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ORIGINAL ARTICLE

Pelvic inflammatory disease among users and non-users of an intrauterine device

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ABSTRACT

The correlation between pelvic inflammatory disease (PID) and a present intrauterine device (IUD) has been debated. We aimed to evaluate the differences between IUD users and non-users among women hospitalised with a diagnosis of PID. Our hypothesis was that the role of a present IUD among PID patients is minimal, if any. We performed a retrospective cohort study during 2010–2018 in a tertiary university hospital. Overall, 474 hospitalised patients were diagnosed with PID. Of these, 121 patients were IUD users. The patients without an IUD were younger and had lower gravidity and parity. Among the patients without an IUD, higher rates of prior history of PID and fever at presentation were noticed. In 23.9% (29/121) of women, the IUD was inserted less than four weeks prior to the PID diagnosis. The patients with an IUD insertion-associated PID, had lower rates of tubo-ovarian abscess (2 (6.9%) versus 24 (26.0%), OR [95% CI] 0.18 (0.04–0.84), $p = .02$) at presentation, as well as a shorter length of stay (LOS) (median 4 versus 5 days, $p = .05$). In a patient in whom the IUD was retained, hospitalisation period was shorter (median LOS 4 days versus 5 days, $p = .007$). PID inpatients who carry an IUD represent a specific subset of patients with a milder disease.

IMPACT STATEMENT

- **What is already known on this subject?** The correlation between pelvic inflammatory disease (PID) and a present intrauterine device (IUD) is debateable.
- **What the results of this study add?** PID inpatients who carry an IUD represent a specific subset of patients with milder disease.
- **What the implications are of these findings for clinical practice and/or further research?** Our results show that in IUD users with PID, the practice of IUD removal as part of their PID treatment is of little benefit.

KEYWORDS

Intrauterine device; intrauterine device culture; intrauterine device removal; pelvic inflammatory disease; tubo-ovarian abscess

Introduction

Pelvic inflammatory disease (PID) is a serious complication of sexually transmitted infections (STIs) and of certain gynaecological procedures. PID comprises a spectrum of inflammatory pathologies along the female genital tract with an annual incidence of up to 2% among sexually active women (Workowski et al. 2015). An intrauterine device (IUD) represents one of the most effective contraceptive methods and rapidly gained popularity in recent decades among women across all age groups (Jatlaoui et al. 2017). Approximately, 15% of PID cases are attributed to procedures that involve the breakage of the cervical mucus barrier (Lobo et al. 2017). The correlation between microbiological pathogens associated with PID and IUD usage is debated with conflicting results reported (Svensson et al. 1984; Grimes and Schulz 2001; Ness et al. 2005; Viberga et al. 2005; Bohm et al. 2010; Hubacher et al. 2013). It is well established that increased risk for PID associated with IUD utilisation, if it exists, is mainly restricted to the first four weeks after insertion (Grimes 2000; Viberga et al. 2005; Workowski et al. 2015). Moreover, it has been previously shown that treatment outcomes of patients with PID are not different between women in whom the IUD was retained and those in whom it was removed (Tepper et al. 2013). Accordingly, current guidelines state that in patients with PID carrying an IUD, the IUD should not be removed (Curtis et al. 2016).

Due to the lack of clarity in the literature, we sought to evaluate the clinical course differences between IUD users and non-users of an IUD, among women hospitalised with diagnosis of PID. Our hypothesis was that the role of a present IUD among PID patients is minimal, if any.

Materials and methods

Patients

This is a retrospective cohort study. The study cohort comprised all patients diagnosed with a PID and treated as inpatients in a tertiary medical centre during 2010–2018. PID diagnosis was made in accordance with diagnostic criteria published in recent guidelines by the United States Centers for Disease Control and Prevention criteria for PID

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(Workowski et al. 2015). All women included in the study meet the diagnostic criteria for PID with at least one 'minimum criteria' and at least one 'additional criteria' (Workowski et al. 2015). In short, PID diagnosis was established in sexually active women experiencing pelvic or lower abdominal pain, excluding other aetiologies for their complaints and including one of the following: cervical motion tenderness (CMT), uterine tenderness or adnexal tenderness. In our centre, patients with PID are hospitalised in cases of the following: the presence of a tubo-ovarian abscess (TOA), severe illness (as most patients in emergency department encounters suffering from a PID are having mild-moderate disease) (Ness et al. 2002), nausea and vomiting or fever >38 °C and patients who are judged not to be compliant with an outpatient treatment regimen. We excluded patients who were recently treated in an outpatient fashion (oral antibiotics) for a diagnosis of PID in accordance with the anamnesis query performed at the emergency department, as documented in the medical file.

