Practice Guideline 5: The Association between Surgical Abortion and Preterm Birth: An Overview *

ABSTRACT: Evidence in peer-reviewed literature from 168 studies over fifty years points to a causal, dose-response relationship between surgical abortion and subsequent preterm birth. This document provides an overview of this literature, discusses mechanisms for this effect, demonstrates the strength of evidence for causality, and offers guidance for informed consent prior to surgical abortion. This document does not provide detailed statistical analysis or a high-resolution assessment of the quality of studies on surgical abortion and preterm birth (covered in Practice Guideline 11).

Background

Preterm Birth

Preterm birth (PTB), defined as birth before 37 weeks of pregnancy, plagues modern society. There are over 3 million annual deaths worldwide due to PTB, and PTB is estimated to cost over 100 million disability-adjusted life-years, when combined with low birth weight (LBW).[1] The incidence of PTB ranges from 6 to 8% in Europe, Australia, and Canada[2-3] to 9 to 12% in Asia, Africa, and is currently 10.1% in the United States, a decrease since the push to eliminate non-indicated PTB.[7, 8] Despite reassurance from reports like that from the National Academy of Sciences,[9] surgical abortion does have demonstrated risks of preterm birth.

* AAPLOG Practice Guideline. This document was developed by three authors on the Research Committee. Practice Guidelines are evidence-based documents informing pro-life providers with high-quality, peer-reviewed literature.icine.

Evidence for Increased Preterm Birth after Abortion

As of November 2021, 168 studies have been published on the association between abortion and PTB. A complete review of the literature is provided in Practice Bulletin 11, but this document reviews key studies at a foundational level. The landmark meta-analyses on PTB after abortion are:

- Swingle et al., a 2009 meta-analysis
- Shah et al., a 2009 meta-analysis
- van Oppenraajj et al., a 2009 review
- Lowit et al., a 2010 meta-analysis
- Saccone et al., a 2016 meta-analysis

The first landmark study is Swingle et al., which examined studies published between 1995 and 2007 and found that women with a prior abortion had increased odds of delivery before 32 weeks (1.64, 95% CI 1.38-1.91).[10]

A few comments are helpful to understand these results. The increased odds ratio (OR) published by Swingle *et al.* was 1.64, and it was statistically significant as denoted by the 95% confidence interval (95% CI) of 1.38 to 1.91, which does not include 1.0. A confidence interval denotes 95% certainty that the true difference in odds resides between the two values; if the 95% CI includes 1.0, we cannot be certain that there is no difference from the control group (here, the group with no prior abortion), denoted by their odds of 1.0. Odds are different than relative risk, or absolute risk difference, and require some computation to derive a clinically memorable percent risk. An odds ratio of 1.64 translates to an increase in risk from 1.5% (the United States baseline rate of delivery before 32 weeks) to about 2.4%. Importantly, this is not a 64% increase. That would be reported in a study as a relative risk (RR) of 1.64, different from odds.

The second landmark study from 2009 is Shah *et al*., which found increased odds of delivery before 37 weeks (OR 1.35, 95% CI 1.20-1.52).[12] These odds mean the rate of birth before 37 weeks after one abortion is 13%, compared to the baseline 10%. This study also reported the odds of PTB after two or more abortions, OR 1.72 (95% CI 1.45-2.04). This translates to an increase in risk from 10% to about 18%, nearly doubling. Shah et al.'s results also show the important epidemiological principle of a *dose effect*: the more abortions prior to first delivery, the higher the risk for PTB.

van Oppenraaij *et al*. combined 13 studies and found increased risk of delivery before 32 weeks and delivery before 37 weeks after one abortion, and that effect was more dramatic after two or more induced abortions (a dose effect).[13]

Lowit et al. reported data from seven systematic reviews (including four meta-analyses) and eighteen primary studies found increased risk of delivery before 32 weeks and before 37 weeks, concluding that "[c]urrent evidence … suggest an association between IA [Induced abortion] and pre-term birth."[14]

Saccone et al. included 36 studies in a systematic review and meta-analysis. This study found that women with one prior abortion had a significantly increased risk of PTB (OR 1.52, 95% CI 1.08-2.16), a significant increase in odds that translates to a risk increase from 10% to 14%.[15]

Pathophysiology of Induced Abortion and Preterm Birth

The putative mechanisms by which surgical induced abortion may increase the risk for PTB may include the following:

1) Cervical trauma from surgical dilation.
2) Predisposition to inflammation, or subclinical inoculation from the procedure.
3) Chronic increased production of maternal stress hormones.

Regarding mechanical trauma, dilation and curettage (D&C) is independently associated with an increased risk of PTB based on the investigation of neutral researchers.[16] The mechanical injury from the surgical procedure itself is the most likely reason that surgical abortion increases PTB risk.

