

Induced Abortion and Risk of Later Premature Births

Brent Rooney
Byron C. Calhoun, M.D.

ABSTRACT

At least 49 studies have demonstrated a statistically significant increase in premature births (PB) or low birth weight (LBW) risk in women with prior induced abortions (IAs). This paper will focus on the risk of early premature births (EPBs) (< 32 weeks gestation) and extremely early premature births (XPBs) (< 28 weeks gestation). Large studies have reported a doubling of EPB risk from two prior IAs. Women who had four or more IAs experienced, on average, nine times the risk of XPB, an increase of 800 percent.

These results suggest that women contemplating IA should be informed of this potential risk to subsequent pregnancies, and that physicians should be aware of the potential liability and possible need for intensified prenatal care.

Informed consent for an elective surgical procedure must generally cover long-term consequences and not just immediate risk. A woman considering an induced abortion (IA) should thus expect to be informed of potential effects on her fertility and the health of future infants, as well as her own future health. An elevated risk of bearing a child afflicted with a serious disability such as cerebral palsy might influence her decision, as well as future liability determinations by courts.

Low birth weight (LBW) and premature birth (PB) are the most important risk factors for infant mortality or later disabilities¹ as well as for lower cognitive abilities and greater behavioral problems² and thus contribute importantly to the liability exposure of obstetricians.

A literature review retrieved 49 studies that demonstrated at least 95 percent confidence in an increased risk of preterm birth (PB), or surrogates such as low birth weight or second-trimester spontaneous abortion, in association with previous induced abortions. A list of these studies, which probably does not comprise all such studies, is appended to this article. If these 49 statistically significant associations were the result of chance alone, as may happen in 5 of 100 tests, IA should be associated with a reduction in PBs, with $P < .05$, in an equivalent number of tests. Not one such instance has been found in the literature.

A MedLine search from 1966 to March, 2003, retrieved 8 studies that purportedly failed to show a significant increase in premature births after IA.³⁻¹⁰ Most showed an increase that did not reach statistical significance because of the small sample size: fewer than 1,000 pregnancies following an IA. In one, an increased risk of PB in women who had had an IA was nonsignificant when controlled for parity.³ These studies did not consider separately the risk of EPBs or XPBs, or the effect of multiple IAs, except one that showed a statistically significant increase of EPB, despite the statement in the abstract that “in the Netherlands there are no significant indications that spontaneous midtrimester abortions or premature deliveries are caused by a previous induced abortion.”⁶

A 1986 review concluded that “more research is needed before it is clear whether multiple induced abortions carry an increased risk of adverse pregnancy outcomes.”¹¹ The more recent, large studies discussed here help supply this lack.

Australian Study

A 1993 study in Victoria, Australia,¹² involved 121,305 total births and compared the risk of PB and XPB in women with various numbers of IAs, compared with a control group of women who had no prior pregnancies (see Table 1, derived from data in this report).

Gestational age	Number of prior IAs		
	1	2	3 or more
20-27 weeks (XPBs)	1.6	2.5	5.6
28-31 weeks	1.6	1.1	2.6
32-36 weeks	1.1	1.6	2.4

[RR = relative risk]

Table 1: Premature birth risk by number of prior induced abortions (IAs) compared with outcome of first pregnancies, Victoria, 1986-1990¹²

As Lumley explains:

The associations are different in the three gestation categories (20-27, 28-31, and 32-36 weeks), being particularly striking for births before 28 weeks. In this category, there is also evidence for a dose-response relationship between number of prior lost pregnancies and the prevalence of preterm birth: relative risks of 1.66 and 1.55 for one spontaneous or induced abortion, of 2.94 and 2.46 for two, and of 5.89 and 5.58 for three or more. These last four relative risks are substantially greater than any of those associated with maternal age, marital status, parity or socioeconomic status: that is, the association is most unlikely to be explained by confounding factors of a sociodemographic kind.¹²

Lumley's argument that “small single possible confounders cannot explain big risk factors such as 2.46 and 5.58” would also apply to any attempt to pose smoking or drug abuse as an explanation for the entire abortion-premature birth association.

The great majority of the Australian IAs were via vacuum aspiration; thus the PB risk cannot be attributed to dilation & curettage IAs.

