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CLINICAL PRACTICE UPDATE

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Management of Full-Term Nulliparous Individuals Without a Medical Indication for Delivery

This Clinical Practice Update was developed by the American College of Obstetricians and Gynecologists with the assistance of Vanessa E. Torbenson, MD; Aaron B. Caughey, MD, PhD; Mai Hoang, MD; and Stephanie Ros Saposnik, MD, MSCI.

This Clinical Practice Update integrates data from a large, randomized controlled trial (the ARRIVE trial [A Randomized Trial of Induction Versus Expectant Management]) and subsequent other related studies into existing American College of Obstetricians and Gynecologists' guidance regarding management of pregnant individuals at 39 0/7–41 6/7 weeks of gestation without a medical indication for delivery. This document updates Practice Bulletin No. 146, *Management of Late-Term and Postterm Pregnancies* (Obstet Gynecol 2014;124:390–396) and replaces the *Clinical Guidance for Integration of the Findings of the ARRIVE Trial: Labor Versus Expectant Management in Low-Risk Nulliparous Women Practice Advisory,* originally published in August 2018.

CLINICAL RECOMMENDATIONS

Patients should receive counseling regarding the potential benefits and risks of induction of labor at or beyond 39 weeks of gestation compared with expectant management. Hospitals and health systems, in collaboration with clinicians, should evaluate the available resources to accommodate these inductions of labor, with active effort toward maintaining equitable delivery of care.

RATIONALE

The optimal timing of delivery for full-term pregnancies (39 0/7 to 40 6/7 weeks of gestation [1]) has not been determined. Multiple studies have been conducted to investigate induction of labor compared with expectant management in low-risk patients, driven by the need to strike a balance between the risks of neonatal and maternal morbidity during expectant management and the potential harm from intervention. Retrospective studies comparing induction of labor with expectant management of pregnancy showed induction of labor being associated with a lower risk of cesarean delivery (2, 3). Other retrospective studies and a randomized controlled trial showed no statistical decrease in cesarean delivery with induction of labor at term (4, 5), whereas other studies have suggested increased neonatal morbidity with increasing gestational duration (6, 7).

The largest and most contemporary trial, the ARRIVE trial (A Randomized Trial of Induction Versus Expectant Management, summarized in Box 1), demonstrated that, in low-risk nulliparous women at full term, induction of labor at 39 0/7–39 4/7 weeks of gestation demonstrated no difference in a composite of adverse neonatal outcomes but was associated with decreased rates of cesarean delivery and hypertensive disorders of pregnancy (8). After the publication of the ARRIVE trial and the American College of Obstetricians and Gynecologists' Practice Advisory (9) based on the trial, which stated that it was reasonable to offer elective induction of labor to low-risk nulliparous women at 39 weeks of gestation, the rate of elective induction of labor by 39 6/7 weeks increased (36.1% vs 30.2%; adjusted odds ratio 1.36, 95% CI, 1.36–1.37) (10) (Table 1).

Retrospective cohort studies attempting to evaluate the outcomes of induction of labor after 39 weeks of gestation in a larger population since the ARRIVE trial have had mixed findings (Table 1). Although some studies indicate no effect or a decrease in rates of cesarean delivery (10–12), others have reported varied results concerning maternal and neonatal morbidities. Specifically, there are mixed findings on maternal outcomes, with some studies demonstrating a decrease in peripartum infections, severe perineal lacerations, and operative vaginal deliveries (12, 13) and other studies indicating

Box 1. Summary of the ARRIVE Trial (A Randomized Trial of Induction Versus Expectant Management) (8)

- Large unmasked multicenter trial conducted from March 2014 to August 2017 in 41 facilities across the United States
- 22,533 eligible women were approached, and 6,106 (27%) agreed to participate and were randomized
- Compared a composite of perinatal death or severe neonatal complications in 3,062 low-risk nulliparous patients randomly assigned to labor induction between 39 0/7 and 39 4/7 wk and 3,044 low-risk nulliparous patients who were randomized to expectant management ("low-risk" was defined as the absence of any condition considered to be a maternal or fetal indication for delivery before 40 5/7 wk)
- Results:
  - In a total of 3,062 low-risk nulliparous patients randomly assigned to labor induction between 39 0/7 and 39 4/7 wk, the ARRIVE trial revealed no significant differences in a neonatal composite outcome composed of perinatal mortality and severe perinatal morbidity vs 3,044 low-risk nulliparous patients who were randomized to expectant management (4.3% vs 5.4%, RR 0.80, 95% CI, 0.64–1.00).
  - The main secondary outcome, cesarean delivery rate, was noted to be significantly lower in the group undergoing elective induction of labor (18.6% vs 22.2%, RR 0.84, 95% CI, 0.76–0.93) vs those expectantly managed.
  - Other findings in patients who underwent induction included:
    - Lower rates of gestational hypertension and preeclampsia (9.1% vs 14.1%, RR 0.64, 95% CI, 0.56–0.74)
    - Increased length of stay on the labor and delivery unit (20 h, IQR 13–28 vs 14 h, IQR 9–20)
    - Decreased need for neonatal respiratory support within the first 72 h of life (3.0% vs 4.2%, RR 0.71, 95% CI, 0.55–0.93)
  - These findings were consistent among the entire cohort, with no significant differences noted in any prespecified subgroups, specifically maternal race or ethnic group, maternal age, body mass index, or modified Bishop score.

