

The Effects of TCU-380 on Cervicovaginal Flora

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OBJECTIVE: This study aims to identify the alterations in cervicovaginal flora after insertion of TCU 380A which is a popular type of copper IUD.

STUDY DESIGN: Among the women who attended to the Department of Family Planning in our hospital during a month, 100 subjects who preferred IUDs for contraception and had no history of local or systemic antibiotic use were eligible.

RESULTS: Anaerobic colonies, especially Gram positive cocci and Gram negative bacilli were isolated at significantly higher rates after the insertion of TCU-380A. Aerobic colonies were isolated relatively but insignificantly less.

CONCLUSIONS: Being consistent with the literature, it can be suggested that the copper IUD causes the predominance of anaerobic species in the cervicovaginal flora. This clinically insignificant condition can be attributed to the copper content or threads of the IUDs. Yet there is no evidence that the prevalence of pelvic infections is influenced by the use of IUDs.

(*Gynecol Obstet Reprod Med*;13:3 164-167)

Key Words: Intrauterine device, Cervicovaginal flora, Pelvic infection

The intrauterine device (IUD) is an effective, safe, economic equipment which is the most widely used method of contraception; that is, today more than 100 million women all over the world use it.¹ The frequently used IUDs are T-shaped objects made up of copper and plastic which can be either non-medicated or progestin releasing.²

TCu-380A is a popular type of IUD which is well tolerated by most women. It is a T-shaped equipment with a polyethylene frame holding 380 mm² of exposed surface area of copper on its arms which is represented by the letter "A". A polyethylene monofilament is tied through the 3 mm ball on the stem, providing two white threads for detection and removal. The IUD frame contains barium sulfate, making it radiopaque. Making the copper solid and tubular has increased the effectiveness and lifespan of this type of IUD.³ The TCU-380A has been in use in more than 30 countries since 1982.⁴ Although the TCU-380A is approved for 10 years' use, it has been demonstrated to maintain its efficacy over at least 12 years.⁵

The copper IUD releases free copper which has many specific actions, both enhancing the prostaglandin production and inhibiting various endometrial enzymes. The copper IUD is associated with an inflammatory response, marked by endometrial production of cytokine peptides known to be cytotoxic with an additional spermicidal effect in cervical mucus.⁶

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Submitted for Publication: 11.04.2007

Accepted for Publication: 26.09.2007

A review of the World Health Organization (WHO) database concluded that the risk of pelvic inflammatory disease (PID) was six times higher during the 20 days after the insertion compared with later times during follow-up, but, most importantly, PID was extremely rare beyond the first 20 days after insertion.⁷

IUD related bacterial infection is now believed to be due to short-lived contamination of the endometrial cavity at the time of insertion. Mishell's classic study indicated that the uterus is routinely contaminated by bacteria at insertion.⁸ These data confirm later studies that the risk of infection is highest immediately after insertion and that PID risk does not increase with long-term use.⁹ The infections can be minimized with the use of aseptic techniques.¹⁰

Infections that occur 3-4 months after insertion are believed to be due to acquired sexually transmitted infections (STIs), but not the direct results of the IUDs. The insertion-related infections are shown to be derived from the endogenous cervicovaginal flora, with a predominance of anaerobes.¹¹ The association between IUD use and pelvic infections that might contribute to infertility later is now seriously questioned.¹² With effective patient screening and good insertion technique, the copper IUDs are found to be unassociated with an increased risk of infertility attributed to pelvic infections.¹³

Because sexual behaviour is the most important modifier of the risk of infection, clinicians should ask prospective IUD users about their sexual practices and history of STIs¹⁴ Women at low risk for STIs are unlikely to have pelvic infections while using IUDs.¹³

Two studies have attempted to document bacteremia during IUD insertion or removal.^{15,16} Only one study could find blood culture evidence of bacteremia which was present tran-

siently in only a few patients.¹⁶ Asymptomatic IUD users who have any kind of cervical and vaginal infection should be treated with the recommended drugs without removal of the IUD.¹⁷

Doxycycline in a dose of 200 mg administered orally one hour prior to the insertion can provide protection against insertion associated pelvic infection, but two double-blind randomized studies, one conducted in Africa and one in our country, found no significant advantage in treated groups.^{18,19} In women at low risk for STIs, the incidence of infection related to IUD use is so low that there is little benefit of prophylactic antibiotics.²⁰

This study aims to identify the alterations in cervicovaginal flora after insertion of TCU 380A which is a type of copper IUD.

