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Immersion in Water During Labor and Delivery

ABSTRACT: Immersion in water has been suggested as a beneficial alternative for labor, or delivery, or both and over the past decades has gained popularity in many parts of world. Immersion in water during the first stage of labor may be associated with decreased pain or use of anesthesia and decreased duration of labor. However, there is no evidence that immersion in water during the first stage of labor otherwise improves perinatal outcomes, and it should not prevent or inhibit other elements of care. The safety and efficacy of immersion in water during the second stage of labor have not been established, and immersion in water during the second stage of labor has not been associated with maternal or fetal benefit. Given these facts and case reports of rare but serious adverse effects in the newborn, the practice of immersion in the second stage of labor (underwater delivery) should be considered an experimental procedure that only should be performed within the context of an appropriately designed clinical trial with informed consent. Facilities that plan to offer immersion in the first stage of labor need to establish rigorous protocols for candidate selection, maintenance and cleaning of tubs and immersion pools, infection control procedures, monitoring of mothers and fetuses at appropriate intervals while immersed, and immediately and safely moving women out of the tubs if maternal or fetal concerns develop.

Immersion in water has been suggested as a beneficial alternative for labor, or delivery, or both and over the past decades has gained popularity in many parts of world (1–4). Approximately 1% of births in the United Kingdom include at least a period of immersion (5), and a 2006 joint statement from the Royal College of Obstetricians and Gynaecologists and Royal College of Midwives supported immersion in water during labor for healthy women with uncomplicated pregnancies and stated that to achieve best practice with water birth, it is necessary for organizations to provide systems and structure to support this service (6). The prevalence of this practice in the United States is unknown because such data are not collected as part of vital statistics. A 2001 survey found that at least 143 U.S. birthing centers offered immersion in water during labor, or delivery, or both (7). A 2005 commentary by the Committee on Fetus and Newborn of the American Academy of Pediatrics did not endorse underwater birth (8). This Committee Opinion reviews the literature concerning the reported risks and benefits of immersion in water during labor and delivery.

Evidence Regarding Immersion in Water During Labor and Delivery

Before examining available evidence concerning immersion during childbirth, it is important to recognize limitations of studies and evidence in this area. Most published literature that recommend underwater births are retrospective reviews of a single center experience, observational studies using historical controls, or personal opinions and testimonials, often in publications that are not peer reviewed (1–3, 9–11). Also of importance, there are no basic science studies in animals or humans to confirm the physiologic mechanisms proposed to underlie the reported benefits of underwater births.

Other issues, in addition to the nature and design of studies, complicate the interpretation of the published findings, including the absence of a uniform definition of the exposure itself. Often, immersion is referred to as “underwater birth,” but effects and outcomes may be different for immersion during the first stage and second stage of labor. This document, accordingly, avoids the

term underwater birth and makes an effort to distinguish data and outcomes related separately to immersion in the first stage and second stage of labor. Not all studies, however, distinguish when in the course of labor and delivery immersion was undertaken. Outcomes indicating safety or risk in association with immersion at one stage may not translate into equivalent outcomes at a different stage of labor: specifically, safety during labor may not translate into safety during delivery. In addition to this important limitation, immersion therapies have varied between studies in the duration of immersion, the depth of the bath or pool, the temperature of the water, and whether or not agitation (jets or whirlpool) was used. In considering the evaluation of outcomes, it is important to note that health care providers involved in providing or studying immersion therapy are not masked to either the treatment or outcomes, and especially in nonrandomized studies, outcomes may be influenced by differences in the environment attending a particular choice of delivery. Finally, most trials of immersion therapy are small, which limits their power to detect rare outcomes.

Randomized controlled trials (RCTs) would be ideal to address many of the aforementioned concerns. A 2009 Cochrane review identified 12 relevant and appropriately designed RCTs of immersion during labor, which involved 3,243 women. Nine of these trials involved immersion during the first stage of labor alone (one of nine trials compared early versus later immersion during the first stage), two trials involved first stage and second stage of labor, and one trial involved comparing only the second stage of labor with the controls. Even among these RCTs, however, some of the aforementioned limitations remain, including concerns for power and how the absence of blinding might affect definition of outcomes. The systematic review also noted that most trials have small sample sizes and, thus, a high risk of bias. These factors limit comparison across trials and the reliability and validity of the trial findings (5).

Proposed Benefits From Immersion During Labor and Delivery

There have been claims concerning the positive effects of immersion during labor (12–14). Immersion is known to affect maternal cardiovascular physiology as hydrostatic pressure promotes increased venous return and mobilization of extravascular fluid and edema (15, 16). In part as a result of these effects, proponents of underwater immersion during labor and delivery argue that there are a variety of benefits to such treatment, including a decrease in perinatal pain, a greater sense of well-being and control, and a decreased rate of perineal trauma. Some advocates argue that immersion during labor and delivery decreases maternal stress and stress-associated hormone levels. It could also potentially benefit the newborn infant for a “gentler” transition from the in utero to ex utero environment (1–7).

