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Pelvic inflammatory disease and the intrauterine device: findings in a large cohort study

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Abstract

The incidence of pelvic inflammatory disease was investigated among parous women taking part in the Oxford-Family Planning Association contraceptive study. Hospital admission rates for "acute definite" disease were 1·51 per 1000 woman-years among those currently using an intrauterine device (IUD) and 0·14 per 1000 woman-years among those using other methods of birth control (age-standardised relative risk 10·5 to 1 with 95% confidence limits of 5·4 to 1 and 32 to 1). There was little evidence of an increased risk of such disease in ex-users of an IUD. Hospital admission for "chronic definite" disease, on the other hand, was commoner in ex-users of an IUD than in current users.

Acute definite disease occurred somewhat more frequently during the early months of use of an IUD than during the later months. While the rate of such disease was increased in users of each type of device, the highest rate (8·1 per 1000 woman-years) was observed in users of the Dalkon shield. This rate, however, was based on only three affected women.

Introduction

Several epidemiological and clinical investigations have shown that the risk of pelvic inflammatory disease is increased in women using an intrauterine device (IUD).[1] Few controlled data are, however, available from cohort studies. In the present report we summarise the findings in the Oxford-Family Planning Association contraceptive study up to the end of September 1979.

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Methods

A detailed description of the methods used in the study has been given elsewhere.[2] In brief, 17 032 women were recruited at 17 large family planning clinics in England and Scotland during 1968-74. At the time of recruitment the women had to be (a) aged 25-39 years, (b) married, (c) white and British, (d) willing to participate, and (e) either a current user of oral contraceptives of at least five months' standing or a current user of a diaphragm or an IUD of at least five months' standing without prior exposure to the pill. During follow-up each subject is questioned by a doctor or nurse at return visits to the clinic and certain items of information are noted on a special form. These include details of pregnancies and their outcome, changes in contraceptive practices and reasons for the changes, and particulars of any referrals to hospital either as an outpatient or as an inpatient. Diagnoses on discharge from hospital are confirmed by obtaining copies of discharge letters or summaries. Women who stop attending the clinic are sent a postal version of the follow-up form and, if this is not returned, are interviewed by telephone or at home. The work in each clinic is co-ordinated by a part-time research assistant, and follow-up has been maintained with an annual loss rate for "relevant" reasons (withdrawal of co-operation or loss of contact) of only about 0·3%.

The present analysis is limited to parous women (since IUDs have been used by very few nulliparae during the study) with no known past history of pelvic inflammatory disease. Woman-years of observation were computed separately for non-users, current users, and ex-users of an IUD. Non-users were entered into the analysis on the date of recruitment and continued in it until any of the following events occurred: (a) end of follow-up, (b) loss to follow-up, (c) hospital referral for pelvic inflammatory disease, (d) pregnancy, (e) hysterectomy or female sterilisation, or (f) change to an IUD as method of contraception. Current users were entered into the analysis either on the date of recruitment or, for those switching to an IUD during the study, on the date of insertion of the device. They remained in the analysis until any of events (a) to (e) occurred or until the IUD was removed. Short interruptions in IUD use (less than three months), such as sometimes happened when a device was changed, were ignored. Ex-users were entered into the analysis three months after removal of a device and remained in it until any of events (a) to (e) occurred or until an IUD was reinserted.

Pelvic inflammatory disease occurring in association with pregnancy or the puerperium is not considered here. In addition, two episodes of disease occurring during the three months after a pelvic surgical procedure (unilateral oophorectomy in one case; ventrosuspension in one) were excluded. The available clinical details of each of the remaining episodes were then reviewed by one of us (MPV) as far as

possible in the absence of knowledge about the woman's contraceptive history. Episodes were divided into three categories: "acute definite," "chronic definite," and "other."

Acute definite—42 patients admitted to hospital on an emergency or urgent basis with acute symptoms. In 15 cases the diagnosis was based on a convincing clinical picture only (fever, pelvic pain, and pelvic tenderness on vaginal examination, usually with a palpable swelling or mass), while in a further five diagnostic laparoscopy showed inflamed tubes. The remaining 22 patients were diagnosed at laparotomy; 10 had inflamed tubes, while 12 had a pyosalpinx, a tubo-ovarian abscess, or a pelvic abscess.