Data collection

For the purpose of this study, data on PID hospitalisations from 2010 to 2018 were extracted from our tertiary medical centre's database (based on International Classification of Diseases – 9th revision – Clinical Modification (ICD-9) codes to identify PID). We retrieved patients' hospital admission records, gynaecological ward follow-up charts, laboratory and imaging scan reports, operation reports and discharge letters from the electronic medical record databases of the gynaecological unit in our medical centre. Records were reviewed by a single reviewer (G.L). The following data were extracted: patient characteristics (age, body mass index (BMI), gravidity, parity, history of documented PID, marital status and current usage of an IUD and time elapsed since IUD insertion), current admission characteristics: (body temperature, C-reactive protein (CRP) serum level, white blood cell (WBC) count, erythrocyte sedimentation rate (ESR), presence of a TOA and physical examination findings (pelvic tenderness, fundal tenderness, CMT, abnormal cervical discharge)). Clinical outcomes, including length of stay (LOS) and readmissions, as well as culture results of vaginal, cervical, urine, IUD, blood and aspirated TOA samples, were also reviewed. Marital status was defined as accepted, with a widow status being regarded as a single status. Recent IUD insertion was regarded as IUD insertion in the previous four weeks (Farley et al. 1992). Body oral temperature measured in Celsius centigrade measured at admission was recorded. TOA was diagnosed when objectively evident by an imaging modality (vaginal ultrasonography, computed tomography). Readmission was defined as re-hospitalisation during a period of 30 days after discharge (Havens et al. 2016). In general, inpatient treatment regimens were in accordance with the Center of Disease Control and Prevention (CDC) guidelines (Workowski et al. 2015). During study period, all of the patients were treated with the clindamycin/gentamicin regimen (clindamycin 900 mg IV every eight hours plus gentamicin in a single daily dosing (5 mg/kg) until 48 hours after clinical improvement, followed by oral therapy with clindamycin (450 mg orally four times daily) or doxycycline (100 mg twice daily), home prescribed to complete the therapy on an outpatient basis).

Microbiology

IUD removal was performed at the discretion of the attending gynaecologist at the emergency department. Removed IUD were sent to the our hospital's microbiology laboratory immediately following extraction. Bacterial identification was performed using the Vitek2 or Vitek MS systems (BioMerieux, St. Louis, MO). Established PID causative bacteria (Chow et al. 1975; Eschenbach et al. 1975, Anon 1982; CDC 1995) were separated from suspected contaminants, such as *staphylococci coagulase-negative, bacillus* species and common vaginal flora.

Statistical analysis

The patient characteristics are described as proportions for categorical variables and medians, interquartile ranges and means for continuous variables without a normal distribution. The significance between the groups was assessed by the Chi-square test and Fisher's exact test for categorical variables. The Student *t* test was used for analysis of continuous variables with normal distribution and the Mann–Whitney *U* test for analysis of continuous variables with a skewed distribution. A two-sided p value $< .05$ indicated statistical significance. Data were analysed using the Software Package for Statistics and Simulation (IBM SPSS version 22, IBM Corp., Armonk, NY).

Ethical approval

Approval was obtained from the institutional review board of the Hadassah Medical Center before the data extraction was performed. The approval date was made on 15 December 2018. The requirement for written informed consent was waived by the institutional review board.

Results

Overall, 474 women diagnosed with PID and hospitalised for inpatient intravenous antibiotic treatment, were included in our study. Of these, 25.5% (121/474) patients were IUD users at the time of PID diagnosis. Table 1 presents the patients' demographic and clinical characteristics. The patients without an IUD were younger (median age 32 years *versus* 38 years, $p < .001$) and had a lower gravidity and parity. The proportion of single women was higher among patients without an IUD (25.0% *versus* 4.1%, $p < .001$). Among the patients without an IUD, we noticed a higher proportion of a prior history of PID (17.8% *versus* 9.1%, $p = .02$) and fever at presentation (17.3% *versus* 9.1%, $p = .04$). Both of the groups were comparable in terms of the patients' BMI, inflammatory markers at presentation (CRP, WBC and ESR), clinical characteristics (TOA rate, findings of physical examination) and outcome

Table 1. Patient, disease characteristics and outcomes according to IUD association.

