Childbirth as Protective of the Health of Women in Contrast to Induced Abortion- IV.
Reproductive Complications and Infections

Despite its importance, there is only limited study of the effects of reproductive history on hypertension in pregnancy.


According to the most recent data for the U.S. published by the Centers for Disease Control for 1987-90, 256 women died from complications from pregnancy-induced hypertension out of a total of 1453 pregnancy-related deaths during that period. This represented 17.6% of the total pregnancy-related deaths.


Eclampsia and pre-eclampsia are the most important causes of maternal mortality in the western world, including the United States, the Nordic Countries and England and Wales. Cerebral hemorrhage, brought on by high blood pressure, is identified as the lethal event in 50-60% of the cases.


Between 1967-1978 in Aberdeen City District there were 29,851 pregnancies of which 6,637 had two or more previous pregnancies. Among the 6,637 women 419 (6.3%) had an induced abortion of their first pregnancy. Among the 6,637 women 358 women (5.4%) had an induced abortion of their second pregnancy. Among viable first pregnancies which reached at least 28 weeks gestation, the incidence of mild pre-eclampsia, proteinuric pre-eclampsia and eclampsia was 26.3%, 5.5% and 0.2% respectively. Among women with a viable first pregnancy and a viable second pregnancy, the incidence of mild pre-eclampsia, proteinuric pre-eclampsia and eclampsia was 17.0%, 1.9% and 0% respectively. Among women with a viable second pregnancy when the first pregnancy outcome was an induced abortion, the incidence of mild pre-eclampsia and proteinuric pre-eclampsia was 26.1% and 7.8% eclampsia and was similar to the population incidence in a first pregnancy. (Table 1)

Comment: This is the leading study on reproductive history and hypertension in pregnancy. Having one viable pregnancy clearly protects against hypertension in the subsequent pregnancy. An earlier study

Hypertension (high blood pressure) in Pregnancy

The etiology of hypertension in pregnancy (PIH), including pre-eclampsia and eclampsia, is not well-known, although it appears to be generally accepted that it has a disease model. The incidence of hypertension in pregnancy among U.S. women is 10-12%. PIH is one of the leading causes of pregnancy-related deaths in the world.

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on women in the city of Aberdeen had found that a previous abortion reduced the incidence of pre-eclampsia but not as much as childbirth. This later study found that there was no protective effect from early abortion, whether induced or spontaneous, but that late spontaneous abortions (13-27 weeks) did significantly reduce the risk.


The relationship between pregnancy-induced hypertension and reproductive history was assessed in 29,484 women receiving obstetric care at Parkland Memorial Hospital in Dallas, Texas. The incidence of pregnancy-induced hypertension was 25.4% in women experiencing their first pregnancy, 22.3% in women whose only previous pregnancy had terminated in abortion, and only 10% among women who carried two or more successive pregnancies to viability.

Comment: This study basically confirmed the results of the Aberdeen City district study.


In a study of 139 pre-eclamptic cases compared to 132 controls of women who gave birth at Northern California Kaiser Permanente Medical Centers during 1984-1985, those with a previous history of therapeutic abortion had a statistically significant increased risk of 2.16 of preeclampsia compared to women with no history of therapeutic abortion.

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<td><strong>Pre-Eclampsia and Reproductive History-Aberdeen Study</strong></td>
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<td><strong>Mild</strong></td>
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Texas. The incidence of pregnancy-induced hypertension was 25.4% in women experiencing their first pregnancy, 22.3% in women whose only previous pregnancy had terminated in abortion, and only 10% among women who carried two or more successive pregnancies to viability.


A study of birth records from North Carolina from 1988-1989 found an overall incidence of pregnancy-induced hypertension (PIH) of 43.1 per 1000 births. Women with parity one (1) had a risk of 0.4-0.5, while women with parity two (2) had a risk of 0.3-0.4 compared to parity 0, which indicates a protective effect from childbirth. Black and white women were at virtually the same risk. Tobacco use during pregnancy reduced the risk of PIH from 0.9 to 0.7 depending on the frequency of smoking.


In a study of 9,771 women from the Jerusalem Perinatal Study who were pregnant for the first or second time, the rate of pre-eclampsia for women experiencing their first pregnancy was 2.9%, compared to 1.5% for women with two successive pregnancies carried to term, 1.7% for women whose first pregnancy ended by induced abortion, and 2.3% among women whose first pregnancy ended by spontaneous abortion. An out of date definition for pre-eclampsia was used in this study so results may not be directly comparable.


