

Isolation of *Chlamydia trachomatis* from endometriums of women with and without symptoms

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SUMMARY *Chlamydia trachomatis* was isolated from the endometrial cavities of three out of 19 women with positive cervical cultures, who were all symptomless sexual contacts of men with non-gonococcal urethritis (NGU). *C trachomatis* was recovered from the endometrial cavities of four out of 14 women with pelvic inflammatory disease (PID), three of whom had positive cervical cultures. Although endometrial biopsy is probably not justifiable as a routine procedure, it may be a useful adjunct to endocervical investigations for managing women with PID.

Lower genital tract infection with *Chlamydia trachomatis* is well known. Between 12% and 31% of women attending genitourinary medicine clinics in the United Kingdom are infected with *C trachomatis*.¹ Strong evidence supports its causal role in pelvic inflammatory disease (PID): Mårdh isolated *C trachomatis* from inflamed fallopian tubes but not from healthy ones,² rising titres of specific antibodies to chlamydiae have been shown in women with PID,³ and salpingitis has been induced experimentally in animals after inoculating the lower genital tract with *C trachomatis*.⁴

PID can lead to infertility. Evidence linking *C trachomatis* with infertility comes from serological studies.^{5,6} Isolation of *C trachomatis* from the fallopian tubes of infertile women has been reported from only one centre,⁷ but in the United States of America *C trachomatis* has been recovered from the endometrial cavities of infertile women with serum IgG concentrations of antibodies to chlamydiae of 1/32 or more.⁸ If lower genital tract infection with *C trachomatis* leads to PID, infection of the endometrium is probable as ascent seems to be canalicular.⁴ *C trachomatis* was first isolated from the endometrium by Hamark *et al* in 1980.⁹ Subsequent studies showed chlamydial isolation from the endometrium of 30% to 44% of women with PID.^{10,11} Little information exists concerning isolation of *C trachomatis* from the endometrium of symptomless women.

The histological picture of chlamydial endometritis

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is not fully defined. Intracytoplasmic inclusions in its epithelial cells are believed to be pathognomonic for chlamydial infection of the endometrium,¹² but no other specific features of the inflammatory response have so far been described.^{10,11}

Patients and methods

SYMPTOMLESS CONTACTS

We studied 50 female contacts of men with non-gonococcal urethritis (NGU) seen in the department of genitourinary medicine at University College Hospital by one of the authors (AF). Informed written consent was obtained from all patients. Each woman was asked about her obstetric history, present contraceptive use, dates of her last menstrual period and most recent sexual contact, and duration of the present relationship. She was then examined in the lithotomy position, and a bivalve speculum was used to expose the cervix. A specimen was collected from her vagina for microscopy for clue cells, motile trichomonads, and yeast cells. Another vaginal specimen was taken for culture for yeasts. Urethral specimens were obtained for microscopy and culture for *Neisseria gonorrhoeae*. The cervix was cleaned with cotton wool, specimens for microscopy and culture for *N gonorrhoeae* and *C trachomatis* were taken with cotton wool swabs, and the cervix was cleaned with normal saline and wiped dry.

The technique of endometrial aspiration was a modification of a method described elsewhere.¹³ An endometrial cell sampling catheter (Rocket, London), which consisted of a sterile plastic cannula with a luminal introducer, was inserted through the cervix into the endometrial cavity. The introducer was then

removed, and a specially adapted aspiration tube was introduced into the endometrial cavity. The endometrial contents were then aspirated into a sterile syringe, and a specimen was placed in sucrose phosphate transport medium (2SP) and stored at 4°C until transported to the laboratory. A further specimen was placed in formol saline for histological examination.

Blood was taken for serological tests for syphilis, and a midstream sample of urine was collected and examined for protein and sugar.

WOMEN WITH PID

We also studied 14 patients with a diagnosis of suspected PID. The diagnostic criteria had to include lower abdominal pain, pelvic tenderness, and at least two of the following: vaginal discharge, menstrual irregularities, dysuria, dyspareunia, a temperature of 38°C or more, an erythrocyte sedimentation rate of 15 mm or more in the first hour, or a white cell count of 10.5×10^9 or more. Patients were interviewed and examined as described for the symptomless contacts of men with NGU. In addition, blood was taken to investigate white cell counts and erythrocyte sedimentation rates, and temperatures were recorded. Endometrial aspiration of these women produced minimal discomfort only.