Material and Methots

Among the women who attended to the Department of Family Planning in Dr Zekai Tahir Burak Women’s Health Teaching and Research Hospital during a month, 100 subjects who preferred IUDs for contraception and had no history of local or systemic antibiotic use were invited to join the study.

After their physical examination was completed, 96 out of 100 women who had neither abnormal vaginal discharge nor cervicitis were included within our research. Copper IUDs of TCU 380A type were inserted in these women after their cervical and vaginal cultures were obtained. Ten days after the insertion of copper IUDs, these women were reexamined and their cultures were retaken.

Cervical and vaginal cultures were transported by Stuart transport agar and cultivated in both eosine methylene blue (EMB) and thioglycate media. A half of the cultivated media were kept at 37 °C for 18 to 24 hours in aerobic conditions. The other half were incubated at 37 °C for 48 hours in anaerobic conditions which were provided by Gas-Pack anaerobic system (Oxoid BR 38). Indicators coded as BR 55 were used as indicators for the anaerobic conditions. After these specimens were evaluated to have aerobic, anaerobic and facultative colonies; bacteria were subtyped according to their morphology, pigmentation, hemolysis and Gram staining.

The collected data were analysed by Statistical Programme for Social Sciences (SPSS)11.0 programme available for Microsoft software. The microbiological status of women before and after the insertion of copper IUDs were compared by means of chi-square test. So p values less than 0.05 were accepted to be statistically significant.

Results

96 subjects included in the study were 21 to 40-year-old

women who had a mean age of 28.78 years. These women were found to have 1 to 9 pregnancies with an average of 2.18 and 1 to 5 live births with a mean of 1.9.

Although 78 aerobic and 126 anaerobic cultures were found to be positive before the insertion of copper IUDs, 105 aerobic and 159 anaerobic cultures showed positive results after the application of these devices (Table 1).

Table 1:Carvicovaginal Cultures Before and After IUD Insertion

	n=96	Aerobic		Anaerobic	
		positive	negative	positive	negative
BEFORE	IUD				
cervical	cultures	30	66	60	36
vaginal	cultures	48	48	66	30
	SUM	78	114	126	66
AFTER	IUD				
cervical	cultures	52	54	75	21
vaginal	cultures	63	33	84	12
	SUM	105	87	159	33
	TOTAL	183	201	285	99

Within the anaerobic cervical and vaginal cultures of women obtained before the insertion of TCU-380A, Peptostreptococci were the most commonly isolated species (31.6%) followed by E. coli (28.9%) and Lactobacilli (18.4%) respectively. When the anaerobic cervical and vaginal cultures of women obtained after the insertion of TCU-380A were evaluated, Peptostreptococci again were isolated most frequently (34.3%), followed by E. coli (27.4%) and Lactobacilli (12.9%) (Table 2).

Table 2: Microbiological Grouping Before and After IUD Insertion

	VAGINAL CULTURES					CERVICAL		CULTURES		TOTAL
	before number	IUD %	after number	IUD %	sum	before number	IUD %	after number	IUD %	
ANAEROBES										
Peptostreptococci	6	50	6	50	12					
Peptococci	18	33	36	67	54	18	3	36	67	54
Lactobacilli	12	40	18	60	30	9	50	9	50	18
Bacteriodes			12	100	12			12	100	12
FACULTATIVES										
S.aureus			6	100	6			6	100	6
E.coli	18	38	30	63	48	15	36	27	64	42
Streptococci	3	50	3	50	6	3	50	3	50	6
Enterococci	3	50	3	50	6	3	100			3
Klebsiella	6	67	3	33	9					
AEROBES										
S.aureus	6	29	15	71	21			9	100	18
Streptococci	15	80	3	20	15	9	75	3	25	12
Enterococci	12	67	6	33	18	9	100			9
E.coli	18	46	21	54	51	6	33	12	67	18
Proteus	3	50	3	50	6					
Klebsiella	9	75	3	25	12	3	100			3
G.vaginalis	6	100			6	6	100			6
FUNGUS	18	67	6	33	27	9	100			9

Within the aerobic cervical and vaginal cultures of women obtained before the insertion of TCU-380A, E. coli were the

most commonly isolated species (22.9%) followed by streptococci and enterococci (20.0%) and Klebsiella and Gardnerella (11.4%) respectively. When the aerobic cervical and vaginal cultures of women obtained after the insertion of TCu- 380A were evaluated, E.coli colonies again were isolated most frequently (40.7%), followed by S. aureus (29.6 %) (Table II).

