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Review Article
Postpartum IUD contraception – a review of an international experience

I-Cheng CHI and G. FARR

Family Health International, Research Triangle Park, NC 27709, USA

Abstract

Postpartum insertion of intrauterine contraceptive devices (IUDs) performed while women are still in hospital has a number of advantages. Earlier reports, however, generally associated this procedure with high expulsion rates. Recent studies, on the other hand, have shown that if IUDs are inserted immediately (within 10 minutes) after placental delivery, it is safe and effective. In some experienced centers, fairly low expulsion rates are reported. In this paper the experiences with postplacental IUD insertions from international studies are reviewed, the lessons we have learned from these experiences summarized, and future research directions suggested.

Introduction

Postpartum insertion of intrauterine devices (IUDs) performed while women are still in hospital has the advantages of high motivation, ease of insertion, and convenience for both the patients and the service providers. Accessibility and demographic effectiveness are two other advantages, especially for women in less-developed countries (LDCs) where availability of contraceptive services is usually limited and procrastination occurs frequently [1]. Previous studies have also indicated that postpartum IUD contraception does not interfere with lactation [2–4].

Because of these apparent advantages, postpartum IUD insertions have been practiced in a number of well-meaning and innovative maternity hospitals over the world, and international multi-center studies have followed. Is this procedure medically safe? Is this procedure use-effective? And how can the safety and effectiveness of this procedure be further improved? This paper will assess the current state of research on this topic and will seek to shed light on the above-posed questions.

A review of previous studies

1. The early experience

The International Postpartum Family Planning Program of the Population Council initiated a multi-center study on IUD contraception in 1966. Insertions of IUDs were performed before the patient was discharged, usually within 10 days postpartum. This study revealed a high overall expulsion rate of 20.5 per 100 women at 3 months of use [5]. The distribution of the expulsion rates is wide among the 13 study centers, ranging from 7.3% to 46.2%. More importantly, in one participating center located in Singapore, which performed 8977 insertions ranging from within 48 hours to those eight weeks after delivery, 93 perforations (termed translocations by the investigators) occurred, resulting in an incidence rate of 1.04 per 100 insertions. Further analysis of the Singapore data revealed a clustering of these uterine perforations among insertions performed four to eight weeks postpartum and primarily among those performed by two of the six insertors [6].

In a study co-ordinated by the World Health Organization (WHO) in the late 1970s, insertions of three types of IUDs were randomly assigned immediately following delivery of the placenta in 841 women at six international centers [7]. This study also revealed high expulsion rates; 41 for the Postpartum T, 44 for the Lippes Loop D and 35 for the Copper 7-200 devices, all per 100 women at one year of use. The expulsion rates varied greatly among centers. The one-year pregnancy rates also were high: 5.6, 12.1 and 7.2 per 100 women, respectively. Translocation was defined in this study as 'embedding or altered orientation of the device within the uterine cavity and diagnosed at the time of removal or by radiography'. The translocation rates at one year were 2.0, 2.8 and 0.9 per 100 women for the three devices, respectively. Removal of IUDs was difficult among 'many cases in one center due to embedding of devices in the uterine wall'. Incidence of uterine perforation on insertion was not mentioned. The study was terminated early by WHO because of the high expulsion rates.

When reviewing postpartum IUD contraception, we cannot ignore the extensive experience at Profamilia, an International Planned Parenthood Federation (IPPF) affiliate in Columbia [8], and the Institute Mexicano del Seguro Social (IMSS) in Mexico [9]. At the postpartum clinic of the former, between May 1969 and December 1970, more than twice ($n = 11\,512$) as many women chose immediate postpartum IUD insertions (defined as IUD insertions before women were released from the hospital) as those who chose to return for insertion at a later date ($n = 4826$). However, in a sample of 2000 immediate Lippes Loop insertions studied, 44.8% of the women expelled their IUDs within the first 30 days. In the latter institute, more than 80 000 insertions were performed postpartum in 1983–1984 alone [10]. Among them were many immediate postplacental insertions (IPPIs, i.e. insertions performed within 10 minutes after placental delivery).

The results of 1008 IPPIs performed at the IMSS were reported by Aznar *et al.* [9]. Five device types (Lippes Loop D, TCu220C, Progestasert, TCu200 postpartum and Multiload 250) and three insertion methods (manual placement, ring forceps and

several prototype applicators) were used for insertions by 75 insertors, ranging from medical students to certified gynecologists. An overall expulsion rate of 15.1 per 100 women at three months of use was derived.

Other single-center IPPI IUD studies usually have enrolled smaller numbers of women, and their termination rates are subject to wide fluctuation. Follow-up rates, however, were usually high. Newton *et al.* [11] compared three device types (the Lem, Copper 7 and Progestasert) in 274 women using a specially designed 25 cm inserter, all inserted within 20 minutes after delivery of placenta at their London clinic. The overall expulsion rate was low (<7%). No uterine perforations or pelvic sepsis were noted. Also, no differences in puerperal morbidity were detected between these women and a matched control group. On the other hand, Emens and Shah [12] inserted MLCu250 devices between day two and day five postpartum in 88 women and reported 22 expulsions, resulting in a relatively high expulsion rate of 25.6% at one year. Fifteen of the 22 expulsions occurred within the first month of insertion.