Regarding infection, this hypothesis emerges from the association of infection and inflammation with PTB,[31] coupled with data about the risk of chorioamnionitis during a subsequent delivery. The risk of chorioamnionitis in a pregnancy after abortion is three- or fourfold higher compared to live birth (OR 4.0, 95% CI 2.7-5.8). [17,18]

Causality in Medicine: Bradford Hill Causation Criteria

There is substantial evidence for an association between surgical abortion and PTB—more evidence than for the relationship between tobacco use and preterm birth. (This is not to belittle the association between tobacco and PTB, but to show that a neutral observer who acknowledges that association would also acknowledge an abortion-PTB association.)

But before insisting on a response like that to tobacco, we must discuss criteria for determining *causality*, whether one thing is actually *causing* another, or simply associated with it.

The Bradford Hill criteria have been used since the 1960s for this purpose (see Box 1). Dr. Hill cautioned, however:

> I do not believe [there are] hard-and-fast rules … that must be observed before we accept cause and effect. None of my [criteria is] indisputable evidence for or against the cause-and-effect hypothesis and none can be required as a *sine qua non*. What they can do [is] help us to make up our minds on [whether] there any other answers equally, or more, likely than cause and effect? All scientific work is incomplete [and] liable to be…modified by advancing knowledge. That does not confer … a freedom to ignore the knowledge we already have, or to postpone … action.[19]

Thus, while the Bradford Hill criteria are a good foundation, the lack of any particular criterion is not grounds for dismissal of a causal relationship.

Applying the Bradford Hill Criteria to Abortion and Preterm Birth

Here, the comparison between surgical abortion and tobacco use is helpful. In 1964, the US Surgeon General applied the emerging Bradford Hill criteria for causality to studies evaluating the association between tobacco use and PTB, and chose to warn the public of a potential causal effect of tobacco use on risk of PTB.

Box 1. The Bradford Hill Criteria for Causality

Strength of the association	Does the effect meet statistical and/or clinical significance?
Consistency	Does the effect provide consistent results or outcomes?
Specificity	Is the effect specific to the outcome or result?
Temporality	Does the effect occur prior or during the given item under study?
Dose Response	Does the effect increase with increasing exposure?
Plausibility	Does the effect meet criteria for biologically reasonableness?
Coherence	Does the effect make sense with the outcome specified or found?
Experiment	Is the effect experimentally reproducible in multiple experiments with diverse authors and/or populations?
Analogy	Is the effect similar (analogous) to other effects found experimentally or clinically?

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With regard to *timing*, surgical abortion occurs before a subsequent pregnancy at risk of PTB. There is a known *dose effect* demonstrated for the risk of PTB increasing with a greater number of induced surgical abortions.[20,21] (No such increased risk has been demonstrated with smoking and PTB.)The *experiment* for surgical abortion has been repeated dozens of times, in over 168 studies on the topic. There is also *consistency* of the effects of prior surgical abortion, and no study shows a protective effect of prior surgical abortion. There is inconsistency on tobacco use and PTB,[40] since some studies show a protective effect of tobacco.[39]

Induced abortion has a demonstrable *effect* on the rate of subsequent PTB.[11-16] Biologic *plausibility* for prior surgical abortion as a cause for future preterm birth is thought to be the result of either trauma or inflammation, as mentioned above.[16-18] This leads to *coherence* with subsequent evidence of cervical insufficiency or chorioamnionitis. This is *analogous* to the risk of preterm birth from other surgeries that affect cervical integrity (e.g. cervical conization) or on other procedures that may result in intrauterine inflammation.

While the effect of abortion on PTB is not unique (there are other factors that increase risk of PTB), this lack of the criterion of specificity is common in clinical outcomes. Tobacco is also not the only factor associated with increased risk of PTB, and this non-specificity does not disqualify either tobacco use or surgical abortion as causal in the pathophysiology of PTB.

The logical conclusion drawn from the published literature that linked tobacco use and lung cancer is almost exactly the same as the logical conclusion drawn from the published literature linking induced surgical abortion and PTB: there is a causal relationship.

Clinical Questions and Answers

Q This Practice Bulletin doesn't Address sSome of My Concerns about the Quality of the Evidence Available on this Purported "Link." Who Does?

Practice Bulletin 11 is designed to delve into the quality of evidence available on this link and investigates the statistical and methodological merit of many of the studies on this topic.[22]

Q What about Medication Abortion?

There has not been much data on medication abortion yet, in comparison to the decades of data on surgical abortion. Bhattacharya et al., 2012 found that women with previous abortion (medication or surgical) had increased risk of PTB (adjusted relative risk of 2.3, 95% CI 2.27-2.33). This study had some missing data on tobacco use and type of abortion (not listed in 25% of cases), which are weaknesses in a study of abortion and PTB.[23] Other studies have not identified a dramatic increase in PTB after medication abortion.[24-26]

Q What do Other Medical Experts Say about the Relationship between Surgical Abortion and PTB?