Chronic definite—30 patients admitted to hospital on a non-urgent basis. Of these patients, 24 had chronic symptoms, such as pelvic pain, menstrual disorders, dyspareunia, and infertility, while in six the disease was found incidentally at sterilisation. In every case the diagnosis was proved by laparoscopy or laparotomy. Almost all patients had pelvic adhesions, and many had blocked tubes. Nine were stated to have a chronic pyosalpinx or a hydrosalpinx.

None of the three categories of the disease showed any strong relation to age, though the rates did decline in women over 40. Likewise, there was little association between risk of disease and social class. Table II summarises the relevant data for acute definite disease. The age-standardised relative risk of acute definite disease in current IUD users compared with non-users was estimated as 10·5 to 1 with 95% confidence limits of 5·4 to 1 and 32 to 1.

Table III gives the incidence rates for the three categories of the disease in relation to duration of current use of an IUD. Women already using an IUD at the time of recruitment to the study were entered into this analysis at the point dictated by the duration of continuous prior use of the method (for example, a woman entering the investigation after 40 months of using an IUD began to contribute woman-months of observation in the fourth "duration of use" group). Acute definite disease was apparently commoner in the early months of using an IUD than in the later months, though a steady downward trend in incidence was interrupted by a high rate in users of more

TABLE I—*Incidence rates per 1000 woman-years of observation for the three categories of pelvic inflammatory disease (PID) in relation to IUD use. Numbers of patients with PID shown in parentheses*

	Woman-years of observation	PID category		
		Acute definite	Chronic definite	Other
Current users of an IUD	20 482	1·51 (31)	0·54 (11)	0·54 (11)
Ex-users of an IUD	4 210	0·48 (2)	0·95 (4)	0·48 (2)
Non-users of an IUD	65 259	0·14 (9)	0·23 (15)	0·25 (16)

Current users v non-users: acute definite $\chi^2_{(1)} = 60\cdot27$, $p < 0\cdot001$; chronic definite $\chi^2_{(1)} = 3\cdot89$, $p = 0\cdot05$; other, not significant.
Ex-users v non-users: acute definite, not significant; chronic definite $\chi^2_{(1)} = 5\cdot11$, $p < 0\cdot05$; other, not significant.

TABLE III—*Incidence rates per 1000 woman-years of observation for three categories of pelvic inflammatory disease (PID) in relation to duration of current IUD use. Numbers of patients with PID shown in parentheses*

Duration of current IUD use (months)	PID category		
	Acute definite	Chronic definite	Other
≤12	2·65 (5)	0·00 (0)	0·53 (1)
13–24	1·86 (4)	1·39 (3)	0·46 (1)
25–36	1·29 (3)	0·00 (0)	0·00 (0)
37–48	1·24 (3)	0·00 (0)	0·41 (1)
49–72	1·06 (5)	0·43 (2)	0·85 (4)
≥73	1·57 (11)	0·86 (6)	0·57 (4)

TABLE II—*Incidence rates per 1000 woman-years of observation for acute definite pelvic inflammatory disease in relation to age and social class. Numbers of patients with disease shown in parentheses*

	Age (years)				Social class*			
	25–29	30–34	35–39	≥40	I	II	III	IV–V
Current users of an IUD	1·91 (5)	1·85 (13)	1·70 (12)	0·26 (1)	1·29 (3)	1·18 (6)	1·82 (19)	1·13 (3)
Non-users of an IUD	0·10 (1)	0·30 (6)	0·05 (1)	0·07 (1)	0·00 (0)	0·17 (3)	0·12 (4)	0·30 (2)

*Registrar General's classification.
Data for the two ex-users with acute definite disease omitted.