Research in other countries include a recent study in India, where the TCu200s were inserted in 200 women in the immediate postplacental period, also using an inserter (actual length not specified) [13]. A six-week expulsion rate of 10.5 was reported and was considered comparable to the investigators' experience with interval insertions. No uterine perforations were reported.

The most impressive results of IPPIs were those reported by Thiery's group from Belgium (Table 1). A non-comparative study of the MLCu250 in 1979 reported a 30-month expulsion rate of 6.0 per 100 women. A randomized trial in 1980 similarly reported low two-year expulsion rates of 11.2 for the TCu200 and 9.9 for the MLCu250 [14]. In a subsequent study [15] in which several copper-bearing IUD models and the Lippes Loop D were used for IPPIs, they found a low overall one-year expulsion rate of 9.0 for the copper devices (the T- and the M-models); the one-year expulsion rate for the Loop users was, however, unacceptably high (23.7). Based on their extensive experience, they were convinced that IPPI, using the regular inserter, is safe. They emphasized the importance of fundal placement of the IUD and proper (early) follow-up of women for maintaining the efficacy of IPPIs [16].

Table 1 Cumulative gross life-table expulsion rates of postpartum IUD contraception at a Belgian center*

Year report published	*IUD type used*	*No. of women admitted*	*Expulsion rates per 100 women reported at longest follow-up visit*
1979	MLCu250	600	At 30 months: 6.0
1980**	TCu200	269	At 24 months: 11.2
	MLCu250	293	9.9
1985	LLD	271	At 12 months: 23.7
	Copper devices (6 models)	2375	9.0

* All insertions were immediate postplacental (IPPI) using regular inserter
** Randomized comparative studies

2. *The Family Health International (FHI) study*

FHI began a series of studies on postpartum IUD contraception in the early 1970s. Initially, study focused on the physical properties of IUDs, but later shifted to the importance of careful training of those who insert IUDs. Three sutures (biodegradable extensions or projections, Ethicon #2 chromic material) were atached to the upper arms of the Lippes Loop and the TCu200 devices (named as Delta Loop and Delta T) in the hope that these sutures would facilitate retention of IUDs during uterine involution after delivery [17]. Co-operative clinical studies on postpartum IUD insertions were initiated at centers in the following countries* (Table 2):

Egypt: In a study on IPPIs of the Delta Loop in 100 women, one expulsion occurred among the 86 women followed up at three months, resulting in an expulsion rate of 1.2 at 3 months of use. No perforations were reported. One case of infection (fever for one week) required antibiotic treatment. The investigators felt that IPPIs of IUDs are safe and that the low expulsion rate was due to manual insertion of the IUDs [18].

Chile: Insertions of the TCu200 were performed in 1142 women. The majority of the insertions were performed less than 72 hours after the women gave birth. The expulsion rate was high, 32.1 at three months and 37.8 at one year of use. Of the 372 women who expelled their IUDs, 349 women came back for reinsertions of the same device (then interval insertions). The one-year expulsion rate for reinsertions was 7.7. No uterine perforations occurred among the postpartum insertions. One perforation was reported among the reinsertions [19].

The United States: A Los Angeles center inserted Delta Ts in 100 women within 55 hours of delivery of the placenta. Seventeen expulsions occurred. The investigator felt that expulsions were more likely to occur in patients recruited at the beginning of the study (compared to later patient series), and among those insertions performed more than 30 minutes after delivery of the placenta (compared to earlier insertions) [20]. No uterine perforations or cervical lacerations were reported.

Belgium: This co-operative study with Thiery's group was primarily for the evaluation of the Delta devices developed at FHI. A total of 906 IPPIs were performed using three IUD types: the Delta Loop, the Delta TCu220C and the TCu220C by random allocation. Results indicated that the IPPI procedure is 'totally safe in terms of

* This comprehensive review of FHI's co-operative studies included a few studies on non-Delta devices and postpartum insertions other than IPPIs. Cumulative gross life-table rates per 100 women were used throughout the FHI studies.

infection and perforation', but the 'suturing' did not improve the retainability of the IUDs significantly. The one-year expulsion rate for the Delta TCu220C was 9.0, comparable to that of the unsutured TCu220C of 10.6. The Delta Loop had an unacceptably high expulsion rate of 22.6 and was considered to be unfit for IPPI [21].