In a study of 765 Italian women enrolled in a study of aspirin in pregnancy, a total of 132 developed pregnancy-induced hypertension (PIH) during the study who were then compared to those who did not develop hypertension. Women of parity 2 or more had an Odds
Ratio of 0.5 compared to nulliparous women, which was statistically significant. Compared to women with no induced abortions (1.0), women with one or more induced abortions had an Odds Ratio of 1.2 indicating a non-significant increased risk.


A case-control study of primiparous women without a history of high blood pressure who gave birth in Quebec City or Montreal, Canada Hospitals between 1984-86, found that women who were smokers at the onset of pregnancy had a statistically significant reduced risk of preeclampsia of 0.51 compared to women who had never smoked and a statistically significant reduced risk of gestational hypertension of 0.78 compared to women who never smoked.

Comments: It is known that women with prior induced abortion(s) will smoke at a higher rate than women with other pregnancy outcomes. To the degree that the higher incidence of smoking is unrelated to the induced abortion, it would underestimate the actual effect of induced abortion on hypertension in pregnancy.

Infections/Complications/Reproductive Problems

U.S. women experience a substantial number of reproductive health problems. According to a recent survey, there were at least 18 pregnancy associated hospitalizations per 100 births among U.S. women in 1991-92. Another study reported that approximately 1.4 million annual gynecologic visits were made by U.S. women age 15-44 to emergency departments during 1992-1994. Nearly one-half of these visits resulted in a diagnosis of genital tract infections.

The following studies illustrate the protective effects of childbirth and the increased risk from induced abortion with respect to infections, such as sepsis or intraamniotic infection, complications and future reproductive problems.

Infections


A case-control study of neonatal sepsis was conducted using the Washington State Birth Registry. Cases of sepsis were selected among singleton live births during 1984-1990, and compared with a control group for the occurrence of spontaneous or induced abortion in previous pregnancies. After exclusion of primigravidae, the age-adjusted odds ratio was 2.20 for previous induced abortion compared with previous live birth. After exclusion of nulliparous women, the odds ratio for previous induced abortion decreased to 1.45 compared to previous live birth. The authors concluded that “after controlling for the effect of parity, induced abortion is associated with an increased risk of neonatal sepsis in a subsequent pregnancy”.

The authors also stated that although neonatal sepsis occurs in only one to ten cases per 1000 live births, it is offset by a case fatality rate of 50-75%. It is also complicated by meningitis in 20-30% of the cases with surviving children frequently having neurological defects. Citing five studies, see also Maternal Infection and Cerebral Palsy in Infants of Normal Birth Weight, JK Gerthner, KB Nelson, JAMA 278:207-211, July 16, 1997 Where one or more indicators of maternal infection were present in 2.9% of control children and 22% of children with cerebral palsy.

Comment: These studies are probably the first to demonstrate that post-abortion or postpartum infections are sufficient to cause serious injury or death to newborn children in the absence of low birth weight or premature delivery. Serious infections also can result in the death of the mother. The Centers for Disease Control reported that among the 797 pregnancy related deaths of U.S. women during 1987-1990 where there was a live birth, 97 (12.2%) were from infection which was primarily general septicemia.


A case-control study of 585 women from five hospitals in King County, Washington from 1990-1994 identified intraamniotic infection by medical record review for clinical signs of infection during labor and compared with controls. Women were classified as having a
spontaneous or induced abortion if the pregnancy had been diagnosed by a health care professional before 20 weeks gestation and was verified by medical record review. Compared to women whose prior pregnancy outcome was a birth of more than 20 weeks gestation, women whose prior pregnancy outcome was an elective abortion were 4.0 times more likely to have intraamniotic infection in the subsequent pregnancy.


A study of 26,332 U.S. women undergoing abortion at five abortion facilities during 1975-1978 found that post-abortion infections as measured by an oral temperature of 38 degrees centigrade or higher for two or more days were significantly lower (relative risk 0.54) among women with one or more previous births compared to women with no previous births.

Comments: This study demonstrates the protective effects of prior childbirth from infection in a subsequent pregnancy which ends in induced abortion. These findings have important health implications particularly in light of reports of the growing ineffectiveness of antibiotics.


Seventy-six Swedish women with either ectopic pregnancy or infertility were compared with 367 controls with an intrauterine pregnancy in order to study the relationship between delayed care of symptomatic pelvic inflammatory disease and infertility. Delayed care was defined as seeking health care three or more days after the onset of lower abdominal pain.

