

# Ectopic pregnancy concurrent with induced abortion: Incidence and mortality

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From 1972 through 1985, 24 women who underwent an induced abortion died as a result of a concurrent ectopic pregnancy. We analyzed data from the Joint Program for the Study of Abortion, National Hospital Discharge Survey, and the Centers for Disease Control Ectopic Pregnancy and Abortion Surveillance Systems to determine the incidence and mortality of ectopic pregnancy concurrent with induced abortion. During the period 1971 through 1985, the incidence of ectopic pregnancy concurrent with induced abortions was 1.35/1000 induced abortions, compared with 13.6/1000 pregnancies not terminated by induced or spontaneous abortion. The rate was higher among women who obtained abortions at earlier gestational age and among older women. The death-to-case rate for ectopic pregnancies concurrent with induced abortion was 1.3 times higher than that for women not undergoing abortion. Most of the deaths of women with ectopic pregnancy who underwent induced abortion were attributable to the failure to diagnose the ectopic pregnancy before the woman left the facility where the abortion was performed. Such deaths could be prevented by the provider of the abortion assuring that the tissue is examined for products of conception at the time of the abortion. (*AM J OBSTET GYNECOL* 1990;162:726-30.)

**Key words:** Induced abortion, ectopic pregnancy, maternal morbidity

The diagnosis of an ectopic pregnancy in a woman undergoing an induced abortion may be missed at the time of the procedure and can be further delayed because symptoms of ectopic pregnancy may be ascribed to sequelae of the abortion. The incidence of ectopic pregnancies is rising,<sup>1</sup> and the number of women with an ectopic pregnancy who request an induced abortion is also increasing. In this study we used data from several sources to estimate the incidence of ectopic pregnancy concurrent with induced abortion and to estimate the risk of death in this situation. We found that the incidence of ectopic pregnancy was 10 times lower among women undergoing abortion than among women not seeking abortion. However, the risk of death among women with ectopic pregnancy and induced abortion was higher than the overall risk of death from ectopic pregnancy.

## Methods

We used data from the National Hospital Discharge Survey (NHDS) to estimate the number of women with the joint diagnoses of induced abortion and ectopic pregnancy discharged from hospitals during 1971 through 1985.<sup>2</sup> Each year this survey samples approx-

imately 200,000 discharge face sheets from approximately 400 U.S. nonfederal, short-stay hospitals in the 50 states and the District of Columbia. The sample is stratified to represent all discharges from U.S. short-stay hospitals with respect to hospital size, type of ownership, and geographic location. The NHDS abstracts the first seven diagnoses and the first four surgical procedures (three surgical procedures for 1971 to 1978) noted on the face sheet. For this study, we identified cases of ectopic pregnancy concurrent with induced abortion by searching for ectopic pregnancy among all diagnoses and for induced abortion among all surgical procedures. The rates of ectopic pregnancy concurrent with induced abortion were obtained by use of the numbers of induced abortions performed in hospitals as denominators. Denominators were obtained by applying the proportion of abortions performed in hospitals as reported by the Alan Guttmacher Institute<sup>3</sup> to the total number of abortions reported by the Centers for Disease Control (CDC).<sup>4,5</sup> We estimated the total number of ectopic pregnancies concurrent with induced abortion by applying these rates to the total number of abortions as reported by the CDC.

We used data from the Joint Program for the Study of Abortion (JPSA) II and III as another way to estimate the incidence of ectopic pregnancy concurrent with induced abortion and to study the characteristics of women with these conditions. JPSA II included 80,437 legal abortions performed at 32 institutions between 1971 and 1975, whereas JPSA III included

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84,318 legal abortions performed at 13 institutions between 1975 and 1978. Some cases of ectopic pregnancy may have been missed among the 45% of women in JPSA II and the 43% of women in JPSA III who did not receive follow-up. The rates of ectopic pregnancy concurrent with induced abortion were adjusted for follow-up and were further stratified by the woman's age and gestational age at the time of the abortion.

Deaths as a result of ectopic pregnancy among women obtaining legal abortion during the period 1972 through 1985 were identified through the CDC's Ectopic Pregnancy and Abortion Mortality Surveillance Systems. These systems identify maternal deaths associated with an ectopic pregnancy or an abortion by gathering reports of such deaths from state health departments, coroners, the nationwide surveillance of abortion mortality, and from other sources.<sup>6, 7</sup> All deaths are investigated by medical epidemiologists. A diagnosis and a cause of death are assigned each case from information obtained from death certificates, medical records, and autopsy reports.