Table 2 Cumulative gross life-table expulsion rates of postpartum IUD insertion at centers in FHI-coordinated studies

Center location (year of report)	*Type of IUD*	*Timing of insertion**	*Insertion method*	*No. of women admitted*	*Expulsion rates per 100 women at longest follow-up visit*	
*A. Non-comparative***						
Egypt (1980)	Delta Loop	IPPI**	Manual	100	At 3 months:	1.2
Chile (1983)	TCu200	< 72 hours	***	1142	At 12 months:	37.8
USA (1983)	Delta T	from IPPI to 55 hours	Inserter	100	17 expulsions occurred (Rates not reported)	
*B. Comparative****						
Belgium (1983)	Delta Loop	IPPI	Manual	298	At 12 months:	22.6
	Delta TCu220C	IPPI	Manual	298		9.0
	TCu220C	IPPI	Manual	310		10.6
Thailand (1983)	Delta Loop	2–36 h	Forceps	130	At 6 months:	36.3
	Lippes Loop D	2–36 h	Forceps	130		35.7
China (1983)	Delta T	IPPI	Special inserter	108	At 6 months	13.3
	Delta Loop	IPPI	Ring forceps	92		17.2
Taiwan (1984)	Copper T	IPPI	Manual	124	At 6 months	15.2
	Delta T	IPPI	Manual	125		12.1
Turkey (1985)	Delta Loop	IPPI	Inserter	122	At 12 months:	3.7
	Delta T	IPPI	Inserter	124		7.6
Philippines (1985)	Delta Loop	IPPI	Special inserter	123	At 12 months:	29.6
	Lippes Loop	IPPI	Special inserter	126		38.0
Costa Rica (1986)	Delta T	IPPI	Manual	129	At 6 months:	14.4
	TCu220C	IPPI	Manual	119		12.1
Mexico (1987)	Delta T	IPPI	***	48	At 3 months.	15.0
	TCu220	IPPI	***	51		10.0

* Timing of insertion is related to delivery of placenta
** Immediate postplacental insertions
*** Insertion method was not mentioned
**** All comparative studies except the one in China were randomized clinical trials

Thailand: In a university-affiliated clinic in Bangkok, the Delta Loop and the Lippes Loop D devices were randomly inserted in 260 postpartum women within 2–36 hours after delivery of placenta using uterine-packing forceps. At six months follow-up, the expulsion rate was comparably high for users of either device, 36.3 for the Delta Loop and 35.7 for the Lippes Loop. Other pertinent event rates were also similar between the two devices. One woman inserted with a Delta loop had pelvic inflammatory disease. No other serious complications were observed [22].

China: Two hundred IPPIs were performed in a Beijing maternity hospital in a non-randomized trial using the Delta T (inserted with the specially designed inserter) and the Delta Loop (inserted with ring forceps). Fifty-two women were delivered by elective cesarean section. No perforations occurred, and salpingitis was reported in one woman. The overall six-month expulsion rates were 13.3 for the Delta T users and 17.2 for the Delta Loop users. The difference was not statistically significant [23]. Despite the small numbers, the expulsion rate was significantly lower ($p<0.05$) among insertions performed at the time of cesarean section through the incision wound (PCS; 4.1) than among vaginal insertions performed immediately after vaginal deliveries (PVD; 20.5). The lower expulsion rate in the PCS group was thought to be due to proper fundal placement of IUD and a tighter cervix [24].

Taiwan: The standard Copper T was compared with the Delta T at a hospital for military dependents in Taipei. The two types of devices were randomly inserted by hand in 249 women immediately postplacental. The six-month expulsion rate was 15.2 for Standard T users and 12.1 for Delta T users. No uterine perforations were reported. Five cases were diagnosed with pelvic inflammatory disease based on diffused abdominal pain and tenderness of the uterus and adnexa. The IUD was removed from three of the five women [25].

Turkey: A clinical trial of the Delta Loop and Delta T was conducted at a university-affiliated hospital in Ankara. The IUDs were randomly allocated to 246 women and the insertions were performed within 10 minutes postplacenta. Expulsion rates per 100 women at one year of use were low for both devices: 3.7 for Delta Loop and 7.6 for Delta T. The investigators concluded that Delta devices and any type of T devices can be used safely and effectively during the immediate postplacental period [26].

The Philippines: A randomized clinical trial between the Lippes Loop D and the Delta Loop by IPPI was carried out in a Manila maternity hospital. Most of the insertions were performed by qualified midwives using a plastic inserter. The twelve-month expulsion rate was 38.0 for users of the Lippes Loop D device ($n=126$) and 29.6 for users of the Delta Loop device ($n=123$). The difference was not statistically

significant and, according to the investigators, the expulsion rates for the two devices should be considered comparable [27].

Costa Rica: By random allocation, the Delta T and the TCu220C IUDs were inserted in 248 women immediately postplacental using the hand insertion technique. The six-month expulsion rates were 14.4 for users of the former and 12.1 for users of the latter devices; the difference was not statistically significant [28].

