The Significance of Mycoplasma Hominis in Females using Intrauterine Contraceptive Device (IUCD)

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Abstract

Objective: To study the incidence of Mycoplasma hominis in endocervical swabs of women using intrauterine contraceptive device and to compare it with the incidence of Mycoplasma hominis in women using other methods of contraception (barrier, hormones) as a control.

Method: Endo cervical swabs were taken from 260 fertile women (130 of them using intrauterine contraceptive device and 130 using other methods of contraception) and cultured on Hayflick’s agar for detection of Mycoplasma hominis.

Results: The incidence of Mycoplasma hominis in women using intrauterine contraceptive device was 27.6% in comparison with incidence of Mycoplasma hominis in women using barriers and hormones which was (13%), also the pelvic inflammatory disease rate was (86.1%) in women using intrauterine contraceptive device and positive culture for Mycoplasma hominis in comparison with the rate of pelvic inflammatory disease in women using intrauterine contraceptive device and negative culture for Mycoplasma hominis which was (51%).

Conclusion: It is concluded from this study that using intrauterine contraceptive device increases the rate of infection with Mycoplasma hominis among fertile women.

Keywords:

Introduction:

Pelvic infection is defined as infection of the uterus, uterine tubes, adjacent parametrium and overlying pelvic peritoneum. Pelvic inflammatory disease (PID) is the most serious and costly sexually transmitted pelvic infection, affecting women between menarche and menopause [1,2,3].

These infections may be acute, subacute, or chronic and mediate sequel including infertility, ectopic pregnancy, pelvic adhesion, chronic pelvic pain, pelvic abscess and possibly subsequent preterm birth [2,3].

There are many predisposing factors for pelvic infection such as age, sexual activity, intrauterine contraceptive device, smoking, reduced socioeconomic status and recent new sexual partner.

The causative organisms for pelvic infections include Neisseria gonorrhoea, Chlamydiae trachomatis, Gram negative bacilli, and genital mycoplasmas “Mycoplasma hominis, Ureaplasma urealyticum and Mycoplasma genitalium” [1,2,3].

The mycoplasmas are the smallest and simplest self replicating procaryotes, they fall somewhere between bacteria and viruses and are common inhabitants of the oropharyngeal and genital mucous membranes [4,5,6,7].

Different mycoplasmas are known to colonize the human genital tract, Mycoplasma hominis (called classical or large colony-forming mycoplasma) and Ureaplasma urealyticum (Uu) was formally called T. Mycoplasma (T for tiny) because it grows in tiny colonies [8]. These organisms have been shown to result in human disease. In the adult female these organisms have been claimed to cause pelvic infection, infertility, preterm labour, stillbirth, abortion, postpartum fever and low birth weight, while in the adult male these organisms cause non gonococcal urethritis [7,9,10,11].

Mycoplasma hominis can frequently be found in the cervical opening, vagina, vestibule and distal urethra, while the proximal urethra, bladder, uterus and fallopian tubes of healthy women rarely harbor these agents, the greatest incidence of genital colonization in women occurs during pregnancy, while after menopause, the incidence of carriers decrease significantly [5,12].

Evidence in support for an etiologic role of Mycoplasma hominis in pelvic inflammatory disease was obtained from tubal culture and serological studies, arising antibody titer is required for diagnostic significance because of the high incidence of positive serologic tests in normal individuals [13,14].

On the other hand the IUCD cause pelvic infection and the risk of infection is greatest within the first few months after insertion and among younger nulliparous women with more than one sexual partner [2].

The risk also varies with the type of IUCD, the Dalkon shield carries the highest risk, while the hormonal IUCD is thought to have a reduced risk of infection [1].

Materials & Methods:

During the period of six months, the endocervical swabs were taken from 260 fertile
women attending the family planning clinic in Alawiyah Maternity Hospital (130 of them using copper IUCD and 130 using other methods of contraception as barrier or hormonal). Any woman who has received antibiotic therapy for any reason during the preceding two weeks was excluded from the study.

After taking full history and clinical examination, the specimen was obtained from the endocervix with sterile cotton swab and transferred immediately into a tube containing Stuart transport medium, and quickly taken to the central laboratory where the culture was performed.

The classic way to demonstrate mycoplasmas is culture in a peptone-enriched beef-heart infusion broth “commercially available as PPLO broth” supplemented with horse serum and yeast extract. *Mycoplasma hominis* specifically metabolizes arginine with releasing of ammonia and pH increase, addition of defined substance (arginine) to the culture media causes a mycoplasma, if present, to change the pH of the culture medium.

After color change subculture was performed on Hay flick’s agar for detection of *Mycoplasma hominis* colonies which has a typical (fried egg) appearance.

**Statistical Analysis:**
Chi - square analysis was performed to show significant difference between groups. The $p < 0.05$ was considered significant.

**Results:**
The rate of isolation of *Mycoplasma hominis* from the endocervix of women using IUCD was (27.6%), while in women using other methods of contraception(control) was (13%), the difference was significant between the two groups (table 1).

Comparison of *Mycoplasma hominis* isolation rate among the four age groups of women using IUCD and control, revealed a significant difference among the second age group (20-29 years). $p<0.004$, while no significant difference was found among the 1st age group (<20 years), third age group (30-39 years) and the fourth age group (<40 years).

In both studied groups (women using IUCD and control) the highest incidence of *Mycoplasma hominis* was in the second age group (20-29 years) (table 2).