Individual retrospective analyses and case series argue in support of one or more of the benefits listed previously, but among RCTs studying immersion in the first stage of labor that were included in the 2009 Cochrane systematic review (5), results were inconsistent. Although many individual RCTs reported no benefit, the combined data indicated that immersion during the first stage of labor was associated with decreased use of epidural, spinal, or paracervical analgesia among those allocated to water immersion compared with controls (478/1,254 versus 529/1,245; risk ratio [RR] 0.90; 95% confidence interval [CI], 0.82–0.99; six trials). There was a reduction in duration of the first stage of labor (mean difference –32.4 minutes; 95% CI, from –58.7 to –6.13). However, considering each of these effects (particularly the latter), it is difficult to know how factors other than immersion, such as the structure of care (including health care providers and timing and frequency of examinations) affected outcome. Furthermore, there were no differences in perineal trauma or tears (RR, 1.16; 95% CI, 0.99–1.35, five trials) or need for either assisted vaginal deliveries (RR, 0.86; 95% CI, 0.71–1.05, seven trials) or cesarean delivery (RR, 1.21; 95% CI, 0.87–1.65, eight trials) between those allocated to the immersion and control arms in the meta-analysis results.

Among the two trials that reported outcomes from immersion in the second stage of labor included in this systematic review (5), the only difference in maternal outcomes from immersion during the second stage was an improvement in satisfaction among those allocated to immersion in one trial. None of the individual trials or the Cochrane systematic review (5) has reported any benefit to the newborn infant from maternal immersion during labor or delivery.

Reported Complications From Immersion During Labor and Delivery

Individual case reports and case series have noted complications for the mother and the neonate (17–25) that highlight potential risks from immersion during labor and delivery. Because the denominators are not uniformly reported, the exact incidence of complications is difficult to assess. Some of the reported concerns include higher risk of maternal and neonatal infections, particularly with ruptured membranes; difficulties in neonatal thermoregulation; umbilical cord avulsion and umbilical cord rupture while the newborn infant is lifted or maneuvered through and from the underwater pool at delivery, which leads to serious hemorrhage and shock; respiratory distress and hyponatremia that results from tub-water aspiration (drowning or near drowning); and seizures and perinatal asphyxia (23).

Among this list of complications, given its potential seriousness, the possibility of a neonate aspirating water during birth while immersed has been the focus of understandable concern. Alerdice et al (26) summarized case reports of adverse neonatal outcomes, including

drownings and near drownings. The case reports included immersion births in hospitals and at home. Subsequently, a study by Byard and Zuccollo reported four cases of severe respiratory distress in neonates after water birth, one of whom died of overwhelming sepsis from *Pseudomonas aeruginosa* (19). Although it has been claimed that neonates delivered into the water do not breathe, gasp, or swallow water because of the protective “diving reflex,” studies in experimental animals and a vast body of literature from meconium aspiration syndrome demonstrate that, in compromised fetuses and neonates, the diving reflex is overridden (27, 28), which leads potentially to gasping and aspiration of the surrounding fluid.

Morbidity and mortality, including respiratory complications, suggested in case series were not seen in the 2009 Cochrane synthesis of RCTs, which concluded that, “there is no evidence of increased adverse effects to the fetus/neonate or woman from laboring in water or water birth” (5). This conclusion, however, should be tempered by several concerns, including the issue of the power of the sample size to identify rare but potentially serious outcomes. In this regard, in an RCT (29) excluded from the Cochrane analysis (because included labors all involved dystocia), 12% of neonates who were delivered in the immersion arm required admission to the neonatal intensive care unit, as compared with none in the group delivered without immersion.

Summary

Immersion in water during the first stage of labor may be appealing to some and may be associated with decreased pain or use of anesthesia and decreased duration of labor; however, there is no evidence that immersion in water during the first stage of labor otherwise improves perinatal outcomes. Immersion therapy during the first stage of labor should not prevent or inhibit other elements of care, including appropriate maternal and fetal monitoring.

In contrast, the safety and efficacy of immersion in water during the second stage of labor have not been established, and immersion in water during the second stage of labor has not been associated with maternal or fetal benefit. Given these facts and case reports of rare but serious adverse effects in the newborn, the practice of immersion in the second stage of labor (underwater delivery) should be considered an experimental procedure that only should be performed within the context of an appropriately designed clinical trial with informed consent.

Although not the focus of specific trials, facilities that plan to offer immersion in the first stage of labor need to establish rigorous protocols for candidate selection, maintenance and cleaning of tubs and immersion pools, infection control procedures, monitoring of mothers and fetuses at appropriate intervals while immersed, and protocols for moving women from tubs if urgent maternal or fetal concerns develop.

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