### Results

Analysis of data from the NHDS reveals that during the period 1971 through 1985, an estimated 5797 women were discharged from hospitals with the diagnoses of ectopic pregnancy and induced abortion for pregnancy termination. For the same period, we estimated that 4,300,783 induced abortions were performed in hospitals in the United States. As a result, the incidence of ectopic pregnancy concurrent with induced abortion among hospital discharges for the period 1971 through 1985 is estimated to be 1.35/1000 induced abortions. The rate increased more than two-fold, from 0.95/1000 induced abortions during the period 1971 through 1978 to 1.92/1000 induced abortions during the period 1979 through 1985 (Table I). This increase parallels the increase in the rates of ectopic pregnancy among women whose pregnancies did not terminate in an abortion (Table I). The rates of ectopic pregnancy concurrent with induced abortion were approximately 10 times less than the rates of ectopic pregnancy per 1000 deliveries for all time intervals (Table I).

Among women included in JPSA II and JPSA III studies, 77 had an ectopic pregnancy. Based on these studies, the crude rate of reported ectopic pregnancy concurrent with induced abortion for the period 1971 through 1978 was 0.47/1000 abortions. With adjustment for follow-up the rate was 0.71/1000 abortions. When we extrapolated the JPSA data for gestational age and age of the woman with the use of the national distribution of women obtaining abortions, the estimated rate rose to 0.82/1000 induced abortions (Table I).

In comparison, when we used data from the NHDS

Table I. Rates of ectopic pregnancy and rates of ectopic pregnancy concurrent with induced abortion, United States, 1971-1985

Years	Rates of ectopic pregnancy concurrent with induced abortion per 1000 induced abortions		
	NHDS*	NHDS*	JPSA†
1971-1974	7.34	0.73	0.54
1975-1978	11.55	1.15	1.12
1971-1978	9.43	0.95	0.82
1979-1985	17.92	1.92	NA
1971-1985	13.63	1.35	NA

\*National Hospital Discharge Survey data source.

†Joint Program for the Study of Abortion data source. Rates were adjusted for follow-up and gestation.

for the same period (1971 through 1978). The rate of ectopic pregnancy concurrent with induced abortion was 0.95/1000 induced abortions. Among women included in the JPSA studies, the rate of ectopic pregnancy concurrent with induced abortion increased with age and decreased with gestational age for each age group (Table II).

From 1972 through 1985, 24 ectopic pregnancy-related deaths among women undergoing legally induced abortion were reported to the CDC. During the same period, the CDC reported 15,131,738 legal abortions in the United States. Analysis of data from the NHDS reveals that the rate of ectopic pregnancy concurrent with induced abortion during 1972 through 1985 was 1.36 per 1000 abortions. After application of this rate to the total number of abortions reported by the CDC, we estimate that during 1972 through 1985 there were 20,570 cases of ectopic pregnancy concurrent with induced abortion in the United States. As a result, the death-to-case rate of ectopic pregnancy concurrent with induced abortion is 11.7/10,000. During the same period, 680,000 ectopic pregnancies and 592 deaths as a result of ectopic pregnancy were reported in the United States,<sup>1</sup> representing a death-to-case rate of 8.7/10,000.

All 24 women who died as a result of ectopic pregnancy concurrent with induced abortion died of intraperitoneal hemorrhage. Most were of low gravidity, had the abortions performed by suction curettage, had symptoms of ectopic pregnancy within 1 week after the abortion procedure, had their abortions at  $\leq 9$  weeks' gestation, and had a positive pregnancy test (Table III). Fifteen women died at home, in transit, or in the emergency room. The diagnosis of ectopic pregnancy was confirmed by autopsy in 19 women and by laparotomy in 5. The symptoms of ectopic pregnancy included abdominal pain (19 women), nausea and vomiting (12



Table II. Numbers and rates of ectopic pregnancy concurrent with induced abortion by age and gestational age, among women with follow-up and with known age and gestation.