The author noted that cross-sectional studies show that the relative risk of preterm delivery increases with the number of the previous preterm births, but that the risk of subsequent preterm births diminishes with each full-term delivery.¹² Thus, IA removes the protective potential of a full-term delivery, as others have also observed.¹³

In 1998, with twice the number of births (243,679) to analyze as in 1993,¹⁴ Lumley validated her 1993 results and additionally showed that women with four or more prior IAs had an XPB risk nine times that of primigravidas.

German Study

Another large study of 106,345 births in Bavaria,¹⁵ including 85 percent of births in the state and 1,146 EPBs, showed a comparable dose-response curve (see Table 2, extracted from Table 2 in the Bavarian study), confirming the Australian finding of the greatest increased risk for the earliest premature infants.

In a multivariate analysis that included many of the possible confounding variables, including previous stillborns, infertility treatment, age under 18 or over 35 years, malpresentation, premature rupture of membranes, and preeclampsia, the effect of even a single IA remained significant.

Gestational age	Number of prior IAs		
	1	2	3 or more
	OR (95% CI)	OR (95% CI)	OR (95% CI)
<32 weeks	2.5 (1.96-3.27)	5.2 (3.28-8.34)	8.0 (3.89-16.6)
<37 weeks	1.5 (1.35-1.76)	2.1 (1.54-2.81)	3.6 (2.25-5.62)

Table 2: Odds ratio (OR) for premature births by number of prior induced abortions (IAs)¹⁵

Danish Study

A 1999 study of Danish women¹⁶ is especially important because it used an IA registry, thus eliminating recall bias, the hypothesis that women with prior IAs who deliver prematurely are more accurate in reporting reproductive history than women who deliver at full term, as a possible explanation for the results.

This study of 61,753 women found an odds ratio for preterm birth at <34 weeks gestation of 1.99 (95% CI 1.64-2.43) for one prior IA and 2.03 (95% CI 1.36-3.04) for two or more prior IAs. Vacuum aspiration (VA) was the method used in 92.3 percent of all abortions. For VA, PB (gestation <37 weeks) odds ratios for 1, 2, 3 or more IAs were: 1.82, 2.45, and 2.00, respectively.

Dilation and evacuation increased the risk substantially. One evacuation was associated with a PB odds ratio of 2.27 whereas two prior evacuations had a very large odds ratio of 12.55.

Mechanisms for Abortions Causing a Premature Birth Risk

An accepted risk of surgical IA is incompetent cervix, which is a PB risk factor.¹⁷ Nulliparous women who have multiple IAs boost their odds of being over age 35 at their first term delivery, a risk factor for PB.^{14,15} Additional risk factors for PB that may be increased by abortion include uterine adhesions,^{14,23} infection,¹⁷⁻¹⁹ and mental distress.¹⁷

The evidence meets four of the criteria for determining causality:¹⁴ (1) the abortions preceded the premature births; (2) the association is strong; (3) there is a dose-response relationship; and (4) the association is plausible. A criterion for causality that could not be met in 1998 was confirmation by a prospective study. However, the Danish study identified all subsequent pregnancies until 1994 of the women under study, whose first pregnancies oc-

curred in 1980, 1981, and 1982.¹⁶ Reversibility of the exposure is not applicable to this circumstance. Consistency of findings with earlier studies cannot be assessed because these were not stratified by length of gestation, number of prior pregnancies, and number of IAs.¹⁴ However, the large studies in Germany, Denmark, and Australia consistently support multiple prior IAs as boosting EPB risk.¹⁴⁻¹⁶ Only the Australian studies included an XPB category.^{12,14}

Liability and Informed Consent

Recent litigation by women who claim that they were not fully informed about all the risks of an elective abortion, especially a possible increased lifetime risk of breast cancer, has drawn attention to the process of obtaining informed consent for this procedure. Moreover, even a signed consent form does not suffice to relieve a physician in the U.S. or Canada of the responsibility to withhold a treatment that he knows, or ought to know, is medically contraindicated.²⁰ What level of risk will courts determine to constitute a medical contraindication?