Other—29 patients seen in a hospital outpatient department and told that they had the disease or, in a few cases, admitted to hospital with an inconclusive clinical picture. Since outpatient diagnoses are not routinely confirmed in the Oxford-Family Planning Association study, little else can be said about the patients in this category.

Bacteriological findings were incompletely recorded in the discharge summaries and letters. Such data as there were appeared unhelpful, and they are not considered further in this report. None of the women, however, was stated to have suffered an actinomycotic infection.

Tests of statistical significance were based on the computation of values of χ^2, comparing observed and expected numbers of events. Details of the method used have been described.[2]

Results

Table I gives the incidence rates for the three categories of pelvic inflammatory disease in current users, ex-users, and non-users of an IUD. Acute definite disease was over 10 times commoner in current users than in non-users ($\chi^2_{(1)} = 60\cdot27$; $p < 0\cdot001$), while there was also a suggestion that the risk might be slightly raised in ex-users, though this difference did not reach statistical significance. Chronic definite disease was about two and a half times as common in current users as in non-users ($\chi^2_{(1)} = 3\cdot89$; $p = 0\cdot05$), while the rate in ex-users was increased fourfold ($\chi^2_{(1)} = 5\cdot11$; $p < 0\cdot05$). The relation between other pelvic inflammatory disease and IUD use was weak, though there was a non-significant twofold increase in risk in both current users and ex-users.

than six years. Chronic definite disease and other pelvic inflammatory disease showed little relation to duration of use, but numbers were very small.

We also subdivided the data for current IUD users according to the type of device (table IV). While the rate of acute definite disease

TABLE IV—*Incidence rates per 1000 woman-years of observation for three categories of pelvic inflammatory disease (PID) in relation to type of IUD in current use. Numbers of patients with PID shown in parentheses*

Type of device	PID category		
	Acute definite	Chronic definite	Other
Lippes loop	1·15 (13)	0·71 (8)	0·35 (4)
Saf-T-coil	2·09 (11)	0·38 (2)	0·95 (5)
Copper device	0·90 (1)	0·00 (0)	0·00 (0)
Dalkon shield	8·09 (3)	0·00 (0)	2·70 (1)
Other or unknown	1·26 (3)	0·42 (1)	0·42 (1)

was raised in users of each of the devices, the most striking finding was the high rate of such disease (8·1 per 1000 woman-years) in users of the Dalkon shield. This rate, however, was based on only three affected women. In one of these the diagnosis was clinical. In a second, laparoscopy showed an acutely inflamed left tube and fine adhesions. In the third an acute pyosalpinx was found at laparotomy.

Discussion

In interpreting these results most attention should be paid to the data on acute definite pelvic inflammatory disease. Women with this condition suddenly developed a severe and unexpected illness requiring admission to hospital, and in two-thirds the diagnosis was later confirmed by laparoscopy or at laparotomy. Women with chronic definite disease, on the other hand, suffered a much vaguer illness and, though the diagnosis was confirmed surgically in every case, selective factors were undoubtedly at work in determining who came to operation and who did not. No confirmatory evidence was available in the case of the women with "other" disease, and it seems highly likely that many of them had some non-inflammatory pelvic or abdominal disorder.

Furthermore, the "control" group in the analysis consisted very largely of women using reversible methods of contraception other than an IUD, principally the pill and the diaphragm. There is increasing evidence that these methods of birth control may reduce the risk of pelvic inflammatory disease (compared with no method),[3][4] and this may in part explain the high relative risk of acute definite disease which we observed in current IUD users as compared with non-users (about 10:1). In other studies the relative risks have generally been in the range 2:1 to 9:1.[1] Another possible reason for the high relative risk in our study (apart, of course, from chance) was provided by the stringent criteria which we applied in allocating cases to the acute definite disease category with a resulting reduction in diagnostic "noise."

Women participating in the Oxford-Family Planning Association contraceptive study represent a selected group with a more positive attitude to health than average. In addition, at the time of recruitment all were aged at least 25 years and were married.[2] Furthermore, this analysis was restricted to parous women with no known past history of pelvic inflammatory disease. All these factors probably contributed to the generally low rate of disease observed in the study and to the fact that little relation was observed between the risk of the disease and age or social class.