Women who delayed seeking health care were more likely to have a history of recent gynecological events such as IUD insertion or induced abortion, and to be infected with chlamydia rather than gonorrhea. Compared with women who sought care within the first two days of the onset of pain, those who delayed 3-9 days were twice as likely to experience impaired fertility. Women with chlamydial infections and who delayed care were six times as likely to experience impaired fertility as those who sought care right away.

Comment: The insertion of instruments appeared to be a key factor in the rapid spread of infection and potentially impaired infertility.


A study of 19-25 year-old women in northern Sweden found that the prevalence of c. trachomatis infection was 2.7% and the seroprevalence was 24.7%. Compared to women with no history of therapeutic abortion, those ever having a therapeutic abortion had an unadjusted 3.15 increased risk of seropositivity which was reduced to 2.40 after adjusting for other risk factors.


In a study of 81 women who presented to a London clinic with abdominal pain, 11 (14%) were diagnosed for pelvic inflammatory disease (PID) by laparoscopy. Among those with PID, 8 of 11 (72%) had experienced one or more induced abortions compared to 4 of 11 (36%) who had experienced one or more viable pregnancies.

Early and Late Onset Pelvic Inflammatory Disease among Women with Cervical Chlamydia Trachomatis Infection at the Time of Induced Abortion, JL Sorensen et al, Infection, 22 (4): 242, 1994

A Danish study which followed women in a double-blind randomized study of the effect of erythromycin on post-abortion infections found that untreated women with c. trachomatis infection at the time of the first trimester abortion had a cumulative risk of 72% of developing early and/or late pelvic inflammatory disease after 24 months compared to only 8% if they were treated with erythromycin prior to the abortion.

Comment: This is an important study because frequently U.S. abortion facilities do not check for the presence of C. trachomatis at the time of the abortion. Also, because it is controversial, there is no gen-
Gestational Trophoblastic Disease

Gestational trophoblastic neoplasia includes complete hydatidiform mole, invasive mole and choriocarcinoma.

The incidence of molar pregnancy among U.S. women is reported to be 1 per 1,500 live births and it is potentially life threatening. According to pregnancy related deaths of U.S. women compiled by the Centers for Disease Control for 1987-1990, six women died from molar pregnancy.

Choriocarcinoma is a form of gestational trophoblastic disease which is malignant and therefore is considered a form of cancer. According to a 1986 U.S. study its incidence is about one in 24,000 pregnancies.


A case-control study of gynecologic and reproductive risk factors for gestational trophoblastic neoplasia among Baltimore area women from 1975-1982 found that there was a higher mean incidence of induced abortions or spontaneous abortions among cases compared to controls, while women having at least one term pregnancy or one live child provided a protective effect.


A Massachusetts study of women with molar pregnancy matched with parous controls without molar pregnancy found that there was an 8-fold increased risk for molar pregnancy when the prior pregnancy was an induced abortion.


A multi-centered study of women with gestational choriocarcinoma matched with women by year of pregnancy, age at pregnancy, and geographical residence found that an induced abortion preceding the choriocarcinoma was a risk factor while a live birth was protective against carcinoma. The article concluded that the most important factor for choriocarcinoma is the nature of the preceding pregnancy.

Placenta Previa

Placenta previa occurs when the placenta is implanted in the uterus extending to the margin of the internal os of the cervix or partially or completely obstructing the os.


A cohort study at Vanderbilt University found that the incidence of placenta previa was 4.6% if it was the first delivery following induced abortion compared to 3.8% if women had a history of induced abortion and an overall incidence of 0.9% during the same period.


A review of 12 studies from 1950-1996 by researchers at the Robert Wood Johnson Medical School found that there was a strong association between a previous induced abortion and a higher risk of placenta previa among U.S. women.

Bleeding

Long-term sequelae following legally induced abortion, EB Obel, Danish Med Bull, 27 : 61 1980

An induced abortion increased the risk of bleeding in a subsequent
pregnancy compared to women with previous deliveries as well as women with no previous pregnancies.

Pain

Chronic abdominal or pelvic pain in women can be very serious and accompanied by other adverse effects. Women with abdominal pelvic pain syndrome have been found to be significantly more anxious, depressed, hostile and have more somatic symptoms than other women. Other research concluded that these women exhibited a significantly higher prevalence of major depression, substance abuse, adult sexual dysfunction, somatization, and history of childhood and adult sexual abuse than a comparison group. They also are more likely to use disassociation as a coping mechanism, show current psychological distress, see themselves as medically disabled, and to experience vocational and social problems.