Liability costs are especially high in cases involving damaged babies. The median damage award in cases of medical negligence in attending at childbirth was \$2,050,000 between 1994 and 2000.²¹

Women are warned in a classic book covering 50 risk factors for PB that “if you have had one or more induced abortions, your risk of prematurity with this pregnancy increases by about 30 percent.”²² As shown here, the risk could be substantially higher than that, depending on the number of abortions and the method used.

It has been claimed that “induced abortion...is directly responsible for many thousands of cases of cerebral palsy—in North America alone—that otherwise would not have occurred.”²³ Supporting this assertion is the fact that the cerebral palsy risk in XPB is about 38 times higher than in the overall population of newborns,¹ in which the risk of cerebral palsy is approximately 2-3 per 1,000 births.²⁴ As the liability costs for cerebral palsy are exceptionally high, induced abortion, particularly without very detailed informed consent, may carry an unsupportable legal liability. Courts may not require definitive proof of causation; the existence of a number of positive studies, in the absence of definitive refutation, may be sufficient reason to include discussion of a potential serious adverse effect in obtaining informed consent.

A consent form that simply lists such items as “incompetent cervix” or “infection” as potential complications, but does not inform women of the elevated future risk of a preterm delivery, and that the latter constitutes a risk factor for devastating complications such as cerebral palsy, may not satisfy courts.

The authors of a recent CME review survey article, which evaluated 24 studies of abortion and PB, strongly affirmed the need for informed consent. They stated that prior IAs boost the risk of PB and that 7 of 12 significant studies that they reviewed identified a dose-response effect, with risks increasing with the number of IAs.²⁵

Brent Rooney is a medical researcher. He may be contacted at the Reduce Preterm Risk Coalition, 3456 Dunbar St. (146), Vancouver, Canada V6S 2C2. E-mail address: stopcancer@yahoo.com or whatsapp@vcn.bc.ca.

Byron C. Calhoun, M.D., F.A.C.O.G., F.A.C.S., is Director, Perinatal Assessment Unit, Rockford Memorial Medical Center in Rockford, IL; Visiting Clinical Professor in Obstetrics and Gynecology, University of Illinois at Chicago; and Adjunct Professor of Obstetrics and Gynecology, Midwestern University, Chicago College of Osteopathic Medicine.

Editorial assistance by Jane M. Orient, M.D., is gratefully acknowledged.

REFERENCES:

- ¹ Escobar GJ, Littenberg B, Petitti DB. Outcome among surviving very low birthweight infants; a meta-analysis. *Arch Dis Child* 1991;66:204-211.
 - ² Bhutta AT, Cleves MA, Casey PH, Cradock MM, Anand KJS. Cognitive and behavioral outcomes of school-aged children who were born preterm: a meta-analysis. *JAMA* 2002;288:728-737.
 - ³ Park TK, Strauss LT, Hogue CJ, Kim IS. Previous experience of induced abortion as a risk factor for fetal death and preterm delivery. *Int J Gynaecol Obstet* 1984;22:195-202.
 - ⁴ Meirik O, Bergstrom R. Outcome of delivery subsequent to vacuum-aspiration abortion in nulliparous women. *Acta Obstet Gynecol Scand* 1983;62:499-509.
 - ⁵ Frank PI, Kay CR, Lewis TL, Parish S. Outcome of pregnancy following induced abortion. Report from the joint study of the Royal College of General Practitioners and the Royal College of Obstetricians and Gynaecologists. *Br J Obstet Gynaecol* 1985;92:308-316.
 - ⁶ Van der Slikke JW, Treffers PE. Influence of induced abortion on gestational duration in subsequent pregnancies. *BMJ* 1978;1(6108):270-272.
 - ⁷ Daling JR, Emanuel I. Induced abortion and subsequent outcome of pregnancy in a series of American women. *N Engl J Med* 1977;297:1241-1245.
 - ⁸ Schott G, Ehrig E, Wulff V. Prospective studies into pregnancies of primiparae with record of therapeutic termination of previous pregnancies or of spontaneous abortion and assessment of fertility. *Zentralbl Gynaekol* 1980;102:932-938, 939-944 [German].
 - ⁹ Kalish RB, Chasen ST, Rosenzweig LB, Rashbaum WK, Chervenak FA. Impact of midtrimester dilation and evacuation on subsequent pregnancy outcome. *Am J Obstet Gynecol* 2002;187:882-885.
 - ¹⁰ Lao TT, Ho LF. Induced abortion is not a cause of subsequent preterm delivery in teenage pregnancies. *Hum Reprod* 1998;13:758-761.
 - ¹¹ Hogue CJ. Impact of abortion on subsequent fecundity. *Clin Obstet Gynaecol* 1986;13:95-103.
 - ¹² Lumley J. The epidemiology of preterm birth. *Bailliere's Clin Obstet Gynecol* 1993;7(3):477-498.
 - ¹³ Hogue CJ, Cates W Jr., Tietze C. Impact of vacuum aspiration on future childbearing: a review. *Fam Planning Perspect* 1983;15:119-126.
 - ¹⁴ Lumley J. The association between prior spontaneous abortion, prior induced abortion and preterm birth in first singleton births. *Prenat Neonat Med* 1998;3:21-24.
 - ¹⁵ Martius JA, Steck T, Oehler MK, Wulf K-H. Risk factors associated with preterm (<37+0 weeks) and early preterm (<32+0 weeks): univariate and multi-variate analysis of 106,345 singleton births from 1994 statewide perinatal survey of Bavaria. *Eur J Obstet Gynecol Reprod Biol* 1998;80:183-189.
 - ¹⁶ Zhou W, Sorenson HT, Olsen J. Induced Abortion and subsequent pregnancy duration. *Obstet Gynecol* 1999;94:948-953.
 - ¹⁷ Berkowitz GS, Papiernik E. Epidemiology of preterm birth. *Epidemiol Rev* 1993;15:414-443.
 - ¹⁸ Muhlemann K, Germain M, Krohn M. Does an abortion increase the risk of intrapartum infection in the following pregnancy? *Epidemiol* 1996;7:194-198.
 - ¹⁹ Daling JR, Krohn MA. Miscarriage or termination in the immediately preceding pregnancy increases the risk of intraamniotic infection in the following pregnancy. *Am J Epidemiol* 1992;136:1013 SER Abstracts.
 - ²⁰ Picard E, Robertson G. *Legal Liabilities of Doctors and Hospitals in Canada*. Scarborough, Ontario: Carswell; 1996:264-265.
 - ²¹ Zimmerman R, Oster C. Assigning liability: insurers' missteps helped provoke malpractice "crisis." *Wall St J* 2002;June 24:A1.
 - ²² Luke B. *Every Pregnant Woman's Guide to Preventing Premature Birth*. New York, N.Y.: Times Books; 1995.