Age group	Gestational age (wk)	No. of abortions	No. with ectopic pregnancy	Rate per 1000 abortions
15-24	≤8	22,511	26	1.15
	9-12	21,243	2	0.09
	≥13	14,994	1	0.07
	All gestations	58,748	29	0.49
25-34	≤8	12,619	20	1.58
	9-12	8,370	3	0.36
	≥13	3,735	1	0.27
	All gestations	24,724	24	0.97
35-44	≤8	2,396	6	2.50
	9-12	1,809	3	1.66
	≥13	865	0	0
	All gestations	5,070	9	1.78
All ages	≤8	37,526	52	1.39
	9-12	31,422	8	0.25
	≥13	19,594	2	0.10
	All gestations	88,542	62	0.70

Data source is Joint Program for the Study of Abortion II and III.

women), shock (9 women), vaginal bleeding (3 women), fever (3 women), and constipation (2 women). Tissue was submitted for pathologic examination after the abortion procedure for 20 women; the examination showed villi in 6 tissue samples and no villi in 14. Three women suspected of having ectopic pregnancy after gross examination of the products of conception were informed of the possibility but did not return for follow-up and could not be contacted. Two women could not be contacted after pathology showed no villi. On the other hand, nine women with various symptoms were sent home from emergency rooms with diagnoses including mental problems, viral gastroenteritis, pelvic inflammatory disease, urinary tract infection, uterine perforation, septic abortion, and influenza.

#### Comment

We found comparable estimated rates of ectopic pregnancy concurrent with induced abortion with the use of two different data sources (Table I). This comparability suggests that the estimates accurately reflect the low rates of ectopic pregnancy concurrent with induced abortion. The crude rate of 0.41/1000 abortions on the basis of the JPSA II study for the period 1971 through 1974 is consistent with rates reported from other similar studies for that time period. Jerome et al.<sup>8</sup> in Washington, D.C., reported a rate of 0.40/1000 procedures among 55,000 women undergoing induced abortion between 1972 and 1977; Tietze<sup>9</sup> reported 17 cases of ectopic pregnancy concurrent with induced abortion among 72,988 women obtaining abortion who were included in the JPSA I study conducted by the Population Council during the period 1970 through 1971, a rate of 0.38/1000 abortions; and Wulf<sup>10</sup> reported seven cases among 16,410 abortions from 1973 through 1976, a rate of 0.43/1000.

Our estimated rate of ectopic pregnancy concurrent with induced abortion of 1.35/1000 abortions is 10 times less than the overall rate of ectopic pregnancy of 13.63/1000 deliveries for the United States between 1970 and 1985. A number of reasons suggest why women who seek abortion may have a lower incidence of ectopic pregnancy than those not seeking abortion. First, many women with ectopic pregnancies become symptomatic early in gestation, seek medical care, and as a result, never become candidates for induced abortion. Second, other women with ectopic pregnancies may never seek abortion because they are unaware that they are pregnant, and they remain asymptomatic until they are seen as acute surgical emergencies. In a study of 300 women with ectopic pregnancies, Brenner et al.<sup>11</sup> found that 16% of the women were in this category. Third, most abortion providers require positive pregnancy test results before performance of an abortion.<sup>12</sup> Because most of the tests will be slide agglutination tests, with a sensitivity of 700 to 1000 mIU human chorionic gonadotropin, at least 25% of women with ectopic pregnancies will have negative test results and thus will not undergo an abortion.<sup>13</sup> Fourth, several studies have shown a relatively high incidence of prolonged infertility in women in whom ectopic pregnancies develop.<sup>13,14</sup> Women with a history of infertility are probably less likely to desire an abortion if they become pregnant than are women without this history. For these and perhaps other reasons, the rate of induced abortion among women with ectopic pregnancies is much lower than the rate among other pregnant women. We think these factors can explain the 90% lower incidence of ectopic pregnancy among women who obtain induced abortion.

Our results also indicate that the rate of this condition has increased over time and parallels the rate of in-

crease of ectopic pregnancy in the general population (Table I). As is the case for ectopic pregnancy in general,<sup>1</sup> the rate of ectopic pregnancy concurrent with induced abortion among women  $\geq 35$  years of age was more than three times higher than the rate among women 15 to 19 years old (Table II). Our study also revealed that the rate of ectopic pregnancy concurrent with induced abortion decreased with gestational age for each age group. With later gestation, more women have symptoms of ectopic pregnancy and are treated before they have the opportunity to request an induced abortion.