Westrom et al,[4] in a large case-control study conducted in Lund, Sweden, found the relative risk of acute pelvic inflammatory disease in association with IUD use to be much higher in nulliparous than in parous women. While we are unable to confirm or refute this finding, our results leave little doubt that there is a substantially increased risk in parous women.

Our data on the risk of the disease in ex-users of an IUD are sparse. Nevertheless, it seems clear that acute definite disease is much less common in ex-users of an IUD than in current users. Chronic definite disease, on the other hand, seems if anything to be commoner in ex-users of a device than in current users. One possible explanation is that chronic disease gradually developing with an IUD in situ leads to symptoms resulting in removal of the device. Only when the symptoms persist for some time after removal is surgical intervention undertaken and a diagnosis made.

Our findings on the relation between acute definite pelvic inflammatory disease and duration of use of an IUD are in line with those in most other studies: the progressive decline in the disease rates may, perhaps, reflect a process of selective discontinuation of IUD use by women at risk. Unfortunately, our data are not adequate for assessing the possible relation between replacement of an IUD and the occurrence of the disease, since changes of device where removal is followed by immediate replacement with a device of the same type are not routinely recorded in the Oxford study. Hence we cannot exclude the possibility that the apparent increase in the risk of acute definite disease in users of an IUD of more than six years' duration is associated with IUD replacement. The suggestion that the disease might occur more frequently in association with a Dalkon shield than with other devices is interesting in view of the evidence that this IUD has been associated with an increased risk of septic abortion in the second trimester.[5]

Finally, our findings do not contribute any information on the bacteria or other infectious agents responsible for pelvic inflammatory disease. Nor can we provide any information about fertility subsequent to an attack of the disease, since the great majority of parous women suffering an attack in our study did not wish to have any further children.

References

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BALM. This herb is so well known to be an inhabitant almost in every garden, that I shall not need to write any discription thereof, although its virtues, which are many, may not be omitted.

It is an herb of Jupiter, and under Cancer, and strengthens nature much in all its actions. Let a syrup made with the juice of it and sugar (as you shall be taught at the latter end of this book) be kept in every gentlewoman's house to relieve the weak stomachs and sick bodies of their poor sickly neighbours; as also the herb kept dry in the house, that so with other convenient simples, you may make it into an electuary with honey, according as the disease is you shall be taught at the latter end of my book. The Arabian physicians have extolled the virtues thereof to the skies; although the Greeks thought it not worth mentioning. Seraphio says, it causes the mind and heart to become merry, and revives the heart, faintings and swoonings, especially of such who are overtaken in sleep, and drives away all troublesome cares and thoughts out of the mind, arising from melancholy or black choler; which Avicen also confirms. It is very good to help digestion, and open obstructions of the brain, and hath so much purging quality in it (saith Avicen) as to expel those melancholy vapours from the spirits and blood which are in the heart and arteries, although it cannot do so in other parts of the body. Dioscorides says, that the leaves steeped in wine, and the wine drank, and the leaves externally applied, is a remedy against the stings of a scorpion, and the bitings of mad dogs; and commends the decoction thereof for women to bathe or sit in to procure their courses; it is good to wash aching teeth therewith, and profitable for those that have the bloody flux. The leaves also, with a little nitre taken in drink, are good against the surfeit of mushrooms, helps the griping pains of the belly; and being made into an electuary, it is good for them that cannot fetch their breath: Used with salt, it takes away wens, kernels, or hard swelling in the flesh or throat; it cleanses foul sores, and eases pains of the gout. It is good for the liver and spleen. A tansy or caudle made with eggs, and juice thereof while it is young, putting to it some sugar and rose-water, is good for a woman in childbirth, when the after-birth is not thoroughly voided, and for their faintings upon or in their sore travail. The herb bruised and boiled in a little wine and oil, and laid warm on a boil, will ripen it, and break it. (Nicholas Culpeper (1616-54) *The Complete Herbal*, 1850.)