AAPLOG is the only organization in the United States that has formally acknowledged the risk with induced abortion for PTB, but is not alone in its assessment of the evidence.

Dr. Jay Iams is an Associate Editor of the *American Journal of Obstetrics and Gynecology* and editor of a major maternal-fetal medicine textbook. He served as president of the Society for Maternal-Fetal Medicine from 2003-04 and of the American Gynecological and Obstetrical Society in 2013. Dr. Iams is one of the leading researchers in PTB and wrote in 2010,

> Contrary to common belief, population-based studies have found that elective pregnancy terminations in the first and second trimester are associated with a very small but apparently real increase in the risk of subsequent spontaneous preterm birth.[27]

Dr. Phil Steer, editor of the *British Journal of Obstetrics and Gynecology* wrote an editorial comment on a major meta-analysis of surgical abortion and PTB,

> A key finding is that compared to women with no history of termination, even allowing for the expected higher incidence of socio-economic disadvantage, women with just one [termination of pregnancy] had an increased odds of subsequent preterm birth. However, finding that even one termination can increase the risk of preterm birth means that we should continue to search for ways of making termination less traumatic.[28]

The Royal College of Obstetrics and Gynaecology (RCOG) acknowledges the association of surgical abortion and PTB. In a 2011 guideline entitled "The Care of Women

Requesting Induced Abortion," RCOG advises:

> Women should be informed that induced abortion is associated with a small increase in the risk of subsequent preterm birth, which increases with the number of abortions. However, there is insufficient evidence to imply causality.[29]

The American College of Obstetricians and Gynecologists (ACOG) acknowledges mixed evidence on the relationship between dilation and curettage and PTB, but does not mention the word abortion.[30]

Planned Parenthood has been quoted as saying that "[s]afe, uncomplicated abortion does not cause problems for future pregnancies such as birth defects, premature birth or low birth weight babies," but this text is no longer part of Planned Parenthood's page on considering abortion, which now does not list adverse effects at all.[31]

Q What are the Effects of Abortion-Related Preterm Birth?

A conservative estimate for the last four decades is approximately 100,000 deaths associated with delivery before 32 weeks related to prior abortion.[32] Of these deaths, 45,000 (45%) are estimated to be of Black infants, an over-representation given that Black Americans represent 15-16% of the total population.[33] As noted by one author, this is "equal to the number of lives…lost if 88 fully loaded 747 airliners crashed."[34] With regard to cerebral palsy, Calhoun et al 2007 calculated an estimated 1,096 cases of cerebral palsy each year attributable to induced surgical abortion and very preterm birth.[34]

Effects of abortion are not just neonatal: Gissler et al. 2004 found that pregnancy-related maternal mortality was three times as high for women within one year of abortion, compared to women after a live birth (83.1/100,000 compared to 28.2/100,000).[35] While this is likely related to many factors, it is important not to forget the maternal patient when thinking about the effects of abortion.

Q What are the Physician's Ethical Obligations Regarding this Information?

Ethical medical care requires informing women of the most recent and compelling evidence regarding the increased risk of subsequent PTB after a surgical abortion. Informed consent remains a bedrock of ethical care for surgical and medical interventions. Patients deserve to know about of the risks associated with any procedure.

Summary of Recommendations and Conclusion

The Following Recommendations are Based on Good and Consistent Scientific Evidence (Level A):

1) Women who have a history of surgical abortion are at increased risk for preterm birth (delivery before 37 weeks).
2) Women who have a history of surgical abortion are at increased risk for very preterm birth (delivery before 32 weeks).
3) Multiple surgical abortions are associated with a "dose effect," meaning

more abortions confer more risk.

The Following Recommendations are Based on Limited and Inconsistent Scientific Evidence (Level B):

1) Black Americans are disproportionately affected by abortion-related preterm birth.
2) The increased rate of preterm birth after surgical abortion is likely related to the surgical procedure itself.
3) There may be an inflammatory or subclinically infectious pathology associated with abortion-related preterm birth.
4) Women who have undergone medication abortions may be at increased risk for preterm birth, especially if this was completed surgically.

The Following Recommendations are Based Primarily on Consensus and Expert Opinion (Level C):

1) The relationship between abortion and preterm birth meets the Bradford Hill criteria for causality.
2) Abortion-related preterm birth has effects on neonates, mothers, and society at large.
3) Women with a previous history of termination of pregnancy should be informed of the increased risk for preterm birth.
4) Authors of studies and statements on preterm birth and abortion occasionally do not report their findings accurately.

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