A Swedish study of 50 healthy primiparas and 81 healthy multiparous (age 17-41) in 1985 found that women with fewer children had more intense labor pain than those with more children. A higher intensity of labor pain also correlated with a history of spontaneous or legal abortion. History of legal abortions correlated with loneliness and personal support which the study found were correlated with emotional feelings during labor.


Among 70 women without pelvic inflammatory disease who presented at a London genitourinary medicine clinic between 1985-1987 with abdominal pain, 40% had experienced one or more induced abortions compared to 14% who had experienced one or more viable pregnancies.

Complications of Third Stage of Labor

Retained placenta is a major risk factor for obstetric hemorrhage. A British study found that retained placenta is 13.7 times more likely to result in obstetric hemorrhage of 1000 ml or more, which is large enough that it might lead to maternal death. According to pregnancy-related death reports by the Centers for Disease Control from 1987-1990, hemorrhage was the cause of death in 21.1% of the 797 deaths of U.S. women which resulted in live births.


In a Scottish study of complications of the third stage of vaginal delivery among 36,312 women between 1967-1981, the incidence of retained placenta and/or postpartum hemorrhage was 4.5% for women with a single pregnancy with a normal third stage, 3.5% for women with a normal third stage in the first pregnancy and a normal third stage in the second pregnancy, and 9.1% for women whose first pregnancy had a normal third stage and whose second pregnancy ended in abortion.


Hong Kong researchers studied Chinese women with three or more prior induced abortions, and two or more prior induced abortions with no other pregnancies prior to the index pregnancy, compared to a control group of women with a single pregnancy carried to term. Women with three or more induced abortions had a 7.0% incidence of retained placenta and 3.5% incidence of primary postpartum hemorrhage compared to 2.9% and 1.6% respectfully for the two induced abortion group and 0.4% and 0.8% respectfully for controls.

Infertility/Pregnancy Loss

Induced abortions, miscarriages, and tobacco smoking as risk factors for secondary infertility, A Tzonou et al, J Epidemiology and Comm. Health, 47: 36 39, 1993

A case-control study of women with secondary infertility matched to two controls who were pregnant at Alexandra Maternity Hospital in Athens, Greece in 1987-88, found that compared to women with only live births, those women with a history of one or more induced abortions only had a statistically significant increased relative risk of 3.0 of secondary infertility. In this
study, secondary infertility was defined as such if, there had been a previous conception, the patient was married, the husband had a normal semen analysis, and if the woman had been trying to become pregnant for at least 18 months.

The Effect of Induced Abortion on Subsequent Fertility, P Frank et al, Br. J. Obstetrics and Gynaecology, 100: 575-580, June, 1993

In a follow up analysis of British women who had an induced abortion compared to women whose last pregnancy had a natural outcome, it was found that at the end of 12 months 89.0% of the abortion group had achieved a pregnancy compared to 93.3% of the non-abortion group which approached statistical significance.

Comments: The definition of infertility in the study meets the World Health Organization criteria for infertility. Previous studies on the effect of induced abortion on subsequent infertility have reported little or no risk following induced abortion. However, a 11% infertility rate among post abortion women is certainly important.

Induced Abortion as a Risk Factor for Subsequent Fetal Loss, C. Infante-Rivard, R Gauthier, Epidemiology, 7, 540-542, 1996

A case-control study of fetal losses in pregnancies intended to be carried to term and prior reproductive history in a Montreal obstetrical care facility during 1987-91 found that, compared to women with no previous pregnancies (1.0), women with one prior pregnancy and no induced abortions had a 1.03 relative risk; women with one prior pregnancy and one prior induced abortion had a 1.41 relative risk; and women with two prior pregnancies and two prior induced abortions had a 4.43 relative risk of fetal loss. (Table 2)

Association of Induced Abortion with Subsequent Pregnancy Loss, AA Levin et al, JAMA, 243 (24): 2495-2499, June 27, 1980

In a study of patients entering Boston Hospital for Women from 1976-78 with a spontaneous abortion at less than 20 weeks gestation or premature delivery between 20-27 weeks gestation were compared to patients whose dates of delivery coincided with the dates of spontaneous abortions. It was found that women with two or more prior induced abortions had a statistically significant increased relative risk of 2.3 of a pregnancy loss before 14 weeks, a 3.1 increased relative risk of a pregnancy loss between 14-19 weeks, a 3.3 relative risk of a pregnancy loss between 20-27 weeks, and a 2.6 increased relative risk of a pregnancy loss up to 27 weeks.