	IUD associated PID $N = 121$	Non-IUD associated PID $N = 353$	p Value
Patient characteristics			
Age, years	38 [30–48] (37)	32 [24–39] (34.4)	<.001
BMI (kg/m^2)	25.1 [23.1–27.3] (25.6)	24.5 [22.2–27.7] (25.3)	.78
Marital status			<.001
Married	98 (81.0%)	227 (64.3%)	
Divorced	18 (14.9%)	38 (10.7%)	
Single	5 (4.1%)	88 (25.0%)	
Obstetrical and medical history			
Gravidity	4 [3–5] (4)	2 [1–4] (3)	.01
Parity	3 [2–4] (3)	2 [0–3] (2)	.04
Prior history of PID	11 (9.1%)	63 (17.8%)	.02
Clinical presentation			
Fever ≥38 °C at presentation	11 (9.1%)	61 (17.3%)	.04
Lower abdominal tenderness	99 (81.8%)	292 (83.0%)	.61
Fundal tenderness	55 (45.4%)	141 (39.9%)	.28
Adnexal tenderness	57 (47.1%)	154 (43.6%)	.50
Cervical motion tenderness	72 (59.5%)	181 (51.2%)	.11
Abnormal cervical discharge	49 (40.5%)	115 (32.6%)	.11
CRP at admission, mg/L	1.4 [0.5–7.0] (4.6)	1.9 [0.5–6.6] (5.5)	.50
WBC at admission, ×1000/mm^3	11.0 [8.2–13.9] (11.5)	10.1 [7.8–12.9] (10.7)	.06
ESR at admission, millimetres per hour	15.5 (9.5–55.0) (30.2)	22.0 (12.0–40.0) (29.5)	.88
Tubo-ovarian abscess at presentation	26 (21.5%)	54 (15.3%)	.11
Cultures			
Positive pathological cervical culture	24/58 (41.3%)	36/133 (27.1%)	.05
Positive pathological urine culture	26/93 (27.9%)	74/305 (24.6%)	.51
Positive pathological vaginal culture	6/38 (15.7%)	23/126 (18.2%)	.70
Positive tubo-ovarian abscess culture	3/6 (50%)	17/21 (80.9%)	.13
Positive pathological blood culture	0/8 (0%)	8/79 (10.1%)	NS
Outcome			
Length of hospitalisation, days	5 [4–6] (6)	5 [4–6] (6)	.70
Readmission	7 (5.8%)	26 (7.4%)	.55

BMI: body mass index; CRP: C-reactive protein; ESR: estimated sedimentation rate; IUD: intrauterine device; PID: pelvic inflammatory disease; WBC: white blood cell.
All continuous variables are expressed as median [interquartile range] (mean).

(LOS and readmission rate). Of note, IUD users had a higher proportion of positive pathological cervical culture (41.3% *versus* 27.1%, $p = .05$).

Among IUD users, 89.2% (108/121) had a copper IUD and 10.8% (13/121) had a hormonal IUD. The median time from IUD insertion to PID diagnosis was 78 weeks, interquartile range (4–208). In 23.9% (29/121) of women, the IUD was inserted less than four weeks prior to the PID diagnosis. As compared to patients who were diagnosed with PID more than four weeks after they underwent IUD insertion, the patients who developed PID less than four weeks after IUD insertion were younger (median age 33 *versus* 38, $p = .02$), had lower rates of TOA at presentation (6.9%) *versus* 24 (26.0%), OR (95% CI) 0.18 (0.04–0.84), $p = .02$) and shorter LOS (median 4 *versus* 5 days, $p = .05$) as presented in Table 2. We further compared women with an IUD insertion associated PID (i.e. occurring in the first four weeks after insertion) ($n = 29$) to all other patients diagnosed with a PID ($n = 445$). Women with an IUD insertion-associated PID were of higher parity order, with lower CRP at presentation and were discharged earlier from the hospital (median LOS 4 days *versus* 5 days, $p < .001$).

