation of the intrauterine device postpartum via transvaginal ultrasound, with nil discontinuation at 3 months follow-up. This anchoring technique has similarly been described for the frameless GyneFix in previous studies, involving an anchoring and suture knot which are fixed using an absorbable suture, as well as specifically designed applicator to minimise the risk of uterine perforations (42). Benefits of this technique include minimal additional surgeon time at time of insertion, as

well as less side effects as the need for a plastic frame is removed. However, as of yet nil studies have focused on the removal of IUC devices inserted with the anchoring technique. One study describes the potential risks associated with incorrect placement of tying the anchoring knot beyond the serosa, such as the omentum or bowel, resulting in perforation and intra-abdominal displacement, reportedly occurring in 1 in 1000 insertions. A suggestion to minimise this risk involves measuring fundal thickness prior to insertion, and then after insertion to measure suture knot to anchoring knot thickness to ensure similar measurements (43).

4. Discussion

PPIUC is increasingly being offered to women at both caesarean sections and vaginal births. Several studies addressed differences in IUC expulsion rates in vaginal births and caesarean sections at time of birth versus delayed insertion. Maragoni et al found higher expulsion rates with IUD insertion post-placental delivery in vaginal deliveries when compared to caesarean sections, with higher expulsion rates also noted with IUCD insertion versus IUS and in those who had had one or three and more previous deliveries at time of insertion when compared with two deliveries (7). Women in this study were of a larger body mass index, with the authors also noting different mechanisms of insertion depending on the coil that may have contributed to higher rates of IUCD expulsion in vaginal deliveries. These findings were supported by Wojcik et al's retrospective study (11) with higher expulsion rates in vaginal deliveries following post-placental insertion when compared with caesarean sections. Recent meta-analyses of expulsion rates amongst postpartum placement supports these findings of higher expulsion rates at immediate delivery vs interval postpartum placement, with higher expulsion rates with placement after vaginal birth (27.4%) versus after caesarean section (3.8%). (44)

One cross-sectional study found nil statistical significance between expulsion rates of PPIC in intra-caesarean sections and post-placental vaginal deliveries. Reasonings for partial or complete expulsions could include malpositioned IUCs or lack of experience of the health care provider inserting the contraception, however, nil studies consistently reported on these findings. Another anatomical reason for this disparity between IUC expulsion rates between vaginal and caesarean sections could be due to the cervix not being fully dilated in elective caesareans and most emergency caesarean section cases, thus reducing the chance of expulsion.

4.1. PP insertion during Caesarean Section vs 6 weeks postpartum

Multiple studies have shown lower expulsion rates with insertion of IUCs during caesarean sections compared to traditional methods of delaying insertion up to 6 weeks postpartum. As a long-lasting and reversible form of contraception and nil restrictions on breastfeeding or non-breastfeeding, the IUD offers women an immediate contraception option after delivery with less discomfort. Abdel-Ghany (28) et al's cohort study on 200 women opting for IUCD insertion found higher rates of expulsion and uterine perforation in women at 6 weeks postpartum, compared to at the time of delivery in elective caesarean sections. As the uterus is easily seen and examined during caesareans after placental delivery, insertion of IUDs to achieve optimal fundal positioning is more easily palpable compared to a vaginal insertion at 6 weeks postpartum, thus this could explain the findings of lower expulsion rates in this cohort of women across studies.

As women who choose to have IUCs inserted at time of delivery, they also do not need to attend another appointment for IUC insertion at 6 weeks postpartum, which may also lead to higher uptake and continued use. Levi et al (34) followed-up women at 6 months to assess the ongoing use of IUDs after caesarean postplacental insertions versus delayed insertion, finding a higher rate of use at 6 months in postplacental insertion group (83%) versus delayed insertion (64%). This study involved the use of IUS devices and also whether there was any impact on breastfeeding, finding nil differences in the number of women breastfeeding at various postpartum points. Previous studies support the safety of using levonorgestrel as an emergency contraceptive during lactation without the need for withholding breastfeeding (42), although more research is needed to look at the effect of the hormonal IUS and if any effect on breastfeeding outcomes.

Missing threads was a common finding reported at follow-up in women undergoing IUC insertion at time of caesarean section. Although threads are not visible immediately after postplacental insertion due to the uterus not yet involuted thus the threads have not yet descended, women may feel slightly apprehensive if threads are not visible when checking at follow-up and could result in less uptake of IUCs as shown in other countries such as India (44). Levi et al's study (34) examined threads at 6 weeks postpartum and could visualise threads in 28% of women. Whilst in many cases the inability to identify threads likely may be insignificant, it may also indicate expulsion, malposition or perforation. Dewan et al (44) found that non-visualisation of threads was a source of apprehension for both the healthcare provider and women at follow-up, with women raising concerns about the need for a surgical procedure to remove the coil. Methods

to alleviate these concerns include appropriately counselling women about later thread visibility due to non-descend, as well as offering ultrasound confirmation of the coil in situ. New techniques as shown by Kutlucan's novel method of IUC insertion at time of caesarean, offer new horizons in reducing the chance of expulsions and also confirmation of IUD at follow-up by ultrasound, offering women the knowledge that the coil's position is correct.

5. Conclusion

These findings support the use of IUCs at time of caesarean sections with studies showing lower rates of expulsion, uterine perforation and increased continuation postpartum. Missing thread rates were slightly higher in postplacental IUC insertion, however new methods of IUC insertions at time of caesareans may potentially reduce this in the future. Providing long acting reversible contraception in the postpartum period helps prevent unintended pregnancies as well as morbidity associated with a short interpregnancy interval, thus continued efforts to educate women and studies are vital to support the use of immediate IUC insertion in both caesareans and vaginal deliveries.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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