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Original Article

Intrauterine pregnancies conceived in the presence of intrauterine devices (IUD): a single center experience

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Abstract: Aim: This study aims to investigate the clinical and perinatal outcomes of pregnancies occurring in the presence of an intrauterine device (IUD). Material and Method: A total of 132 women diagnosed as having pregnancies complicated by IUDs in situ with visible strings were retrospectively examined during a period of six years. Twenty-nine women who chose to keep their IUDs in situ during pregnancy were included in Group 1 whereas 103 women who had their IUDs removed during pregnancy were included in Group 2. Results: Age, parity, frequency of IUD insertion at a maternity hospital and frequency of IUDs located within the uterine corpus were significantly higher in women who retained their IUDs compared to women who had their IUDs removed (p=0.02, p=0.04, p=0.02 and p=0.01, respectively). Although women who retained their IUDs had a significantly higher frequency of perinatal complications, they had a higher gestational week at delivery as well as higher Apgar scores at both 1 and 5 minutes (p=0.01, p=0.02 and p=0.02, respectively). Gestational age at preterm delivery was significantly lower in women who retained their IUDs during pregnancy (31.4±6 weeks vs. 33.0±4 weeks, p=0.01). Conclusion: Although removing IUDs with visible strings during pregnancy may increase the abortion risk, retaining them is also associated with adverse perinatal outcomes such as preterm premature rupture of membranes and preterm delivery. If an IUD located within the uterine cavity is retained during pregnancy, it may act as a filter allowing pregnancies to reach term.

Keywords: Intrauterine device, contraception, complication, perinatal, pregnancy

Introduction

An intrauterine device (IUD) is a small, often T-shaped birth control device that is inserted into a woman's uterus to prevent pregnancy. Offering long-acting and reversible birth control, IUDs are amongst the most frequently adopted contraceptive methods in developed countries. Approximately 23% of women who resort to contraceptive methods have IUDs, with varying rates from less than 2% to more than 40% depending on the country [1, 2].

Women with IUDs may still conceive and have pregnancies complicated by IUDs. Complications may occur in association with the IUD in situ or as a result of advanced age, previous IUD expulsion, misplacement, and malfunction due to broken arms or passed expiry date [3, 4]. Occurrence of such pregnancies may surprise both gynecologists and couples **Figure 1**. Removing as well as retaining IUDs has some important clinical implications for the complicated pregnancies. In deed, the best approach to be adopted for pregnancies complicated by IUDs is still under debate. The World Health Organization (WHO) recommends the removal of the device as soon as pregnancy is established provided that strings are visible allowing a safe retrieval of the device from the cervical canal. Such a recommendation is based on the need for avoiding complications related with the maintenance of a foreign object within the uterine cavity. These complications include miscarriage, chorioamnionitis, preterm premature rupture of membranes (PPROM) and preterm delivery. Women who have pregnancies complicated by IUDs should be provided with

Figure 1. Gestational sac with IUD.

information about the possible risks of retaining as well as removing the device, and written informed consent should be obtained before any intervention is attempted in those pregnancies [5-9].

This study aims to investigate the clinical and perinatal outcomes of pregnancies complicated by IUDs.

Material and method

This study was approved by the Institutional Review Board and Ethics Committee of Diyarbakir Maternity Hospital. Written informed consent was obtained from each patient. A total of 167 women who were diagnosed as having pregnancies complicated by IUDs in situ with visible strings were retrospectively examined between 1st January 2010 and 1st July 2016 at the family planning unit of Diyarbakir Maternity Hospital. Thirteen patients with IUDs inserted immediately after delivery, 11 patients with ectopic pregnancies associated with the IUD in situ, 8 patients with missing information about IUD insertion, and 3 patients with IUDs other than Copper T 380A type were excluded from the study.

All women who had intrauterine pregnancies complicated by IUDs in situ and their partners were counseled about the possible risks of retaining as well as removing the device. Twenty-nine women who chose to retain their IUDs during pregnancy were assigned to Group 1 whereas 103 women who had their IUDs removed during pregnancy were assigned to Group 2. Data on maternal age, obstetric history, duration of IUD use, gestational age at diagnosis and delivery, location of the IUD, presenting symptoms, perinatal complications, mode of delivery, birth weight, and Apgar scores were acquired from the hospital records.

Statistical analyses

Data were analyzed by using Statistical Package for Social Sciences software version 12.0 SPSS (IBM Corp, Released 2012. IBM SPSS Statistics for Windows, Version 21.0, NY: IBM Corp, NY, USA). Shapiro Wilk test was used for assessing whether the variables follow normal distribution or not. Variables were reported as median (minimum: maximum) with mean ± standard deviation values. According to normality test result independent samples Mann Whitney U test was used for between group comparisons. Categorical variables were compared by Chi square test, Fisher's exact test or Fisher-Freeman-Halton test. The variables which were found statistically significant in univariate analysis were taken into logistic regression analysis to determine independent risk factor that affect RIA withdrawal and the level of significance was set at α=0.05.

