in maternal bedside diagnosis and screening. This report reviews the use of ultrasound in assessing patients’ gastric contents and airways, managing breathless patients, diagnosing shock, and predicting fluid responsiveness.

The PubMed database was used to search for literature published between 2007 and 2018 in English and French. Two authors screened articles for relevance and quality. The review did not cover ultrasound use for regional anesthesia.

Gastric volume may be assessed using ultrasound to determine a woman’s risk of pulmonary aspiration. Ultrasound may soon be used to determine the level of stomach contents before the induction of anesthesia. Pregnant women have a higher risk of difficult tracheal intubation, but the cricothyroid membrane may be identified using ultrasound of the airway to establish front-of-neck airway access quickly and safely. The risk-benefit ratio of fluid administration can be determined by cardiac and lung ultrasound combined. The use of leg vein ultrasound together with echocardiography and lung ultrasound can determine causes of acute respiratory failure. Circulatory failure and cardiac arrest can be diagnosed early with the use of multiorgan point-of-care bedside ultrasound.

The use of ultrasound as a point-of-care diagnostic tool for critically ill patients is supported by a growing body of evidence and seems to also be applicable to pregnant patients. The direct impact of point-of-care diagnostic ultrasound on maternal outcomes, including mortality and morbidity, should be the focus of future studies.

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Postpartum Venous Thromboembolism Prophylaxis May Cause More Harm than Benefit: A Critical Analysis of International Guidelines Through an Evidence-based Lens

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Topics: Maternal morbidity and mortality, Nonobstetric maternal disease, Pharmacology

Prothrombotic hemostatic changes make pregnant and postpartum women logical targets for venous thromboembolism (VTE) prophylaxis. Most obstetric VTE guidelines recommend low–molecular-weight heparin (LMWH) for many postpartum women, including most delivering by cesarean. Although evidence is limited, a small subset of pregnant and postpartum women is at very high risk of VTE. Women with a personal history of VTE, potent thrombophilia, or prolonged immobilization usually receive and likely benefit from antenatal and postpartum LMWH prophylaxis. This perception of benefit has spread to women with more common risk factors, in whom the risk of VTE is lower.

This paper critically reviewed the evidence and quantified the benefit and harm from LMWH in postpartum women with common risk factors. Several oversights are mentioned: First, VTE prediction models are based on studies that report asymptomatic deep vein thrombosis, with occurrences of VTE typically identified using unverified diagnostic codes, allowing women with suspected VTE and those receiving LMWH for prophylaxis rather than treatment to be inappropriately included. In addition, the similarity of codes for superficial, septic and deep venous thrombophlebitis and amniotic fluid and venous pulmonary embolism inflate the incidence of VTE. Second, risk estimates are not adjusted for time exposure, with a review of studies showing that the VTE risk is spread unevenly over the postpartum period. The highest risk is during the first 4 weeks, and almost one-quarter of postpartum VTE episodes occur during the first week: 680 of 2870 per 100 000 person-years or a proportion of 0.24. Third, the benefits of heparin are exaggerated, and its harms are underappreciated, with meta-analyses of randomized trials of LMWH prophylaxis versus placebo in surgical patients demonstrating absolute risk increases for hemorrhage between 1.5% and 8.6%, while the preventive effect of 1 week of postpartum LMWH is unknown. Although LMWH might be expected to inhibit small clots destined to become symptomatic, there is no evidence that LMWH prevents clinical VTE when it is no longer given. These oversights contribute to a need to apply evidence-based medicine analysis to understand whether the benefit of LMWH outweighs the harm.

The review concludes that for women with previous VTE, potent thrombophilia, or prolonged immobilization, observational evidence strongly suggests LMWH prophylaxis is warranted during pregnancy and for 6 weeks postpartum. However, for women with more common risk factors, the net clinical benefit of LMWH is unclear. Estimation of the absolute risk reduction, number-needed-to-treat, absolute risk increase, and number-needed-to-harm reveals that for most women, LMWH may do more harm than good. Only adequately powered placebo-controlled randomized trials can accurately measure the true magnitudes of benefit and harm. Until and unless such trials show net benefit, women with common risk factors should be offered LMWH prophylaxis only as part of a randomized trial.

COMMENT

A. Kotaska writes a much needed critical analysis of whether or not and when we should prescribe LMWH. My normal role as a reviewer for Obstetric Anesthesia Digest is to write a comment to enable readers to learn the salient aspects of the paper and to provide my opinions of the relevance of the paper. However, Dr Kotaska has written such an excellent article, I recommend all read the paper. I will list the bullet points of the article.

