Original Article

Bacterial colonization of Intrauterine Device samples from patients without a history of Pelvic Inflammatory Disease

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Abstract

Aim: In this research, we aim to evaluate microbiological colonization of intrauterine devices (IUDs) in patients without the diagnosis of Pelvic Inflammatory Disease (PID) whether it has relationship with the duration of IUD usage.

Material and Methods: Our study included patients at the Obstetrics and Gynecology Polyclinic of second degree state hospital between January 1, 2015 and January 1, 2016, who requested the removal of an IUD. A total of 176 patients were recruited for our study. Age, parity, and duration of IUD use were recorded for all patients, who sought treatment at the outpatient clinic. None of the patients had a clinical or laboratory finding of PID. IUD samples, which were collected in the sterile containers, were sent to the microbiology laboratory.

Results: The mean age of the patients recruited in our study was 34.5 years. 36 IUD cultures (20.4%) were positive. There were no statistically significant differences between the groups of patients with microorganisms cultured and those with none of the microorganisms cultured; in terms of age, parity, and duration of IUD use.

Conclusion: In this study, aerobic bacterial growth occurred in 36 patients, 20.4% of the cultures of the IUDs. In addition, our study adds data to the literature, with the statistical analysis of the groups comparing age, parity, and the duration of IUD use with positive and negative cultures of microorganisms in the IUD samples, as was not done in previous studies.

Keywords: Bacterial colonization; contraception; IUD; PID

INTRODUCTION

An intrauterine device (IUD) is birth control device that is inserted into the uterus to prevent pregnancy. The IUD, one form of long-acting reversible birth control, is a T-shaped device made of soft, flexible plastic and copper (176 mg of copper wire wrapped on the vertical stem of the T-shaped frame, and a 68.7-mg copper collar on each horizontal arm) measuring 32 × 36 mm (1).According to the statistical data published by the World Health Organization in 2007, more than 162 million women of reproductive age worldwide used an IUD (2). The TCu380A IUD is supplied sterile in a sealed primary pack together with an insertion device consisting of a high-density polyethylene tube, a moveable flange, and a rod. The moveable plastic flange is positioned on the insertion tube to control the depth of insertion and to locate the IUD correctly within the uterus during insertion. The insertion rod keeps the IUD correctly positioned within the uterus while the insertion tube is removed (2).

Advantages of the copper IUD include its ability to provide emergency contraception up to 5 days after unprotected sex. The IUD is the most effective form of emergency contraception available (3,4).

Patient adherence rates to the copper-containing IUD were 85% at 1 year, 57% at 2 years, and 28% at 5 years (5). Of 100 copper IUD users in the same research who discontinued use, 20.0% did so due to expulsion, 18.0% due to change in bleeding pattern, 15.0% due to desiring fertility, 8.0% due to abdominal or pelvic pain, and 39.0% discontinued for other or unknown reasons. According to Abraham et al, nulliparous women were more likely to discontinue their IUDs (6).

In the literature, it is advised that women who have current purulent cervicitis or known chlamydial infection or gonococcal infection should not undergo insertion of an IUD (3). Concurrent use of an IUD with pelvic inflammatory disease (PID) has been questioned ever since IUDs were invented.

This study aims to identify the alterations in endometrial flora after insertion of TCu 380A which is a type of copper IUD and evaluate microbiological colonization of IUDs in

patients, and aim to evaluate whether it has relationship with the duration of IUD usage.

MATERIAL and METHODS

This study was approved by the ethics committee for clinical studies with the approval number of 2018-152-06/06-7 of Zonguldak Bülent Ecevit University, Turkey. This study included patients at the Obstetrics and Gynecology Polyclinic of Obstetrics and Gynecology Polyclinic of second degree state hospital between January 1, 2015 and January 1, 2016, who requested the removal of an IUD. A total of 176 patients were recruited for our study. Age, parity, and duration of IUD use were recorded for all patients, who sought treatment at the outpatient clinic. Patients placed in the lithotomy position on the gynecological examination table. The cervix was visualized using a disposable sterile speculum. The cervix and vagina were cleansed with sterile cotton swabs. Then, the IUD was removed using sterile ring forceps under sterile conditions. The tail of the IUD was cut and placed in a sterile container in 15 mL of saline solution and immediately sent for aerobic cultures. After the removal of the IUD, the patient was given a routine gynecologic exam. None of the patients had a clinical or laboratory finding of PID.

Patients without PID symptoms (minimally essential criteria for PID diagnosis were bilateral adnexal tenderness, cervical motion tenderness, and lower abdominal tenderness) were included in the study.

Last 3 months antibiotic users, smokers, history of gonorrhea or chlamydia infection, multipartner patients were excluded. IUD samples, which were collected in the sterile containers, were sent to the microbiology laboratory in less than 20 minutes and seeded with bloody agar, eosin methylene blue medium, chocolate agar, and sabouraud dextrose agar growth medium.

In this study we sought to find whether there was a difference between the patients who has positive bacterial colonization or not in IUD sample according to age, parity, and duration of IUD use. This study included only women who were in a stable relationship, were non-smokers, who were aged 18 to 55 years, and who were at low risk for PID, namely single partner, non-smoker, without history of gonorrhea or chlamydia infection. The sample size was 176, and could be regarded as a large sample size for this type of research. Statistical analysis was performed with SPSS for Windows 20.0, using the Mann Whitney U test. Only $p < 0.05$ was considered significant. Before the study began, all human participants gave informed consent.