Mexico: The Delta T and the TCu220 IUDs were randomly assigned to, and inserted in, 113 women immediately following a normal vaginal delivery. Insertion method was not mentioned. Among the 99 women with follow-ups, no difference was found in expulsion rates at three months of use (15.0 versus 10.0) between the two device groups. The main purpose of this study was to measure the distance between the fundus and the upper part of the stem of the T devices at various times after delivery by echosonography. No relationship was found at any of the readings between incidence of expulsion and the distance between the IUD and the fundus [29].

3. *Multi-center analyses of FHI data*

Pooled data on postpartum insertions of the Delta Loop and Delta T as well as the Standard Loop and the Standard T from 19 FHI centers were analyzed [30].

Users of the Delta devices ($n = 1390$) were compared with women using counterpart standard devices ($n = 1366$) in randomized trials, all by IPPIs. The expulsion rate was lower among users of the Delta Loop than among users of the Standard Loop. The rates between the Delta T and the Standard T users were similar.

Data from 1035 IPPI cases of the Delta Loop, randomized between insertion methods (the 30-cm-long inserter versus manual insertion) at four centers, revealed no differences in expulsion and infection rates between the two insertion methods.

The IPPIs and insertions performed from 10 minutes to 36 hours after placental expulsion were compared. The expulsion rate was significantly lower in the IPPIs than in the later insertions, regardless of the device used (Table 3). The timing of insertion was, however, not allocated randomly at these centers.

Another multi-center analysis at FHI combined data from nine international centers, totaling 1933 IPPI cases* [31]. In three centers, a Delta device (Delta T or Delta Loop) was compared with its counterpart Standard device using the same insertion method; three other centers compared the two Delta devices using the same insertion method; and hand and inserter insertions of the same device were compared in the remaining three centers. Allocation of women was randomized at each center with regard to its study purpose.

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* Both multi-center analyses included data sets from some of the above-reviewed single FHI centers. Also, some single-center data sets were used in both multi-center analyses.

Table 3 Cumulative gross life-table expulsion rates per 100 women by timing of IUD insertion after placental delivery, FHI international data set, 1979–1982

	Delta Loop		*Delta T*	
	Immediate (n = 1239)	*10 min–36 h (n = 538)*	*Immediate (n = 438)*	*10 min–36 h (n = 330)*
Expulsion				
1 month	10.8	16.6*	10.9	15.8
3 months	19.6	33.8*	14.5	26.9*
6 months	23.3	37.0*	16.9	31.3*
Follow-up				
1 month	74.2	64.0	76.5	60.8
3 months	55.4	43.5	62.8	44.2
6 months	38.8	32.5	46.6	35.2

* Differences between immediate insertions and insertions performed 10 minutes to 36 hours after placental delivery are statistically significant at $p<0.01$.
From Cole *et al.* [30]

No significant differences were detected in expulsion rates (or in bleeding/pain removal rates) at six months of use for any of the three sets of comparisons. Age and parity of the women in each set of comparison subgroups were similar due to randomization.

Comparisons were then made between the above pooled nine-center IPPI data and another set of pooled data from two additional centers where insertion of IUDs were performed between 2–72 hours after delivery of placenta. The expulsion rate, adjusted for age and parity of the women, was remarkably lower in the IPPI group (Table 4). This comparison was, however, undertaken among centers where an array of factors that might be related to the incidence of expulsion were varied (including patient selection, insertion technique, IUD type, experience of insertors, etc.). Hence the findings must be interpreted with caution.

To evaluate the effect of the center's experience with IPPI on IUD performance, women with IPPI at each of the nine centers were further divided into two halves according to their insertion date, and then pooled for comparisons between the first half and second half. A significantly higher expulsion rate was found among the first half of the patients than among the second half (Table 5).

Lastly, a case-control analysis was performed on the nine-center pooled IPPI data set. The results did not reveal that episiotomy, oxytocin use for either augmenting or inducing labor, lactation, or any other third-stage labor problems had increased the risk of IUD expulsions in IPPI.

Table 4 Six-month gross cumulative expulsion rates per 100 women by timing of IUD insertions after placental delivery for 9-center pooled data and data from two additional centers, FHI international IUD data set, 1979–1982

Timing of IUD insertion after placental delivery	*9-center pooled data*		*Thailand center*		*Chile center*		*Total expulsion rates*		
	n	*Expulsion rates*	*n*	*Expulsion rates*	*n*	*Expulsion rates*	*n*	*Actual*	*Adjusted**
< 10 minutes	1933	9.3	0	–	0	–	1933	9.3**	9.5**
2–23 hours	0	–	72	28.6	174	35.9	246	33.8	31.5
24–47 hours	0	–	135	34.8	201	40.7	336	38.4	37.3
48–72 hours	0	–	36	32.4	0	–	36	32.4	28.8

* Adjusted for age (< 25, 25 +) and parity (< 3, 3 + , including index pregnancy).
** The differences between insertions < 10 minutes and each of the other time groups are statistically significant at $p < 0.001$
From Chi *et al.* [31]

Table 5 Gross cumulative expulsion rates for women admitted early in the study period and those admitted later, 9-center pooled data, FHI International IUD data set, 1979–1982

Women admitted in the study period	*n*	*Expulsion rates (months)* 1	3	6	*Follow-up rate at 6 months*	*Mean age (in years)*	*Mean parity*
First half	909	7.8	10.9	12.0*	91.6	26.4	2.7
Second half	1024	4.8	6.1	6.9*	90.3	26.4	2.6

* The difference between women admitted in the first half and those admitted in the second half of the study period is significantly different at $p < 0.001$
From Chi *et al.* [31]

What have we learned?