Results

Table 1 demonstrates the demographic and clinical characteristics of the patients. Age, parity, frequency of IUD insertion at a maternity hospital and frequency of IUDs located within the uterine corpus were significantly higher in women who retained their IUDs compared to women who had their IUDs removed (p=0.02, p=0.04, p=0.02 and p=0.01, respectively). There were no significant differences between the two groups with respect to gravidity, number of living children and duration of IUD use (p>0.05 for all).

Table 2 shows the perinatal characteristics of the patients. There were no significant differences between the two groups with respect to gestational age and clinical symptoms at diagnosis (p>0.05 for both). However, frequency of perinatal complications was significantly higher (p=0.01) and gestational age at preterm delivery was significantly lower in women who retained their IUDs during pregnancy (33.04

Table 1. Demographic and clinical characteristics of the patients

	Group 1 (n=29)	Group 2 (n=103)	p
Age (years)	30.8±4.0	28.4±5.4	0.02*
Gravidity	4.2±1.9	3.7±1.4	0.07
Parity	3.1±1.2	2.4±1.2	0.04*
Number of living children	2.9±1.1	2.4±1.2	0.07
Duration of IUD use (years)	3.2±1.2	2.5±1.2	0.07
IUD insertion facility			
Maternity hospital	26 (89.7%)	60 (58.3%)	0.02*
Primary health care facility	3 (10.3%)	43 (41.7%)	
IUD location at admission			
Corpus	22 (75.9%)	16 (15.5%)	0.01*
Cervix	7 (24.1%)	87 (84.5%)	

*p<0.05 was significant. IUD: Intrauterin device.

weeks vs. 31.4±9 weeks, p=0.01). On the other hand, there was no significant difference between the two groups with respect to gestational age at PPROM (34.8±5 weeks vs. 35.2±4 weeks, p=0.548).

Mean gestational age at IUD removal was 9.7±8 weeks in women who chose to have their IUDs removed during pregnancy. As to women who chose to retain their IUDs during pregnancy, 27 women had their IUDs removed right after delivery whereas two resorted to hysteroscopic surgery for IUD removal after abortions. **Table 3** demonstrates the obstetric outcomes of the patients. Women who retained their IUDs had a significantly higher gestational age at delivery as well as higher Apgar scores at both 1 and 5 minutes (p=0.02 for each). There were no significant differences between the two groups with respect to the difference between one-minute and five-minute Apgar scores, mode of delivery, and birth weight (p>0.05 for all).

The risk factors affecting the withdrawal of the RIA are shown in **Table 4**. When the value of parity increases by 1 unit, the probability of deciding in favor of retaining the IUD increases by 5.76 times. The probability of deciding in favor of retaining the IUD increases by 73.24 times if the IUD is located within the uterine corpus compared to IUDs located within the cervix. The probability of finding the IUD within the uterine corpus is 9,01 times higher in patients with complications requiring hospitalization compared to those without complications. Other variables in the Table were not considered to be significantly influential on the probability of deciding in favor of retaining the UID. Significance for logistic regression model p<0.001.

Discussion

IUDs are regarded as one of the most effective long-acting contraceptive methods. More than 150 million women prefer IUDs for contraception. The mechanism of action for IUDs is multifactorial. These devices act as foreign objects and induce an intense sterile inflammatory reaction, which triggers a spermicidal environment in the uterine cavity. In addition, existence of copper in IUDs potentiates the spermicidal environment within the uterus [3, 10]. Copper-containing IUDs are recommended to stay in the uterine cavity for 3-7 years; however, several studies indicate that these devices can be used safely for up to 12 years. The Pearl index for copper-containing IUDs is 0.8% with typical use and 0.6% with perfect use. The failure rate can increase up to 2.2% in the first year of the IUD use. This increase is usually attributable to the relatively higher incidence of displacement during the first year [11, 12]. Accordingly, Moschos *et al.* concluded that an intrauterine pregnancy was three times more likely to occur with a displaced or missing IUD [13].

Intrauterine pregnancies that occur in the presence of an IUD in situ bring about questions about the best approach for their management. Brahmi *et al.* conducted a systematic review of nine studies investigating the outcomes of pregnancies complicated by IUDs in situ. They found that pregnancies occurring in the presence of an IUD in situ were associated with a higher risk of undesired perinatal outcomes such as miscarriage, chorioamnionitis and preterm delivery. Moreover, women who retained their IUDs were more likely to experience adverse perinatal outcomes than women who had their IUDs removed. Even if IUDs were removed, the risk of preterm delivery was not lower than the risk of preterm delivery in pregnancies occurring without an IUD [14]. Later, Kim *et al.* reported that the incidence of PPROM was significantly higher in women who conceived in the presence of an IUD and chose to

Table 2. Perinatal characteristics of the patients

	Group 1 (n=29)	Group 2 (n=103)	p
Gestational age at diagnosis (weeks)	5.5±1.6	6.3±2.3	0.12
Clinical symptoms at diagnosis			
Menstrual delay	25 (86.2%)	78 (75.7%)	0.23
Menstrual irregularity	4 (13.8%)	25 (24.3%)	
Perinatal complications			
None	12 (41.4%)	83 (80.6%)	0.01*
Miscarriage	2 (6.9%)	7 (6.8%)	
Preterm premature rupture of membranes	5 (17.2%)	5 (4.9%)	
Preterm delivery	10 (34.5%)	8 (7.7%)	

*p<0.05 was significant.