- In general the medical evidence studying prophylaxis of VTE in pregnant women with regards to actual risk
Ostetric guidelines are based on estimates, rather than actual incidence of VTE, the protective effect of LMWH, and the harm caused by LMWH.

Prior guidelines by the American College of Chest Physicians often were based on asymptomatic thrombosis detected by screening rather than clinically significant thrombosis.

The author’s opinion states that clinical rather than asymptomatic VTE should be used for estimates of VTE incidence and prophylaxis benefit as prophylaxis of asymptomatic thrombosis will not be beneficial.

Previous guidelines which were based on asymptomatic thrombosis probably overstated the potential benefits and understimated the potential harm of VTE prophylaxis.

The recommendation from American College of Chest Physicians scoring systems such as Padu Prediction Score deems a 3% incidence of VTE is necessary in abdominal pelvic surgery patients before chemotherapy prophylaxis therapy.

VTE prophylaxis obstetrical guidelines from American College of Chest Surgeons, Australia, Canada, New Zealand, Sweden and Royal College of Obstetricians and Gynecologists are based upon case control studies as well as studies that report asymptomatic deep venous thrombosis.

The preventive benefit of 1 week postpartum LMWH is unknown.

One controlled study found women who received postpartum LMWH had a 4% increase of postpartum hemorrhage. (Lindqvist et al. “Efficacy of obstetric thromboprophylaxis and long term risk of recurrence of venous thromboembolism.” *Acta Obstet Gynecol Scan* 2011;90:648–653).

While pneumatic compression devices have not been studied in a randomized trial, 80% of fatal pulmonary embolisms were prevented from the Hospital Corporation of America trial. (Clark et al “Maternal mortality in the United States: predictability and the impact of protocols on fatal post cesarean pulmonary embolism and hypertension-related intracranial hemorrhage.” *Am J Obstet Gynecol* 2014;211:32.e1–32.e9).

Some of the authors of the eighth VTE guidelines from the American College of Chest Physicians had intellectual and financial conflicts of interest. The contributions from these authors for the ninth VTE guidelines from the American College of Chest Physicians were restricted.

While the ninth VTE guidelines from the American College of Chest Physicians and many national obstetric organizations recommend liberal LMWH, The American Congress of Obstetricians and Gynecologists has not adopted this stance.

In the absence of proven benefits of LMWH therapy in the postpartum state as well as risks found in Lindqvist’s data, I agree with Kotaska’s recommendation that we should use data from clinical thrombosis rather than asymptomatic thrombosis to drive guidelines.

Comment by Randall J. Morgan, MD

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**Increased Single-balloon Foley Catheter Volume for Induction of Labor and Time to Delivery: A Systematic Review and Meta-Analysis**

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(*Acta Obstet Gynecol Scand.* 2018;97:1051–1060)

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**Topics:** Obstetric complications

The Foley catheter is commonly used for cervical ripening in women undergoing labor induction. In an attempt to raise the Bishop score at a faster rate and decrease the time to delivery, Foley balloons are often overinflated, or balloons that accept larger volumes are used. This systematic review and meta-analysis examined randomized controlled trials to determine whether or not this practice is effective in decreasing the time between the start of labor induction and delivery.

Several electronic databases were searched from the time of their inception until April 2017 for terms including: “Foley balloon,” “Foley catheter,” “labor induction,” “cervical ripening,” “induction of labor,” “volume,” “size,” and “mL.” Studies were included if they compared larger volumes of single-balloon Foley catheters used for cervical ripening with standard volumes in the induction of labor at >24 weeks’ gestation. Standard volume was defined as 30 mL. The studies could include any catheter material type or balloon sizes. Data regarding double-balloon catheters were not included, but data for catheters inflated above the manufacturer’s recommended limit were included. Data were extracted by 2 authors, independently. The mean time from induction (defined as time of balloon insertion) to delivery was the primary outcome. Secondary outcomes included endometritis, chorioamnionitis, cesarean section, delivery within 24 hours, time from induction to vaginal delivery, time from Foley insertion to expulsion, epidural use, maternal discomfort, postpartum hemorrhage, neonatal intensive care unit admission and meconium staining. The random effects model of DerSimonian and Laird was used for the meta-analysis, and potential publication bias was evaluated.

Of the 103 studies screened, 7 were included in the systematic review and meta-analysis. A total of 1432 patients were enrolled in those 7 studies. No significant publication bias was shown using Begg and Egger tests. Only singleton gestations with cephalic presentation were included in the selected studies. While all trials used balloons inflated to 30 mL as the standard group, 3 used balloons inflated to 80 mL in the intervention group and 4 used balloons inflated to 60 mL. Four trials included overinflated balloons in the intervention group. Only one study reported...