The statistical analysis of these data reveals the result that the alterations in anaerobic colonies after the insertion of copper IUDs is statistically significant while those in aerobic colonies is not. That is; anaerobic colonies increased significantly while aerobic colonies decreased insignificantly but relatively more in the cervicovaginal flora after the insertion TCu 380A. ($\chi^2 = 7.270$, $p < 0.05$) (Table 3).

Table 3: Aerobes and Anaerobes Before and After IUD Insertion

	BEFORE IUD		AFTER IUD		TOTAL	
	number	%	number	%	number	%
ANAEROBES	114	22.35	210	41.18	324	63.53
AEROBES	105	20.59	81	15.88	186	36.47
TOTAL	279	42.94	291	57.06	510	100.00

When anaerobic cultures before and after the insertion of TCu-380A were checked up, Gram positive and negative bacilli were relatively more in number after the application these copper devices but this analysis was statistically insignificant ($\chi^2 = 0.732$, $p > 0.05$) (Table 4).

Table 4: Cervicovaginal Flora Before and After IUD Insertion

	BEFORE IUD		AFTER IUD		TOTAL number
	number	%	number	%	
ANAEROBES					
Gram (+) cocci	54	35.3	99	64.7	153
Gram (+) bacilli	21	43.8	27	56.2	48
Gram (-) bacilli	39	32.7	84	68.3	123
TOTAL	114	35.7	210	64.8	324
AEROBES					
Gram (+) cocci	54	56.3	52	43.7	72
Gram (+) bacilli	12	100.0			12
Gram (-) bacilli	39	50.0	39	50.0	78
TOTAL	105	56.5	81	43.5	186
FUNGUS	27	75.0	9	25.0	36

When aerobic cultures before and after the insertion of TCu-380A were investigated, Gram positive cocci and bacilli were prominently less in number after the application of these copper devices but this analysis was statistically insignificant ($\chi^2 = 0.758$, $p > 0.05$) (Table 4). In summary; anaerobic colonies, especially Gram positive cocci and Gram negative bacilli were isolated at significantly higher rates after the insertion of TCu-380A which is a type of copper IUD. However aerobic colonies were isolated relatively but insignificantly less.

Discussion

A study held by Cuhukudebelu among Nigerian women demonstrated that no bacteria could be cultivated in the cultures of women who got their IUDs removed for any reason.²¹

A similar study done by Wahab et al showed that some anaerobic species of cervicovaginal flora together with some aerobic species of cervical flora increased significantly after short term usage of IUDs.²²

However Wolf et al assessed bacterial colonization in 152 women using IUDs in a similar study and found cervicovaginal contamination by S.epidermidis, enterococci and anaerobic lactobacilli in the majority of subjects.²³

In a study conducted by Haukkama et al, cervicovaginal flora assessed before the insertion of the IUD was compared to the flora three to six months after the insertion of the IUD. Although there was no significant change in aerobic species, anaerobic colonization was found to increase significantly in long-term users of the IUD. This result was interpreted as a normal finding in healthy IUD users without any symptoms of a pelvic infection.²⁴

Viberga et al found out that an anaerobic environment pioneered by Peptostreptococci was preponderant in the cervicovaginal flora of the women who used copper IUDs for contraception. However the incidence of bacterial vaginosis and cervicitis did not increase significantly despite the predominance of anaerobic species.²⁵

In our study; anaerobic colonies, especially Gram positive cocci and Gram negative bacilli were isolated at significantly higher rates after the insertion of TCu-380A which is a type of copper IUD. However aerobic colonies were isolated relatively but insignificantly less. Although there was an alteration in cervicovaginal flora in behalf of anaerobic species, no symptoms of a pelvic infection could be detected clinically.

As the results of our research are consistent with the findings of the previous studies, it can be suggested that the copper IUD causes a change in the cervicovaginal flora that results in the predominance of anaerobic species, which are especially Gram positive cocci and Gram negative bacilli. This clinically insignificant condition may be attributed to the copper content of IUDs, mechanical irritation induced by their threads or both.

Cervicovaginal flora is dominated by anaerobes within weeks after IUD insertion accompanied with a slightly increased risk of pelvic infection. Such a risk with the modern copper IUDs related only to the insertion can be prevented by appropriate use of aseptic techniques. Yet there is no evidence that the prevalence of bacterial vaginosis and pelvic infections is influenced by the use of the IUDs. More studies are needed for further understanding of the effects of IUDs on pelvic flora.

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