 - ²³ Ring-Cassidy E, Gentles I. *Woman's Health after Abortion*. Toronto, Ontario: de Veber Institute; 2002.
 - ²⁴ Smith WS, Camfield C, Camfield P. Living with cerebral palsy and tube feeding: a population-based follow-up study. *J Pediatr* 1999;135:307-310.
 - ²⁵ Thorp JM, Hartmann KE, Shadigian E. Physical and psychological health consequences of induced abortion: review of the evidence. *Obstet Gynecol Survey* 2003;58(1):66-79.
-
- APPENDIX:** Studies that showed a statistically significant increase in preterm birth after induced abortion
- *Ancel P-V, Saurel-Cubizolles M-J, Renzo GCD, Papiernik E, Breart G. Very and moderate preterm births: are the risk factors different? *Br J Obstet Gynaecol* 1999;106:1162-1170.
- Barsy G, Sarkany J. Impact of induced abortion on the birth rate and infant mortality. *Demografia* 1963;6:427-467.
- Berkowitz GS. An epidemiologic study of preterm delivery. *Am J Epidemiol* 1981;113:81-92.
- Bognar Z, Czeizel A. Mortality and morbidity associated with legal abortions in Hungary, 1960-1973. *Am J Public Health* 1976;66:568-575.
- Czeizel A, Bognar Z, Tusnady G, et al. Changes in mean birth weight and proportion of low-weight births in Hungary. *Br J Prev Soc Med* 1970;24:146-153.
- Drac P, Nekvasilova Z. Premature termination of pregnancy after previous interruption of pregnancy. *Cesk Gynecol* 1970;35:332-333.
- Furusawa Y, Koya Y. The influence of artificial abortion on delivery. In: Koya Y, ed. *Harmful Effects of Induced Abortion*. Tokyo: Family Planning Federation of Japan; 1966:74-83.
- Grindel B, Lubinski H, Voigt M. Induced abortion in primigravidae and subsequent pregnancy, with particular attention of underweight. *Zentralbl Gynaekol* 1979;101:1009-1114.
- Harlap S, Davies AM. Late sequelae of induced abortion: complications and outcome of pregnancy and labor. *Am J Epidemiol* 1975;102:219-224.
- Henriet L, Kaminski M. Impact of induced abortions on subsequent pregnancy outcome: the 1995 French national perinatal survey. *Br J Obstet Gynaecol* 2001;108:1036-1042.
- *Hillier SL, Nugent RP, Eschenbach DA, Krohn MA, et al. Association between bacterial vaginosis and preterm delivery of a low-birth-weight infant. *N Engl J Med* 1995;333:1737-1742.
- Hungarian Central Statistical Office. *Perinatalishalazons*. Budapest: Hungarian Central Statistical Office; 1972.
- Koller O, Eikhom SN. Late sequelae of induced abortion in primigravidae. *Acta Obstet Gynecol Scand* 1977;56:311-317.
- Kreibich H, Ludwig A. Early and late complications of abortion in juvenile primigravidae (including recommended measures). *Z Aerztl Fortbild (Jena)* 1980;74:311-316.
- Lang JM, Lieberman E, Cohen A. A Comparison of Risk Factors for Preterm Labor and Term Small-for-Gestational-Age Birth. *Epidemiology* 1996;7:369-376.
- Lean TH, Hogue CJR, Wood J. Low birth weight after induced abortion in Singapore. Presented at the 105th Annual Meeting of the American Public Health Association, Washington D.C., Oct. 31, 1977.
- Legrillo V, Quickenton P, Therriault GD, et al. Effect of induced abortion on subsequent reproductive function. Final report to NICHD. Albany, N.Y.: New York State Health Department; 1980.
- Lerner RC, Varma AO. Prospective study of the outcome of pregnancy subsequent to previous induced abortion. Final report, Contract no. (N01-HD-62803). New York: Downstate Medical Center, SUNY, January 1981.
- Levin A, Schoenbaum S, Monson R, Stubblefield P, Ryan K. Association of abortion with subsequent pregnancy loss. *JAMA* 1980;243(24):2495-2499.
- Lieberman E, Ryan KJ, Monson RR, Schoenbaum SC. Risk factors accounting for racial differences in the rate of premature birth. *N Engl J Med* 1987;317:743-748.