1. Timing of insertions and safety

Studies conducted before the 1970s have generally advocated that postpartum IUD insertions should be performed no earlier than six to eight weeks after delivery for the fear of increased risks of uterine perforation, infection, and/or prolonged bleeding [32]. However, in a study by Mishell and Roy [33] of 441 women who had an IUD inserted between 4 and 8 weeks postpartum and 1197 women who had the IUD inserted more than 8 weeks after term delivery (five different copper-bearing IUDs used), no uterine perforations occurred among women observed for two years after IUD insertion. Similarly, Rosenfield and Castadot [34] did not find a higher incidence

of complications, including pain, infection and bleeding, for the early postpartum insertions than for those performed six weeks later.

Previous studies further showed that IPPIs are not associated with increased risk of infection [20,30,35–37], uterine perforation [30,31,35], prolonged postpartum bleeding [38] or subinvolution of the uterus [39,40]. The safety aspects of IPPIs seem to have been assured. Thiery *et al.* [21] concluded that IPPI is a perfectly safe procedure and should be recommended for wider dissemination throughout the world.

2. *Timing of insertion and expulsion rates*

Earlier studies [5,12,41–43] showed high expulsion rates for early postpartum IUD insertions (not IPPIs, but less than 42 days after delivery of live birth). Mishell and Roy [33], however, found no significant differences in any of the termination event rates between women with earlier (four to eight weeks) and later (more than eight weeks) insertions after term deliveries.

Recent studies revealed that if the insertion is performed within 10 minutes after placental delivery (IPPI), the expulsion rates are usually lower [15,30,31], although still higher than those for interval insertions [16,44]. Brenner [20] has asserted that the risk of expulsion increases as the interval from delivery of the placenta to the time of IUD insertion increases, and that later insertions during the postpartum period are usually associated with higher expulsion rates.

3. *Experience of insertors*

The previous findings of the higher expulsion rates in the first half than in the latter half of patient series [20,31], in insertions performed by unskilled than the skilled insertors [15], and in clinic patients than in private patients [45,46] suggest the importance of training, skills and experience of insertors. This is further supported by the finding of the wide variations of expulsion rates among centers [7,30,31]. This conclusion, however, may be intuitive, since definitions of insertors' experience used in previous studies have usually been loose and lack support by objective findings from well-designed studies.

4. *The IUD type*

Past efforts in modifying the shape of existing IUDs to reduce expulsion rates in postpartum use have not been successful. The LEM device [47], the Nova-T-PP [48] and the Delta devices with 'suturing' [21,22,27,31] were developed, but have subsequently been withdrawn because none of these devices markedly improved IUD retainability. On the other hand, researchers like Thiery and colleagues have used copper-bearing devices which are commonly used for interval insertions (such as the

TCu380A, TCu200, TCu220, MLCu250 and MLCu375) for IPPIs in their clinics. These devices have produced low expulsion rates generally considered acceptable [15,21] (Table 1). The LLDs, however, are probably poor candidates for IPPIs [7,15].

5. *The inserter*

The long inserter (25–30 cm), designed specifically for IPPIs with the intention to place the IUD high in the fundus, was advocated by Newton *et al.* [11]. Thiery *et al.* [21], on the other hand, did not find this inserter capable of improving the ease of insertions and/or the performance of IUDs for IPPIs, and advocated the standard inserter instead. Kamal *et al.* [18] recommended manual insertions (of the Lippes Loop D); their study was, however, based on a small number of cases. None of these three studies were comparative clinical trials randomized for insertion methods, and their assertions were more or less a reflection of the investigators' own subjective feeling.

Four of the six centers in the WHO study used normal inserters and reported varied expulsion rates. The London center (not Newton's center), which used the long postpartum inserter, experienced a relatively high expulsion rate and the El Salvador center, which used digital insertion, experienced a relatively lower rate [7].

More convincing findings were derived from the multi-center randomized trials at FHI [30,31]. Neither analysis revealed significant differences in termination events rates between manual (hand) and inserter insertions.