Table 3. Obstetric outcomes of the patients

	Group 1 (n=29)	Group 2 (n=103)	p
Gestational age (weeks)	38.6±1.6	36.9±3.0	0.02*
Type of delivery			
Vaginal	79 (78.2%)	9 (47.4%)	0.05
Cesarean section	22 (21.8%)	10 (52.6%)	
Birth weight	3306.1±363.2	3046.0±658.3	0.12
1th minute APGAR score	7.95±0.7	7.47±1.02	0.02*
5th minute APGAR score	9.53±0.64	9.05±1.18	0.02*
APGAR (5th min→1st min)	1.58±0.49	1.58±0.51	0.96

*p<0.05 was significant.

Table 4. Risk factors affecting IUD withdrawal

Risk Factor	Wald	OR (%95CI)	p
Age	3.68	0.70 (0.48:1.01)	0.055
Parity	5.55	5.76 (1.34:24.72)	0.018*
IUD location at the diagnosis	0.11	1.12 (1.07:1.17)	
Cervix	-	Reference	-
Corpus	11.75	73.24 (6.29:853.03)	0.001*
Where was the IUD applied			
Hospital	-	Reference	-
The health clinic	0.15	0.66 (0.10:5.17)	0.695
Gestational week at delivery	0.05	0.93 (0.52:1.67)	0.819
1th minute APGAR score	0.11	1.34 (0.23:7.91)	0.741
5th minute APGAR score	0.62	0.47 (0.08:3.01)	0.429
Birth type			
Vaginal delivery	-	Reference	-
Cesarean section	0.01	0.94 (0.15:5.76)	0.942
Complications			
None	-	Reference	-
Medical treatment	0.98	5.62 (0.19:170.69)	0.322
Hospitalization	5.06	9.01 (1.33:61.09)	0.004*

*Significance for logistic regression model p<0.001. IUD: Intrauterin device.

keep them during pregnancy [15].

In agreement with the previously published observational studies, a recent Turkish study reported a significantly higher risk of adverse pregnancy outcomes including miscarriage, PPROM and preterm delivery in women who kept their IUDs during pregnancy [6, 7, 16, 17]. The present study also indicated a significantly higher risk of PPROM and preterm delivery in women who kept their UIDs. However, there was statistically no significant difference between the two groups of women with respect to miscarriage. Such differences of results between the studies may be due to the different demographic and clinical characteristics of the patients.

In this study, women in Group 1 were significantly older and had significantly higher parity, which might have confounded the relationship between IUD maintenance and perinatal complications. Another potential confounding factor was the intrauterine location of most of the IUDs that were retained. Such location might have caused women to decide in favor of retaining their IUDs because of the increased risk of spontaneous abortion associated with the removal of the device. Therefore, the risk of abortion did not increase significantly in Group 1. On the other hand, the risk of PPROM and preterm delivery increased significantly

in Group 1 since it was more probable that an IUD located within the uterine corpus would interfere with the progression of the pregnancy [14, 15, 17]. Another important point to be emphasized is that the majority of IUDs that were retained because of their location had been inserted at a maternity hospital. This highlights the importance of professional expertise in the application of IUDs. IUD insertion by experienced midwives and gynecologists at tertiary health centers may decrease the displacement incidence, thus reducing the associated pregnancy risks [18].

The aforementioned Turkish study also reported that gestational age at delivery and Apgar scores were significantly lower in women who kept their IUDs compared to those who had them removed [17]. In the present study, on the other hand, gestational age at delivery and Apgar scores were significantly higher in women who kept their UIDs. Such differences of results between the studies are attributable to the different demographic and clinical characteristics of the patients. In addition, women who keep their IUDs during pregnancy are more likely to experience perinatal complications but the obstetric outcomes would be more favorable if their pregnancies reach term.

In the present study, it was hypothesized that retention of an IUD within the uterine corpus posed a risk for maintenance of healthy pregnancies. This hypothesis was reinforced by the result that gestational age at preterm delivery was significantly lower in women who retained their IUDs. Limitations of the present study included the retrospective design, relatively small and heterogeneous sample size, absence of data on biochemical markers indicating inflammation and lack of standardization in timing and techniques of IUD removal.

In conclusion, perinatal complications occur more frequently in women who choose to retain their IUDs during pregnancy. Although removing IUDs with visible strings during pregnancy may increase the risk of abortion, retaining them is also associated with adverse perinatal outcomes such as PPROM and preterm delivery. If an IUD located within the uterine cavity is retained during pregnancy, it may act as a filter that allows pregnancies to reach term. Further research is needed to determine the best approach for the management of pregnancies occurring in the presence of an IUD.

Disclosure of conflict of interest

None.

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