- Lumley J. Very low birth-weight (less than 1500g) and previous induced abortion: Victoria 1982-1983. *Aust NZ J Obstet Gynecol* 1986;26:268-272.
- Lumley J. The epidemiology of preterm birth. *Bailliere's Clin Obstet Gynecol* 1993;7(3): 477-498.
- Lumley J. The association between prior spontaneous abortion, prior induced abortion and preterm birth in first singleton births. *Prenat Neonat Med* 1998;3:21-24.
- Martius JA, Steck T, Oehler MK, Wulf K-H. Risk factors associated with preterm (<37+0 weeks) and early preterm (<32+0 weeks): univariate and multivariate analysis of 106 345 singleton births from 1994 statewide perinatal survey of Bavaria. *Eur J Obstet Gynecol Reprod Biol* 1998;80:183-189.
- Meirik O, Bergstrom R. Outcome of delivery subsequent to vacuum aspiration abortion in nulliparous women. *Acta Obstet Gynecol Scand* 1982;61:415-429.
- *Michielutte R, Ernest JM, Moore ML, Meis PJ, Sharp PC, Wells HB, Buescher PA. A Comparison of Risk Assessment Models for Term and Preterm Low Birthweight. *Prev Med* 1992;21:98-109.
- Miltenyi K. On the effects of induced abortion. *Demografia* 1964;7:73-87.
- Mocsary P, Csapo AI. Effect of menstrual induction on prematurity rate. *Lancet* 1978;1:1159-1160.
- Mueller-Heubach E, Guzick DS. Evaluation of risk scoring in a preterm birth prevention study of indigent patients. *Am J Obstet Gynecol* 1989;160:829-837.
- Obel E, et al. Pregnancy complications following legally induced abortion with special reference to abortion technique. *Acta Obstet Gynecol Scand* 1979;58:147-152.
- Pantelakis SN, Papadimitriou GC, Doxiadis SA. Influence of induced and spontaneous abortions on the outcome of subsequent pregnancies. *Am J Obstet Gynecol* 1973;116:799-805.
- Papaevangelou G, Vrettos AS, Papadatos D, Alexiou C. The effect of spontaneous and induced abortion on prematurity and birthweight. *J Obstet Gynaecol Br Commonwealth*. 1973;80(May):418-422.
- Pickering RM, Forbes J. Risk of preterm delivery and small-for-gestational age infants following abortion: a population study. *Br J Obstet Gynecol* 1985;92:1106-1112.
- Pickering RM, Deeks JJ. Risks of Delivery during 20th to the 36th Week of Gestation. *Int J Epidemiol* 1991;20:456-466.
- Puyenbroek J, Stolte L. The relationship between spontaneous and induced abortions and the occurrence of second-trimester abortion in subsequent pregnancies. *Eur J Obstet Gynecol Reprod Biol* 1983;14:299-309. [This is the only study in this complete list that uses second-trimester abortion as a surrogate for PTB.]
- Ratten G et al. Effect of abortion on maturity of subsequent pregnancy. *Med J Aust* 1979(June):479-480.
- Richardson JA, Dixon G. Effect of legal termination on subsequent pregnancy. *BMJ* 1976;1:1303-1304.
- Roht LH, Aoyama H, Leinen GE, et al. The association of multiple induced abortions with subsequent prematurity and spontaneous abortion. *Acta Obstet Gynaecol Jpn* 1976;23:140-145
- Schoenbaum LS, Monson RR. No association between coffee consumption and adverse outcomes of pregnancy. *N Engl J Med* 1982;306:141-145.
- Seidman DS, Ever-Hadani P, Slater PE, Harlap S, et al. Child-bearing after induced abortion: reassessment of risk. *J Epidemiology Community Health* 1988;42:294-298.
- Shiono PH, Lebanoff MA. Ethnic differences and very preterm delivery. *Am J Public Health* 1986;76:1317-1321.
- Slater PE, Davies AM, Harlap S. The effect of abortion method on the outcome of subsequent pregnancy. *J Reprod Med* 1981;28:123-128.
- Van der Slikke JW, Treffers PE. Influence of induced abortion on gestational duration in subsequent pregnancies. *BMJ* 1978;1:270-272.
- Vasso L-K, Chryssa T-B, Golding J. Previous obstetric history and subsequent preterm delivery in Greece. *Eur J Obstet Gynecol Reprod Biol* 1990;37:99-109.
- World Health Organization. Special Programme of Research, Development and Research Training in Human Reproduction: Seventh Annual Report, Geneva, Nov. 1978.
- World Health Organization Task Force on the Sequelae of Abortion. Gestation, birthweight and spontaneous abortion. *Lancet* 1979;1:142-145.
- *Zhang J, Savitz DA. Preterm birth subtypes among blacks and whites. *Epidemiology* 1992;3:428-433.
- Zwahr C, Voigt M, Kunz L, et al. Relationships between interruption abortion, and premature birth and low birth weight. *Zentralbl Gynaekol* 1980;102: 738-747.
- Zhou W, Sorenson HT, Olsen J. Induced abortion and subsequent pregnancy duration. *Obstet Gynecol* 1999;94:948-953.
- *Studies that included spontaneous and induced abortions but did not report PTB/LBW risk separately for each

Medical Controversy

“Since among practitioners there will prove to be so much difference of opinion about acute diseases that the remedies which one physician gives in the belief that they are the best are considered by a second to be bad, laymen are likely to object to such that their art resembles divination; for diviners too think that the same bird, which they hold to be a happy omen on the left, is an unlucky one when on the right, while other diviners maintain the opposite.”

Hippocrates Regimen in Acute Diseases

[Fortunately AAPS can discern right from left, and open debate is welcome.]

– Lawrence R. Huntoon, M.D., Ph.D.