6. *IUD insertion during cesarean delivery*

A much lower expulsion rate was reported with immediate insertions of IUDs at cesarean section compared to vaginal insertions after vaginal delivery in studies from Mexico [9,49], China [24] and Belgium [50]. The rates were usually comparable to that of interval insertions. Chi *et al.* [51] further reviewed data from the centers in China where post-C-section (PCS) insertion of IUDs was practiced. In each of the eight centers (nine studies), the PCS insertions consistently had impressively low expulsion rates; and in two of these centers where PCS insertions were compared with immediate vaginal insertions after vaginal delivery (no random allocation), PCS was associated with a remarkably lower expulsion rate (Table 6). Risk for infection was not found to be greater with the PCS than with the vaginal insertions.

Table 6 Expulsion rates for eight single-center studies and one multicenter study in China in which IUDs were inserted at cesarean section, 1979–1985

Study site	*No. of cases admitted*	*Expulsion rate per 100 women*	*Follow-up rate (%)*
A. Life-table analysis not used			
Beijing	218	(6 month rates) 2.3	(at 6 months) 78.0
Guan Hsien, Sichuan	393	(1+ year rates) 3.9	(at 1 year or longer) 45.8
Chongging, Sichuan	260	(1+ year rates) 7.5	*
Beijing	83	(24 month rate) 9.6	(at 24 months) 65.0
Chia-Hsiung, Zechiang	735	(reference period undefined) 1.2	(length of follow-up not stated) 82.3
Wu-Han, Hubei	144	(reference period undefined) 3.0	(at 3 to 15 months) 92.4
B. Life-table analysis used			
Ching Zhou, Hubei	325	(12 month rate) 4.0	(at 12 months) 92.3
Beijing	51	(6 month rate) 4.1 (VIVD** group 17.6)	(at 6 months) 95.6
Multi-center study	906	(12 month rate) 5.5 (VIVD** group 23.5)	(at 12 months) 99.0

* Only 80 cases remained in study with one year or longer follow-up
** VIVD: vaginal insertion of IUD immediately after vaginal delivery
From Chi *et al.* [51]

Future study directions

The following issues regarding postpartum IUD contraception need to be addressed in future studies:

1. Confirmation of the advantages of IPPIs over later postpartum insertions

(a) *Safety.* Multi-center data will be needed to determine that postpartum IUD insertions in general, and IPPIs in particular, are not associated with an increased risk of rare but medically significant events such as uterine perforation and infection. The incidence of uterine perforation is especially pertinent with the copper devices, which may be more likely to cause adhesions if perforation into the abdominal cavity occurs.

Not many postpartum IUD studies have taken lactation into consideration. A case-control study by Heartwell and Schlesselman [52] reported a remarkably increased risk of uterine perforation in lactating women. Sivin [53], however, pointed out a possible methodological flaw with this study* and suggested that the timing of IUD insertion, rather than lactation, is likely to be the dominant factor associated with perforation. Both hypotheses have relevance to the safety of postpartum IUD insertions, and future epidemiologic studies should be designed that can separate the effects of these two potential risk factors in the incidence of uterine perforation. Such studies should be carried out in developing countries where both IUD use and breast-feeding are common. Further studies on post-cesarean section IUD insertions should be aimed at better patient selection to improve its safety [54]. We foresee increasing use of this postpartum IUD contraceptive modality in developing countries as more deliveries are taking place in hospitals.

(b) *Expulsion rates.* While a number of studies [23,30,31] have shown lower expulsion rates of IPPIs compared to later postpartum insertions ranging from two hours to six weeks after delivery, none of them were randomized clinical trials. The WHO study [7] in which all the insertions were IPPIs, on the other hand, showed unacceptably high expulsion rates for most of the study centers.

Only one report presented results on comparisons of expulsion rates between IPPIs and interval insertions of the same device types (the TCu200 or MLCu250) and at the same center [16]. The expulsion rates with IPPIs, although still higher than the rates associated with interval insertions, were considered 'acceptable' (Table 7). It should be noted that this result was derived from two different studies, one on IPPIs and the other on interval insertions, each undertaken about two years apart. Also,

* According to Sivin [53], a woman whose IUD has perforated the uterus is not protected against pregnancy by the device. On the other hand, lactation protects against pregnancy. In the study by Heartwell and Schlesselman [52], subjects who became accidentally pregnant were excluded from analysis. A disproportionate fraction of the 'cases' retained would be lactating women, and thus the relative risk of lactation on uterine perforation might have been over-estimated.

these studies were conducted between 1974 and 1976 when experience with the IPPI techniques was rather limited.

Well-designed trials randomized on the timing of postpartum IUD insertion with blind evaluation are needed to confirm or negate the hypothesis that the earlier the insertion in the postpartum period (and IPPIs in particular), the better the results with regard to safety and retainability of the IUDs. With the state of the art as it is at present, this study approach is ethically acceptable.