Despite the considerably lower incidence of ectopic pregnancy among women undergoing induced abortion, the risk of mortality for these women was 1.3 times higher than that among other women with ectopic pregnancies. When we investigated deaths among women with ectopic pregnancies concurrent with an abortion, we found that the majority were ultimately because of a failure to recognize the symptoms of hemoperitoneum associated with a ruptured ectopic pregnancy. When an ectopic pregnancy is not recognized at the time of the abortion procedure, these women are at especially high risk of misdiagnosis during the postabortal period; the symptoms may be ascribed to abortion complications such as retained products of conception or a postabortal infection rather than ectopic pregnancy.<sup>15</sup> Nine of the 24 deaths in this study might have been prevented if ectopic pregnancy were suspected when these women were first seen with a variety of symptoms after induced abortion.

Although the importance of examining the products of conception for chorionic villi at the time of the procedure is established, apparently this approach has not been universally adopted.<sup>16,17</sup> This examination should be conducted before the woman leaves the clinic. In this study at least 14 of the 24 women who died did not show villi on pathologic examination of the products of conception. Some of the women were suspected of having ectopic pregnancy but were sent home and advised to come back for follow-up. All 14 deaths might have been prevented if the absence of villi and the diagnosis of ectopic pregnancy had been confirmed before the patients were sent home. If the clinic depends exclusively on an outside pathology laboratory to examine the tissue, the diagnosis of an ectopic pregnancy may be dangerously delayed (seven [29%] of the 24 women died within 1 week of the abortion). If the woman leaves the clinic before an absence of villi is discovered, contacting her later may be impossible because some women use false identities when obtaining an abortion.<sup>16</sup> In our review of the 24 deaths, three women suspected of having ectopic pregnancy did not return for follow-up and two could not be contacted after pathology did not show villi.

Floating the tissue in tap water or white vinegar fa-

Table III. Characteristics of women who died as a result of ectopic pregnancy concurrent with induced abortion, United States, 1972-1985

Characteristic	Number	Percent
Age (yr)		
$\leq 19$	4	16.7
20-24	6	25.0
25-29	6	25.0
30-34	5	20.8
$\geq 35$	3	12.5
Race		
White	10	41.7
Black and other	14	58.3
Gravidity		
1	6	25.0
2	6	25.0
3	6	25.0
$\geq 4$	6	25.0
Duration between abortion and death (days)		
During abortion	3	16.7
1	1	4.1
2-7	3	12.5
8-14	10	41.7
15-21	3	12.5
22-50	4	16.7
Gestation (wk)		
6-7	9	37.5
8-9	7	29.2
10-12	3	12.5
$\geq 13$	3	12.5
Unknown	2	8.3
Pregnancy test		
Positive	16	66.7
Negative	2	8.3
Unknown	6	25.0
Place of death		
Hospital	9	37.5
Home	8	33.3
In transit	3	12.5
Emergency room	4	16.7
Pathology result		
Villi	6	25.0
No villi	14	58.3
Unknown	4	16.7
Ectopic pregnancy site		
Right tube	14	58.3
Left tube	10	41.7

cilitates examination of the products of conception. If the characteristic villous structures are not immediately visible, backlighting and examination under a low-power microscope may be helpful.<sup>18</sup> If villi or fetal parts cannot be identified, four possibilities exist: (1) the procedure was unsuccessful, (2) the patient was not pregnant, (3) a perforation or false passage was created, or (4) an ectopic pregnancy is present. The patient should be reexamined, with particular attention given to the adnexa. If indicated, the abortion procedure should be repeated. If doubt persists, another pregnancy test and formal pathologic examination of the tissue should be performed as rapidly as possible. If on the basis of these tests no diagnosis could be made, additional diagnostic tests should be performed to confirm or rule out an

ectopic pregnancy. These tests include culdocentesis, sonography, and laparoscopy. If the woman is asymptomatic and an ectopic pregnancy is not suspected on examination, she should be given a thorough explanation of the situation, briefed on the symptoms of ectopic pregnancy, and followed up closely until the situation is resolved.<sup>16, 17</sup>

In summary, we found that the rate of ectopic pregnancy concurrent with induced abortion is <10% of the rate among women not obtaining abortions. However, the death-to-case rate is higher than that of ectopic pregnancy not associated with induced abortion. In at least 60% of the deaths, care was delayed because of failure to recognize the absence of chorionic villi before discharge of the patient and failure to suspect ectopic pregnancy in patients first seen with a variety of symptoms after induced abortion. The physician who performs the abortion should always be responsible for confirmation of the presence of the products of conception.

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