Table 1: the incidence of *Mycoplasma hominis* in women using IUCD and women using other methods of contraception (control)

<table>
<thead>
<tr>
<th>Method of contraception</th>
<th>No. of tested women</th>
<th>No. of infected women</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUCD</td>
<td>130</td>
<td>36 (27.6)</td>
</tr>
<tr>
<td>Other methods of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraception (control)</td>
<td>130</td>
<td>17 (13)</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>53</td>
</tr>
</tbody>
</table>

$\chi^2=8.56$ d.f =1 $P<0.004$

Table 2: Correlation between age and *Mycoplasma hominis* infection in women using IUCD and control

<table>
<thead>
<tr>
<th>AgeYears</th>
<th>Women using IUCD</th>
<th>Control</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. examined</td>
<td>No. infected</td>
<td>No. examined</td>
</tr>
<tr>
<td>&lt; 20</td>
<td>16</td>
<td>3(18.7)</td>
<td>20</td>
</tr>
<tr>
<td>20-29</td>
<td>36</td>
<td>20(55.5)</td>
<td>32</td>
</tr>
<tr>
<td>30-39</td>
<td>56</td>
<td>9(16)</td>
<td>41</td>
</tr>
<tr>
<td>&gt;40</td>
<td>22</td>
<td>4(18.1)</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>36</td>
<td>130</td>
</tr>
</tbody>
</table>
The rate of pelvic infection in women using IUCD was (60.7%), which was significantly higher than in women using other methods of contraception (15.3%) \( p<0.001 \) (table 3).

Women using IUCD were subdivided into two groups, those with positive endocervical culture for *Mycoplasma hominis* and those with negative culture for *Mycoplasma hominis*, it was found that the rate of pelvic infection in women using IUCD and positive culture was (86.1%), which was significantly higher than in women using IUCD and negative culture (51%). \( P<0.002 \) (table 4).

**Table 3: the incidence of pelvic infection in women using IUCD and control**

<table>
<thead>
<tr>
<th>Method of contraception</th>
<th>No. examined</th>
<th>No. infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUCD</td>
<td>130</td>
<td>79 (60.7)</td>
</tr>
<tr>
<td>control</td>
<td>130</td>
<td>20 (15.3)</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>99</td>
</tr>
</tbody>
</table>

\( \chi^2 = 56.78 \quad d.f = 1 \quad P<0.001 \)

**Table 4: The incidence of pelvic infection in women using IUCD infected with *Mycoplasma hominis* and women using IUCD not infected with *Mycoplasma hominis***

<table>
<thead>
<tr>
<th>IUCD user</th>
<th>No. examined</th>
<th>No. infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUCD with + Mh.</td>
<td>36</td>
<td>31 (86.1)</td>
</tr>
<tr>
<td>IUCD with - Mh.</td>
<td>94</td>
<td>48 (51)</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>79</td>
</tr>
</tbody>
</table>

\( \chi^2 = 13.41 \quad d.f = 1 \quad P<0.002 \)

**Discussion:**

In this study the incidence of *Mycoplasma hominis* in the endocervix of women using IUCD was significantly higher than in women using other methods of contraception (27.6% Vs 13%), this may be due to that IUCD does not protect against sexually transmitted infection in contrast to condoms or hormonal methods (the hormonal contraception effect the cervical mucus, thus reducing the rate of ascending infection) \([15]\).

The reason for a high rate of isolation of *Mycoplasma hominis* among women in the second age group (20-29 years) in both studied groups (women using IUCD and control), can be attributed to increased sexual activity, as the colonization with genital mycoplasma increases proportionally to the number of the sexual partners and sexual activity\([7,8,9]\) and perhaps to a lack of general medical care among young women \([16]\).

The incidence of pelvic infection in women using IUCD was higher than in control (60.7% Vs 15.3%) \( p<0.001 \). The presence of *Mycoplasma hominis* in the endocervix increased the rate of pelvic infection, this result was in accordance to that found by Gump et al.\([17]\) Mardh and Elshibly \([13]\).

Many studies have also concluded that the risk of pelvic infection is 3-9 times higher among IUCD users than in non IUCD users \([18]\).

Most cases of PID seem to result from ascending infection from the cervix, initial epithelial damage caused by bacteria (specially *Chlamydiae trachomatis* and *Neisseria gonorrhoea*) allows the opportunistic entry of other organisms. Isolates from the upper genital tract are polymicrobial, including *Mycoplasma hominis* and anaerobes, the spread of infection to the upper genital tract may be influenced by using of
contraceptive device, instrumentation and vaginal douching [3].

IUCD cause damage to the mucosa of genital tract, thus providing a favorable environment for the growth of microorganisms [19]. In addition the IUCD induce increased muscular activity of the uterus, thus causing profuse bleeding creating a suitable environment for ascending infection [20].

*Mycoplasma hominis* adhere and colonize the epithelial lining of the urogenital tract, and they have been shown to adhere to spermatozoa, which may act as a vehicle transporting adhering pathogenic mycoplasma deep into the female genital tract during fertilization. [4] *Mycoplasma hominis* can also pass to uterus along the tail of IUCD [3].

Factor indicating an ascending route for the colonization of the upper genital tract by *Mycoplasma hominis* is recovery of a higher incidence of cervical *Mycoplasma hominis* in women with past history of PID and in all patients who have mycoplasma positive endometria, the organisms were also isolated from the cervix [5, 21-22].

The normal vaginal flora “lactobacilli” has been recently recognized as an important factor in protecting the vagina from various invading pathogens, the nature of normal flora relates to the age of the female, physiological factors and whether IUCD are used (which cause depletion and non function of lactobacilli), thus bacterial vaginosis which has been claimed to cause PID is common in women using IUCD [1, 13&23].

References:

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