Table 7 Gross cumulative life-table expulsion rates in interval insertions (1974) and immediate postplacental insertions (1976) of TCu200 and MLCu250 at a Belgian center

	Six months		*Twelve months*		*Twenty-four months*	
	TCu200	*MLCu250*	*TCu200*	*MLCu250*	*TCu200*	*MLCu250*
Interval insertion						
Number enrolled	730	664	–	–	–	–
Woman-months of use	4201	3823	7467	6805	10578	9448
Expulsion rate	2.2	0.8	2.7	1.2	3.1	1.2
(95% confidence limits)	(1.1–3.3)	(0.2–1.8)	(1.5–3.9)	(0.5–2.4)	(1.7–4.5)	(0.5–2.4)
Immediate postplacental insertion						
Number enrolled	269	293	–	–	–	–
Woman-months of use	1464	1621	2632	2902	3796	4240
Expulsion rate	9.4	7.4	11.2	9.9	11.2	9.9
(95% confidence limits)	(5.8–13.0)	(4.3–10.5)	(7.3–15.1)	(6.3–13.5)	(7.3–15.1)	(6.3–13.5)

From Thiery *et al.* [16]

2. *Confirmation of the merit of fundal placement of IUDs*

Researchers generally agree upon the importance of fundal placement of the IUDs in interval insertions [55]. Fundal placement of IUDs has also been cited as the primary requirement for successful postpartum IUD insertions, including IPPIs, in order to achieve low expulsion rates [9–11,17,34,36,55]. However, Mariscal *et al.* [29], using echosonography to monitor uterine placement of IUDs after immediate postplacental insertions, did not find a correlation between the distance from the IUD to the fundus on the one hand, and the incidence of expulsion on the other. They 'could not demonstrate that good fundal placement influenced expulsion'. Thiery *et al.* [15], in spite of their earlier support, also raised the question of how an IUD can retain its fundal location without inversion, translocation or somersaulting in a large and involuting postpartum uterus. Younis *et al.* [40], on the other hand, using ultrasonic scanning on 47 cases with the Spiked Loop and 43 with the Standard Loop, found that all Loops except two were correctly positioned within the uterine cavity during the

sixth week after IPPI insertion. More research is needed to prove the hitherto asserted importance of fundal placement of the IUD, which, in turn, would guide the emphasis of the training in IPPIs of IUDs.

3. *Insertors' experience*

The importance of this provider variable in postpartum IUD insertions is reflected in the wide center variations in expulsion rates (which also suggests plenty of room for improvement). Previous studies on insertors' experience, however, have been carried out in a rather cavalier manner, and research tools need to be developed so that the insertors' experience can be more objectively and quantitatively evaluated. This will not only avoid the intuitive bias toward a tendency of overemphasizing its importance, but also will provide a useful reference for the training of postpartum IUD insertion services in the field.

4. *Initiation of operations-research studies responsive to service delivery in the field*

Most previous IUD research has focused on the development of new IUD types and on the conventional comparisons of termination rates between the old and new as well as among IUD types. Studies aimed at solving problems actually faced by the service providers in the field have generally been limited. Within the realm of postpartum IUD insertion, the higher incidence of missing strings of the IUDs is one such example for which the people in the field are anxiously awaiting a solution. The regular strings of a Copper T device are 12 cm long and could be easily retracted into the enlarged postpartum uterus. Only a few postpartum IUD studies mentioned this problem, and most rather casually.

A number of relevant questions with regard to missing threads in postpartum IUD contraception needs to be answered in future studies: First, what is the actual magnitude of this problem? Only two reports on postpartum IUD insertions which mentioned the missing-threads problem could be located by the authors. The Egypt IPPI study [18] revealed that 64% of the 86 women (inserted with the Lippes Loop D by hand) had missing threads when they came back for the first follow-up around three months after insertion. The investigators were concerned about the possible increased risk of infection and perforation associated with probing of the IUD in order to locate it. Newton *et al.* [11], on the other hand, found that only 12 (4.4%) of the 274 patients (all inserted with one of three types of IUDs within 20 minutes of delivery of placenta, using the special 25 cm inserter) had lost threads at 6 weeks of follow-up. What proportions of these women with missing threads were due to unnoticed expulsions of the IUDs, retractions into the uterus or, although probably very rarely, migrations of the IUDs into the abdominal cavity due to uterine perforation? Are the higher accidental pregnancy rates detected in some postpartum studies a result of a higher rate of unnoticed expulsions? Should IUDs be removed when the strings are missing, and is this removal difficult? Should follow-ups for

postpartum IUD insertions be scheduled earlier than for interval insertions so that the incidence of missing threads could be discovered in time? Also, a knowledge of what decisions women will take when they are faced with such a situation should be helpful for effective counselling.*

5. *Initiation of studies to establish country-specific demographic effectiveness of postpartum IUD contraception*

Postpartum contraception is associated with considerable overlap with natural suppression of fertility after delivery [56]. This is more so in countries where breast-feeding is commonly practiced and for a long period. Potter *et al.* [1], however, have argued that if the factor of possible procrastination is taken into consideration, immediate postpartum IUD insertions will still achieve a higher demographic effectiveness, as compared to postamenorrheic insertions, in spite of the overlap. Women in different cultures probably have different procrastination patterns, and greater demographic effectiveness of postpartum contraception is probably more likely to be achieved where women are more prone to proscrastinate and to procrastinate longer. Studies on the proportion of women who would (and how soon they would) come back for a reinsertion of an IUD in the case of an early expulsion, and the effectiveness of reinsertion [27] also becomes relevant. Models of country-specific estimation of the demographic effectiveness of postpartum IUD insertion should help decision-makers in the cost–benefit evaluation of this contraceptive modality.