The Epidemiology of Pre-Term Birth, J Lumley, Bailliere’s Clinical Obstetrics and Gynaecology, 7 (3): 477-498, September, 1993

A study of pre-term singleton births between 20-36 weeks gestation according to prior obstetric history in Victoria, Australia during 1986-1990, found that women with one prior induced abortion, two prior induced abortions, and three or more prior induced abortions had an overall incidence of 7.1%, 9.5% and 15.9% respectfully compared to 5.9% among women with no prior pregnancies. Differences were particularly striking for births before 28 weeks and were thought to be most unlikely to be explained by confounding factors of a socio-demographic kind.

Birth Defects

Hispanic Origin and Neural Tube Defects in Houston/Harris county, Texas. II. Risk Factors, MA Canfield et al, Am J Epidemiology, 143:12-24, 1996

| Table 2
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<tr>
<th>Relative Risk of Fetal Loss in Subsequent Pregnancy</th>
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<tr>
<td>Prior Preganancies</td>
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Source: Infante-Rivard et al, 1996
A case-control study of neural tube defects (anencephaly and spina bifida) in 1989-91 in Harris County, Texas found that a child having a Hispanic mother was a strong risk factor for both anencephaly and spina bifida. Any pregnancy termination or fetal loss was also significantly associated with anencephaly (Odds Ratio 2.48). In contrast, with one or more live births in comparison with no previous live births, there was a slight decrease in risk (Odds Ratio 0.85). The authors stated that one of the factors for increased risk for anencephaly among Hispanic women might be elective pregnancy termination.


A California Birth Defects Monitoring Program found that more than one elective abortion significantly increased the risk of gastroschisis (an abdominal wall defect) in infants (Odds Ratio 1.96), which was reduced to a non-significant elevated relative risk of 1.59 after multivariate analysis.

## Ectopic Pregnancy

Ectopic pregnancy is an extra-uterine pregnancy, usually in the fallopian tube. Death from ectopic pregnancy is reported to be the leading cause of pregnancy related death of U.S. women in their first trimester of pregnancy. According to CDC statistics for 1987-90, 156 women died from ectopic pregnancy which represented 10.7% of all pregnancy-related deaths during that period.

### Ectopic Pregnancy and Prior Induced Abortion


In a study at Boston Hospital for Women during 1976-78, the prior pregnancy history of 85 multigravid women with an ectopic pregnancy was compared with 498 multigravid delivery comparison subjects. Where the prior reproductive outcome was a live birth, the relative odds of an ectopic pregnancy was 0.5 compared to 2.0 when the prior reproductive outcome was an induced abortion. Other statistically significant risk factors for ectopic pregnancy were a history of ectopic pregnancy, history of pelvic infection, payment method, and history of pelvic surgery.

### Induced Abortions, Contraceptive Practices, and Tobacco Smoking as Risk Factors for Ectopic Pregnancy in Athens, Greece


In a case-control study of Greek women with diagnosed ectopic pregnancy in 1986-87, the relative risk for ectopic pregnancy when the preceding reproductive outcome was an induced abortion compared to a live birth was 1.7.

### Risk Factors for Ectopic Pregnancy: An Italian Case-Control Study


An Italian study found that compared to women with parity 0 (1.0), women with parity 1 had a statistically significant reduced risk of ectopic pregnancy (0.5 RR), and women with parity 2 had a non-significant reduced risk (0.6RR).

### Risk of Ectopic Pregnancy and Previous Induced Abortion


A French case-control study found that among women with no previous ectopic pregnancy, women with one previous induced abortion had a statistically significant increased relative risk of 1.4, while women with two or more previous induced abortions had a statistically significant increased relative risk of 1.9 for ectopic pregnancy compared to women with no previous induced abortions.

Compiled by:

Thomas W. Strahan, JD, Editor

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**Special Research Project**


Data is being collected at this site by a website survey on the effects of abortion on men which is being undertaken by Catherine Coyle, PhD, at the University of Wisconsin. For more information, call Catherine Coyle via e-mail at etcoyle@hotmail.com or call her at (608) 271-6997.