The IUD was removed in 91.7% (111/121) of cases diagnosed with PID. In patients in whom the IUD was retained, the hospitalisation period was shorter (median LOS 4 days *versus* 5 days, $p = .007$), as presented in Table 3. Overall, a total of 99 IUD removed were cultured for pathogens. A positive IUD culture was present in 32.3% (32/99) of cases. The most common pathogen isolates were *Escherichia coli* ($n = 11$), followed by *streptococci group B* ($n = 10$), *streptococci anginosus* ($n = 3$), *Enterococci faecalis* ($n = 3$), *streptococci pyogenes* ($n = 2$) and *streptococci pneumonia*, *haemophilus influenza* and *candida albicans*, one isolate each. Ten women with positive pathogenic IUD cultures had identical isolates to those cultured from additional sites (urine, $n = 7$; cervix, $n = 3$). Women with positive IUD cultures had a higher rate of a prior history of PID (21.8% *versus* 5.8%, $p = .01$), as was the positive pathological cervical culture group (66.6% *versus* 37.0%, $p = .05$).

Discussion

In this study, we show that IUD users have a milder PID course with lower temperatures and a lower rate of previous PID as compared to non-IUD users. Furthermore, women with a recent IUD insertion associated PID were shown to have a shorter LOS, possibly implying a milder disease, and lower levels of inflammatory markers, as compared to those with non-recent insertion or patients without an IUD.

Regarding the association between an IUD and PID, previous studies have hypothesised that IUD insertion increases the risk of PID due to uterine contamination from cervical microorganisms at the time of uterine instrumentation (Hubacher 2014; Liabsuetrakul and Peeyananjarassri 2018). Moreover, evidence shows that the risk of PID among IUD users is relatively low and similar to that of the general population of sexually

Table 2. Patient and disease characteristics and outcomes according to IUD insertion time.

	Insertion of IUD< 4 weeks before PID diagnosis $N = 29$	Insertion of IUD > 4 weeks before PID diagnosis $N = 92$	p Value
Patient characteristics			
Age, years	33.0 [27.0–39.5] (33.8)	38.0 [33.5–44.0] (37.9)	.02
BMI	25.7 [23.0–27.0] (25.9)	25.5 [22.4–27.6] (26.0)	.72
Marital status			.33
Married	25 (86.2%)	73 (79.3%)	
Divorced	2 (6.9%)	16 (17.3%)	
Single	2 (6.9%)	3 (3.4%)	
Obstetrical and medical history			
Gravidity	4 [3–4] (4)	4 [2–5] (4)	.99
Parity	3 [2–4] (3)	3 [2–4] (3)	.93
Previous documented PID	4 (13.7%)	7 (7.6%)	.32
Intrauterine device type			.14
Copper	28 (96.5%)	80 (86.9%)	
Hormonal	1 (3.5%)	12 (13.1%)	
Time elapsed from IUD insertion to PID diagnosis, weeks	3 [2–3] (3)	156 [67–273] (209)	<.001
Clinical presentation			
Fever ≥38 °C at presentation	5 (17.2%)	6 (6.5%)	.08
Lower abdominal tenderness	23 (79.3%)	76 (82.6%)	.70
Fundal tenderness	15 (51.7%)	40 (43.4%)	.33
Adnexal tenderness	16 (55.1%)	41 (44.5%)	.41
Cervical motion tenderness	20 (68.9%)	52 (56.5%)	.90
Abnormal cervical discharge	15 (51.7%)	34 (36.9%)	.15
CRP at admission, mg/L	1.3 [0.7–5.2] (2.9)	1.7 [0.9–10.1] (11.1)	.13
WBC at admission, ×1000/mm^3	10.5 [7.6–13.6] (11.0)	11.3 [8.3–14.2] (11.4)	.64
ESR at admission	14.0 (10.0–47.5) (26.4)	16.5 (7.5–39.0) (29.6)	.78
Tubo-ovarian abscess at presentation	2 (6.9%)	24 (26.0%)	.02
Cultures			
Positive pathological cervical culture	6/13 (46.1%)	18/45 (40.0%)	.70
Positive pathological urine culture	4/26 (15.3%)	22/67 (32.8%)	.10
Positive pathological vaginal culture	2/10 (20.0%)	4/28 (14.2%)	.65
Positive tubo-ovarian abscess culture	0 (0%)	3/6 (50.0%)	.38
Positive pathological intrauterine device culture	6/18 (33.3%)	25/81 (30.8%)	.80
Outcome			
Length of hospitalisation, days	4 [3–5] (4)	5 [4–7] (6)	.05
Readmission	1 (3.5%)	6 (6.5%)	.54
Invasive procedure			.28
PCT aspiration	1 (3.4%)	7 (7.6%)	
Surgical aspiration	0 (0%)	2 (2.1%)	