RESULTS

The mean age of the patients recruited in our study was 34.5 years (range, 18-55 y); the median age was 34 years. The mean and median parity numbers were both 2 (range, 1-5), as shown in Table 1. The mean duration of IUD use was 5.87 years (range, 1-27 years), with a median value of 5 years. All the removed 176 IUDs were copper (T Cu 380 A). Following IUD removal, 36 IUD cultures (20.4%) were

Table 1. Number of patients with negative and positive bacteriological identification in the IUDs and Test statistics between two groups				
Bacterial colonization		**Age**	**Parity**	**IUD usage (years)**
Negative (140 patients)				
	Std Deviation	8.37070	0.77270	4.38087
	Median	**33**	**2.0**	**5.0**
	Minimum	18	1.0	1.0
	Maximum	55	4.0	27.0
Positive (36 patients)				
	Std Deviation	8.74543	0.94112	4.71337
	Median	**34.5**	**2.0**	**5.0**
	Minimum	24	1.0	1.0
	Maximum	51	5.0	20.0
P (Comparison between Negative and positive group)		**0.208**	**0.399**	**0.792**
Total (176 patients)				
	Std Deviation	8.47842	0.81014	4.43702
	Median	**34**	**2.0**	**5.0**
	Minimum	18	1.0	1.0
	Maximum	55	5.0	27.0

positive. The most common microorganisms identified were Escherichia coli in 12 patients, others are as follows: *Streptococcus agalactiae* in 5 patients, *Staphylococcus epidermidis* in 4 patients, *Streptococcus mitis* in 3 patients, *Staphylococcus capitis* and *Corynebacterium minutissimum* in two patients; *Proteus mirabilis*, *Leuconostoclactis sp*, *Streptococcus acidominimus*, *Enterococcus raffinosus* and *Corynebacterium matruchotii* in one patient. There were no statistically significant differences between the groups of patients with microorganisms cultured and those with no cultured identified as far as age, parity, and duration of IUD use (Table 1). Although those 36 patients did not show any PID symptom, they had positive IUD culture results, also in previous studies with limited number of cases showed it. However in none of the studies investigated the relation of positive culture results with the duration of IUD usage.

DISCUSSION

The history of IUDs dates back to the early 1900s. The first IUD was mentioned in 1909 in an article by the German physician Richard Richter (7). His device was made of silkworm gut and was not widely used. The invention of the copper IUD in the 1960s brought with it the T-shaped design used by most modern IUDs. IUD contraception is a common way to prevent patients from pregnancies. However, it is a kind of foreign body and it causes infectious media to prevent implantation. This infectious media is completely sterile or not, it is investigated in limited number of studies as well. Also it other wonder whether this microbiological alterations are symptomatic or not. We added new questions to those remarks as whether microbiological alterations are affected by duration of IUD usage or not.

According to Pektas et al, the copper IUD causes the predominance of anaerobic species in the cervicovaginal flora, which can be attributed to the copper content or threads of the IUDs (8). Nevertheless, the authors concluded that there is no evidence that the prevalence of pelvic infections is influenced by the use of IUDs. Although IUD use may increase susceptibility to bacterial vaginosis (9), in our study bacterial flora of the removed IUDs consisted of common aerobic microorganisms that do not account for PID. The mechanism of action of the IUD appears to be accomplished by a foreign-body effect induced by the IUD frame and by local changes caused by the released medication. When the uterus is exposed to a foreign body, a sterile inflammatory reaction occurs, which is toxic to sperm and ova and impairs implantation (10). Female sterilization and the copper IUD are equally effective in preventing pregnancy; moreover, both sterilization and the IUD are associated with ectopic pregnancy if they fail; however, the chance is probably less with an IUD (11). Pelvic infection with the use of an IUD has been a topic of interest since the first years of IUD production. Various studies have reported that antibiotics use before the application of the IUD did not affect the risk of infection (12,13).

In the study conducted by Işık and his colleagues in Zonguldak, located in the Black Sea region of Turkey, the risk of cervicovaginal inflammation was not increased in IUD users; and in our study, 12.5% of the patients had aerobic bacterial colonization, but PID was not observed (14). Bacterial colonization was detected in 30% of cultured IUDs and 50% of cervicovaginal cultures in a study conducted by Mehmet H et al. in 2003 in the Urfa region of southeast Turkey (15). In our study, 20.4% of the cultures of the IUDs were positive. Although there may be regional differences between colonization in cultures, PID signs were not detected in patients that bacterial colonization in IUD samples identified.

In our study, aerobic bacterial growth occurred in 36 patients, 20.4% of the cultures of the IUDs. In addition, our study adds data to the literature, with the statistical analysis of the groups comparing age, parity, and the duration of IUD usage with positive and negative cultures of microorganisms in the IUD samples, as was not done in previous studies. Limitations of the study are lack of simultaneous endocervical swab culture and single centered study.

CONCLUSION

As a result, IUDs are considered one of the most commonly used contraceptive methods, and they do not increase the pelvic infection rates, although bacterial colonization could be identified. Thus, an IUD can be used as a safe and reliable contraceptive method for many years.

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