RR, relative risk; IQR, interquartile range.

Data from Grobman WA, Rice MM, Reddy UM, Tita AT, Silver RM, Mallett G, et al. Labor induction versus expectant management in low-risk nulliparous women. N Engl J Med 2018;379:513–23. doi: 10.1056/NEJMoa1800566

an increased rate of maternal blood transfusions, intensive care unit admissions, and chorioamnionitis (10, 11). Similarly, neonatal outcomes vary, with one meta-analysis indicating a decrease in perinatal mortality (12) but conflicting results on rates of ventilatory support, neonatal intensive care unit admissions, shoulder dystocias, and low 5-minute Apgar scores (10, 12, 13). Given the retrospective nature of the studies, it is unclear whether the observed outcomes post-ARRIVE trial are a result of the increased rates of induction of labor or another cause.

Studies estimating the cost effectiveness of a policy for induction of labor at 39 weeks of gestation on theoretical and actual cohorts, including quality-adjusted life-year improvements, have found varying outcomes. These range from no difference in cost to minor savings among nulliparous individuals or those with an unfavorable cervix (14–16).

IMPLEMENTATION CONSIDERATIONS

The ARRIVE trial is currently the best evidence available to evaluate the risks and benefits of induction of labor compared with expectant management at 39 weeks of gestation in low-risk nulliparous women. It was performed at 41 different institutions, with 94% adherence to the assigned protocol. Within the conditions of the trial, individuals who underwent elective induction experienced a decreased cesarean delivery rate and risk of hypertensive disorder compared with those who underwent expectant management. With current evidence, it is unclear whether those findings would apply to other patient subsets (eg, multiparous individuals, those undergoing trial of labor after cesarean, or those with medical indications for delivery).

A collaborative discussion with a shared decision-making process should include risks and benefits of induction of labor compared with expectant management at term in the environment in which patients will be giving birth. This discussion should take into account the patient's birthing preferences (eg, avoiding or desiring intervention), the resource constraints or availability to support labor inductions, and the maternal outcomes of the delivering institution. Furthermore, obstetric care clinicians and hospital systems should continually monitor and assess their outcomes concerning both elective and medically indicated inductions of labor, ensuring adherence to the best practices to achieve optimal and equitable outcomes.

Table 1. Summary of Post-ARRIVE (A Randomized Trial of Induction Versus Expectant Management) Trials

Study	Study Population	Maternal Outcomes	Neonatal Outcomes
Grobman and Caughey 2019 (12) Meta-analysis of 6 cohort studies	Nulliparous women with no other indication for IOL undergoing either IOL at 39 wk (66,019) or expectant management beyond 39 wk (584,390)	IOL at 39 wk vs expectant management was associated with decreased rates of: Cesarean delivery (26.4% vs 29.1%; RR 0.83; 95% CI, 0.74–0.93) Peripartum infection (2.8% vs 5.2%; RR 0.53; 95% CI, 0.39–0.72)	IOL at 39 wk vs expectant management was associated with decreased rates of: Respiratory morbidity (0.7% vs 1.5%; RR 0.71; 95% CI, 0.59–0.85) Meconium aspiration syndrome (0.7% vs 3.0%; RR 0.49; 95% CI, 0.26–0.92) NICU admission (3.5% vs 5.5%; RR 0.80; 95% CI, 0.72–0.88) Perinatal mortality (0.04% vs 0.2%; RR 0.27; 95% CI, 0.09–0.76)
Gilroy et al 2022 (10) Retrospective cohort of national database, pre-ARRIVE vs post-ARRIVE	1,966,870 births to low-risk nulliparous individuals in the pre-ARRIVE group; 609,322 in the post-ARRIVE group	In post-ARRIVE vs pre-ARRIVE groups, there was: A decreased rate of: Cesarean delivery (27.3 % vs 27.9%; aOR 0.94; 95% CI, 0.93–0.94) An increased rate of: IOL (36.1% vs 30.2%; aOR 1.36; 95% CI, 1.36–1.37) Delivery by 39 6/7 wk (42.8% vs 39.9%; aOR 1.14; 95% CI, 1.14–1.15) Blood transfusion (0.4% vs 0.3%; aOR 1.43; 95% CI, 1.36–1.50) ICU admissions (0.09% vs 0.08%; aOR 1.20; 95% CI, 1.09–1.33)	In post-ARRIVE vs pre-ARRIVE groups, there were increased rates of: Assisted ventilation at birth (3.5% vs 2.8%; aOR 1.28; 95% CI, 1.26–1.30) Assisted ventilation at greater than 6 h (0.6% vs 0.5%; aOR 1.36; 95% CI, 1.31–1.41) Low 5-min Apgar scores (0.4% vs 0.3%; aOR 0.91; 95% CI, 0.86–0.95)