BMI: body mass index; CRP: C-reactive protein; ESR: estimated sedimentation rate; IUD: intrauterine device; PID: pelvic inflammatory disease; WBC: white blood cell.
All continuous variables are expressed as median [interquartile range] (mean).

active women (Kessel 1989; Farley et al. 1992; Beerthuizen 1996; Hubacher 2014). Nevertheless, a four-fold increased rate of PID was shown during the four weeks following IUD insertion (Farley et al. 1992; Grimes 2000; Hubacher et al. 2013; Hubacher 2014). It is possible that the IUD insertion is a critical period of 'all or none' regarding PID establishment, either the body will manage to clear bacterial inoculation and avoid PID or bacterial inoculation will prevail and PID will develop shortly after. Therefore, it is not surprising that Mishell et al. have demonstrated that after contamination of the uterine cavity, the uterus cleanses itself (Mishell et al. 1966) and the bacterial contamination in the uterus is inversely related to time since IUD insertion. Regarding the role of non-recently inserted IUD among PID patients, if an IUD is affixed in place and bacterial exposure occurs thereafter, the mechanism for PID establishment is less intuitive and is also under-reported (Mohllajee et al. 2006).

It is unsurprising that we demonstrated higher proportion of a prior history of PID among the non-IUD users, this could be explained by a preference for utilisation of other forms of contraception, as recurrent and recent PID are considered contraindications for IUD insertion (Nelson 2007). However, this difference could be an alternative explanation for a more complicated clinical presentation in the non-IUD users group.

Fever was less common among the IUD users, this could be explained by a diagnostic bias, as primary care physicians are more likely to refer patients with an affixed IUD for evaluation earlier at symptoms or complaints onset; so are the patients themselves. As such, these patients are admitted earlier in the course of their PID, before systemic signs and fever might develop (Kessel 1989; Hubacher et al. 2013).

Whether there is a difference in outcomes between patients with PID who retained their IUD *versus* those who had it removed is a matter of debate (Tsanadis et al. 2002; Tepper et al. 2013; Fouks et al. 2019; Myriam Safrai et al. 2019). In our study, the patients who retained their IUD had a shorter LOS. Our findings are in line with those of a systematic review which demonstrated that women who retained

Table 3. Patient and disease characteristics and outcomes according to IUD removal.

	IUD not removed $N = 10$	IUD removed $N = 111$	p Value
Patient characteristics			
Age, years	38 [33–45] (38)	36 [30–42] (36)	.49
Marital status			.31
Married	10 (100.0%)	88 (64.2%)	
Divorced	0 (0%)	18 (10.8%)	
Single	0 (0%)	5 (25.0%)	
Obstetrical and medical history			
Gravidity	4 [4–5] (5)	4 [2–5](4)	.11
Parity	4 [3–5] (4)	3 [2–4](3)	.005
Previous documented PID	1 (10.0%)	10 (9.0%)	.91
Clinical presentation			
Lower abdominal tenderness	8 (80.0%)	91 (83.4%)	.77
Fundal tenderness	6 (60.0%)	49 (44.1%)	.33
Adnexal tenderness	6 (60.0%)	51 (45.9%)	.45
Cervical motion tenderness	7 (70.0%)	65 (58.5%)	.44
Abnormal cervical discharge	4 (40.0%)	45 (40.5%)	1
Fever $\geq$38 °C at presentation	2 (20.0%)	9 (8.1%)	.21
CRP at admission, mg/L	0.9 [0.1–8.6] (3.6)	1.4 [0.6–7.4] (4.1)	.85
WBC at admission, $\times$1000/mm^3	11.6 [7.0–13.7 (11.8)	11.6 [8.1–13.9] (11.3)	.71
ESR at admission	14.0 (11–47.0) (26.0)	20.0 (8.0–55.0) (30.1)	.77
Tubo-ovarian abscess at presentation	0 (0%)	26 (23.4%)	.08
Outcome			
Length of hospitalisation, days	4 [2–5] (4)	5 [4–6] (6)	.007
Readmission	0 (0%)	5 (4.5%)	.49

BMI: body mass index; CRP: C-reactive protein; ESR: estimated sedimentation rate; IUD: intrauterine device; PID: pelvic inflammatory disease; WBC: white blood cell.
All continuous variables are expressed as median [interquartile range] (mean).

their IUD had similar or even better outcomes than women who had their IUD removed (Tepper et al. 2013).