Conclusion

The recent marketing of the TCu380A device in the US will exert a positive influence on other countries, and the IUD, as a contraceptive method, will become increasingly important worldwide.

In addition to the advantages mentioned at the beginning of this paper, IUD contraception, unlike sterilization, is easily reversible, and most studies have shown that women's subsequent fertility is not affected, whether the IUDs were removed for complications or for planned pregnancy** [58–61]. As such, IUDs should play an important role in postpartum contraception because women may be overmotivated to terminate their fecundity at the time of delivery, but may change their minds at a later time.

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* We have learned that to counter this missing-thread problem, the IMSS in Mexico is attaching additional strings to the original strings of the regular TCu200 (total length becomes 30 cm) for postpartum insertion use [57]. In this case, it is probably also preferable to find out husband's reaction with regard to the lengthened threads.

** Results from two case–control studies [62,63], however, suggested that women's subsequent fertility is affected by IUD use.

The beneficial consequences of lengthening birth intervals for the mother and the infant have been well-established. It is well known that longer intervals lower the risks of maternal mortality, stillbirths, and neonatal and infant mortality. Recent studies have shown that longer birth intervals also lower the incidence of smaller-for-gestational-age births [64]. The flexibility afforded by IUD contraception thus makes it a preferable method for women who desire to lengthen their birth interval. The copper devices, which will probably be most commonly used worldwide, should suit this desire well, as they are more effective but with a more limited life span when compared to inert devices.

In summary, the studies reviewed here demonstrate that when an IUD is inserted immediately after placental delivery, it is a safe and effective contraceptive modality. With proper training and experience, expulsion rates have generally been at an acceptable level, although still not quite comparable to that for interval insertions. Better designed randomized clinical trials are in order to confirm this important suggestive finding.

The skill of the insertors and high fundal placement of the IUD were frequently asserted to be the important requirements for the safety and retention of the IUDs in postpartum insertion. The validity of these assertions needs to be ascertained in future studies so that emphasis in training can be properly placed.

Direct insertions of IUDs at cesarean section have been shown to have consistently lower expulsion rates than vaginal insertions immediate after vaginal delivery.

Randomized comparative clinical trials on new IUD types and inserters specifically developed for postpartum use have, so far, not shown promising results in either facilitating IUD insertion or in improving IUD performance over their counterpart devices and manual insertions, as the inventors had hoped for. However, with the generally favorable results of IPPIs, further development may be warranted.

A number of practical issues regarding postpartum IUD contraception need clarification. Before actually promoting IPPI of IUDs in a maternity hospital, programmatic considerations such as effective counselling of women on proper postinsertion care (including encouraging women to come back for a check-up in case of missing threads and for reinsertion in case of IUD expulsion) need to be developed. The first follow-up visit probably should be scheduled somewhat earlier than that for interval insertions, since if expulsion occurs, it will usually occur soon after insertion. Also, a cost-effect evaluation [65] might be in order for reference to the decision-makers before IPPIs of IUDs are incorporated into a family planning program.

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Resumé

La mise en place d'un dispositif intra-utérin (DIU) après un accouchement, alors que les femmes se trouvent encore à l'hôpital, présente un certain nombre d'avantages. Toutefois, dans des rapports antérieurs, cette pratique a généralement été associée à des taux de rejet élevés. D'autre part, des études récentes ont montré que si l'insertion du DIU de fait immédiatement après l'expulsion du placenta (dans les 10 minutes qui suivent), cette méthode est sûre et efficace. Certains centres expérimentés ont rapporté des taux de rejet relativement faibles. La présente étude passe en revue les expériences décrites dans des études internationales sur les insertions des DIU après le post-partum, résume les enseignements tirés de ces expériences et suggère des orientations pour les recherches futures.

Resumen

La inserción de un dispositivo intrauterino (DIU) después des parto, mientras las mujeres continúan hospitalizadas, presenta cierto número de ventajas. Sin embargo, en informes anteriores, esta práctica estuvo asociada generalmente con tasas elevadas de rechazo. Por otra parte, estudios recientes señalaron que si la inserción del DIU se realiza immediatamente después de la expulsión de la placenta (dentro de los 10 minutos siguientes), este método es seguro y eficaz. Ciertos centros experimentados señalaron tasas de rechazo relativamente bajas. En este estudio se examinan las experiencias descritas en estudios internacionales sobre las inserciones posparto de DIU, se resumen las lecciones aprendidas de estas experiencias y se sugieren orientaciones para futuras investigaciones.