TREATMENT

Female contacts of men with NGU were routinely treated with oxytetracycline 500 mg four times a day for seven days. Women with PID were treated with oxytetracycline 500 mg four times a day and metronidazole 400 mg twice a day for 14 days. All women were seen and examined three days after completion of treatment. As a test of cure, material for culture was taken from the endocervix of those who had yielded *C trachomatis* before treatment. Two negative cultures after treatment were necessary before we discharged a woman from follow up.

LABORATORY METHODS

Urethral smears were Gram stained and examined at $\times 1000$ magnification for the presence of intracellular

diplococci and polymorphonuclear leucocytes.

Culture for *N gonorrhoeae* was on modified King's medium, and confirmation was by coagglutination and sugar fermentation reactions.

Cervical specimens were cultured for *C trachomatis* on McCoy cells pretreated with cycloheximide; inclusions were stained with iodine. Endometrial specimens were divided into two. One sample was processed as above, the other was passaged in a further two tubes, one fixed and stained after 48 hours with iodine, the other stained with Giemsa.

STATISTICS

Student's *t* test was used to compare means.

Results

SYMPTOMLESS CONTACTS

Endometrial aspiration was performed in 50 symptomless women whose sexual contacts were men with NGU. Despite correct placement of the aspirating cannula, nine tissue samples were not confirmed by histology as being endometrial. One further sample was toxic to cell culture. Of the 40 women from whom histologically confirmed endometrial samples were obtained, 19 yielded *C trachomatis* from the cervix. Three of the 19 women with positive cervical cultures also yielded *C trachomatis* from the endometrium. All three used oral contraceptives. In no case was *C trachomatis* recovered from the endometrium but not the cervix.

WOMEN WITH PID

Of the 14 women with PID who underwent endometrial biopsy, four yielded *C trachomatis*. Three of these women also had positive cervical cultures, but the other one yielded *C trachomatis* from the endometrium only. As shown in the table, the patients with PID were slightly younger than the female NGU contacts ($p < 0.005$). Chlamydial inclusions were identified in two endometrial specimens at the initial staining after 48 hours on cell culture. In five specimens inclusions were not identified until after

Table *Ages and contraceptive practices of symptomless sexual contacts of men with non-gonococcal urethritis (NGU) and women with pelvic inflammatory disease (PID), particularly those yielding Chlamydia trachomatis from the endometrium. Except where stated, figures are numbers (percentages)*

	<i>Symptomless contacts of men with NGU</i>		<i>Patients with PID</i>	
	<i>Total</i> (<i>n</i> = 40)	<i>Endometrial chlamydiae</i> (<i>n</i> = 3)	<i>Total</i> (<i>n</i> = 14)	<i>Endometrial chlamydiae</i> (<i>n</i> = 4)
Mean age (years)	23.8	25.3	21.7	21
Contraception:				
Combined oral contraceptive	28 (70)	3 (100)	7 (50)	2 (50)
Barrier contraception	7 (18)		1 (7)	1 (25)
Intrauterine contraceptive device	3 (8)		1 (7)	
Nil or withdrawal	2 (5)		5 (36)	1 (25)

passage. Histological examination confirmed that the samples obtained consisted of endometrial tissue, but because of the small amount of tissue obtained it was not possible to comment on the presence or severity of endometritis.

Discussion

The method we used for obtaining endometrial samples has advantages and disadvantages. Contamination with cervical organisms is kept to a minimum by the use of protected aspiration techniques. A narrow bore protecting cannula was used to minimise patient discomfort, and we were thus able to avoid the use of instruments to grasp the cervix for countertraction during the procedure. The drawback of the technique is that, although it was possible to confirm that endometrial tissue had been obtained, there was insufficient to show signs of endometritis.

These results show that *C trachomatis* can be isolated from the endometriums of symptomless women as well as from those with PID. Of 19 symptomless women with chlamydial infection of the cervix, three showed endometrial infection. These women may be at risk of PID. There is no evidence from this study that symptomless endometrial infection occurs without cervical infection. Although endometrial aspiration is probably not justifiable as a routine procedure, it may be a useful adjunct to endocervical investigations for managing women with PID. One woman in the study would not have been identified as harbouring *C trachomatis* had endometrial biopsy not been performed. The identification of bacteria that cause PID is important, firstly for precision in treatment, and secondly to indicate the need to examine male sexual partners. Further studies of the value of endometrial aspiration in managing women with PID appear to be desirable.

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