It was recently questioned whether there is a benefit in culturing the IUD in PID patients (Fouks et al. 2019). We found that two thirds of cultured IUD had negative culture results and all cultured isolated pathogens in our study were found susceptible to the empirical treatment suggested by the accepted guidelines (Workowski et al. 2015). As previously suggested (Fouks et al. 2019) and given the relatively low positive culture rate and the susceptibility of the pathogens in the cohort examined, IUD removal for purposes of attaining an IUD cultures is probably unnecessary. It is worth noting that one third of positive cultures had the same pathogen cultured from other sources at the same time. Coupled with our finding that a retained IUD had shorter LOS, it can be suggested that a strict protocol for urine and cervical culture should be implemented when managing PID patients.

Our rate of positive IUD cultures (32.3%) is lower than the rate reported in other studies (Tsanadis et al. 2002; Fouks et al. 2019). However, these studies defined a culture as positive even if more than one microorganism was isolated and when normal vaginal flora microorganisms were isolated. Nevertheless, in accordance with previous reports, the most common microorganisms identified were *Escherichia coli* and *Enterococcus faecalis* (Tsanadis et al. 2002; Fouks et al. 2019). Interestingly, among our cohort, no cases of Chlamydia or Gonorrhoea were found. Furthermore, none of cultures from extracted IUD resulted in a change of antibiotic treatment regimen, implying sufficient empirical treatment protocols. All of the aforementioned underlines the questionable role of IUD removal and culture considering its low clinical importance.

Our study shows that IUD users had a higher proportion of positive pathological cervical cultures. Nevertheless, in only three cases of pathological cervical culture, the same pathogen was concurrently cultured from retrieved IUD. This comes in line with previous publications that pathogens isolated from recovered IUD, are not necessarily related to PID pathogenesis (Tsanadis et al. 2002; Pál et al. 2005; Quentin and Verdon 2012). This finding further highlights the importance of cervical cultures during the evaluation of a patient with a PID.

In the current cohort, a substantial proportion (one fourth) of the women admitted for inpatient treatment for PID were IUD users. As IUD is the most widely used reversible method of contraceptive among sexually active women, and the rate of PID among IUD users is about 1.6 cases per 1000 woman: years (Farley et al. 1992; Kaneshiro and Aeby 2010), guidelines for the management of these women, although lacking, are of utmost importance. Our study takes another step forward towards in optimising these patients' management and decision making strategies.

Biases in PID studies are a matter of concern (Hubacher et al. 2013). PID is a clinical diagnosis and hence lacks objective criteria (Hager et al. 1983). Limitations in both sensitivity and specificity of the diagnosis of PID results are a substantial caveat when regarding it as an outcome measure. In our study, PID was not used as an outcome measure, thus this bias could be minimised. Another limitation in PID research is the heterogeneity of the population studied. Exposure to sexually transmitted pathogens, coital frequency and use of other contraceptives might differ among women using an IUD and those who do not. Furthermore, selection bias might exist as patients with recently inserted IUD are followed-up more closely and therefore might be over-diagnosed. We believe that these limitations are attenuated by the selection criteria of our study that included only patients who were hospitalised. Our study carries limitations associated with its retrospective nature, such as information bias and selection bias. Moreover, IUD removal was performed without a

standardised protocol, at the discretion of the attending gynaecologist at the emergency department. Moreover, the subset of patients in our study of women with an IUD inserted fewer than four weeks ago is limited by a small sample size – thus generalisability of study conclusions may be impaired. Finally, the population in our study using an IUD (and PID patients in general) is somewhat different from previous studies, probably in association with traditional and cultural differences. In our country of practice, IUD is not the first choice of contraception for nulliparous or unmarried women. Moreover, oral contraception is given with no charge for young women in national service, thus their first choice is oral contraceptives. In our study, IUD is more frequently used by married women with a higher parity or who completed family planning, thus hampering the generalisability of our findings.

In conclusion, among women with a diagnosis of PID that necessitates hospitalisation for impatient treatment, IUD users represent a specific subset of patients with a milder disease. Our results show that in these patients, IUD removal and its use for culture is of little benefit. We believe that our findings should be further evaluated in prospective studies.

Disclosure statement

The authors declare no conflict of interest.

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