(*continued*)

Summary of Post-ARRIVE (A Randomized Trial of Induction Versus Expectant Management) Trials (continued)

Study	Study Population	Maternal Outcomes	Neonatal Outcomes
Hong et al 2023 (13) Meta-analysis and systematic review of 14 studies	Included both nulliparous and multiparous individuals, comparing IOL at 39 wk vs expectant management	IOL at 39 wk vs expectant management was associated with: Overall: Decreased rate of: 3rd- or 4th-degree perineal injury (OR 0.63; 95% CI, 0.49–0.81) Operative vaginal birth (OR 0.87; 95% CI, 0.79–0.97) Multiparous women: Decreased rate of emergency cesarean delivery (OR 0.61; 95% CI, 0.38–0.98) No difference in rate of operative vaginal birth (OR 1.01; 95% CI, 0.84–1.21) Nulliparous women: Decreased rate of emergency cesarean delivery (OR 0.80; 95% CI, 0.70–0.91)	IOL at 39 wk vs expectant management was associated with: Overall: Decreased rate of: Low 5-min Apgar scores (OR 0.62; 95% CI, 0.40–0.96) Macrosomia (OR 0.66; 95% CI, 0.48–0.91) Nulliparous women: Decreased rate of NICU admission (OR 0.75; 95% CI, 0.63–0.89) Increased rate of shoulder dystocia (OR 1.22; 95% CI, 1.02–1.46)

(*continued*)

Summary of Post-ARRIVE (A Randomized Trial of Induction Versus Expectant Management) Trials (continued)

Study	Study Population	Maternal Outcomes	Neonatal Outcomes
Jelks et al 2023 (11) Single center retrospective cohort study	Evaluated outcomes after implementing a 39-wk elective IOL policy in multiparous and nulliparous women: 2,672 preimplementation and 2,526 postimplementation deliveries	In postimplementation vs preimplementation groups, there was: No difference in odds of cesarean delivery Overall (aOR 0.97; 95% CI, 0.83−1.14) Low-risk, ≥39 wk, nulliparous (aOR 0.90; 95% CI, 0.66−1.23) Low-risk, ≥39, multiparous (aOR 1.18; 95% CI, 0.71−1.98) Increased median [IQR] time from admission to delivery (preimplementation: 12.8 [6.0−21.6] h vs postimplementation: 15.6 [7.1−25.1] h; $P<.01$) Increase in chorioamnionitis (preimplementation: 8% vs postimplementation: 9.6%; $P<.05$)	

IOL, induction of labor; RR, relative risk; NICU, neonatal intensive care unit; aOR, adjusted odds ratio; IQR, interquartile range.

Data from Grobman WA, Caughey AB. Elective induction of labor at 39 weeks compared with expectant management: a meta-analysis of cohort studies. Am J Obstet Gynecol 2019;221:304–10. doi: 10.1016/j.ajog.2019.02.046; Gilroy LC, Al-Kouatly HB, Minkoff HL, McLaren RA. Changes in obstetrical practices and pregnancy outcomes following the ARRIVE trial. Am J Obstet Gynecol 2022;226:716.e1-12. doi: 10.1016/j.ajog.2022.02.003; Hong J, Atkinson J, Roddy Mitchell A, Tong S, Walker SP, Middleton A, et al. Comparison of maternal labor-related complications and neonatal outcomes following elective induction of labor at 39 weeks of gestation versus expectant management: a systematic review and meta-analysis. JAMA Netw Open 2023;6:e2313162. doi: 10.1001/jamanetworkopen.2023.13162; *and* Jelks AT, Yao AQ, Byrne JD. Impacts of embracing 39-week elective induction across an entire labor and delivery unit. AJOG Glob Rep 2023;3:100168. doi: 10.1016/j.xagr.2023.100168

Use of Language

ACOG recognizes and supports the gender diversity of all patients who seek obstetric and gynecologic care. In original portions of this document, the authors seek to use gender-inclusive language or gender-neutral language. When describing research findings, this document uses gender terminology reported by the investigators. ACOG's policy on inclusive language can be reviewed at https://www.acog.org/clinical-information/policy-and-position-statements/statements-of-policy/2022/inclusive-language.

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CONFLICT OF INTEREST STATEMENT

All ACOG committee members and authors have submitted a conflict of interest disclosure statement related to this published product. Any potential conflicts have been considered and managed in accordance with ACOG's Conflict of Interest Disclosure Policy. The ACOG policies can be found on acog.org. For products jointly developed with other organizations, conflict of interest disclosures by representatives of the other organizations are addressed by those organizations. The American College of Obstetricians and Gynecologists has neither solicited nor accepted any commercial involvement in the development of the content of this published product.

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