Ondansetron and Spinal-Induced Hemodynamic Effects: What Anesthesia Providers Should Know

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Chi Upsilon Chapter

Problem

- Will the review of literature presented to SRNAs with limited clinical experience demonstrate that in obstetric patients, is the administration of prophylactic intravenous ondansetron effective in attenuating the bradycardic and hypotensive effects of neuraxial anesthesia, if administered prior to placement?
- In senior SRNAs in the 2019 cohort at AHU, will an educational PowerPoint presentation improve the knowledge base regarding the use of prophylactic ondansetron as a pharmacologic intervention to attenuate spinal-induced hypotension and bradycardia?

Literature Review

- 50-80% of obstetric patients experience hypotension after neuraxial anesthesia without pharmacologic interventions.
- Important physiologic changes with pregnancy:
  - Hemodynamic changes which can lead to potential harm of mother and/or fetus.
  - ↑ progesterone = ↑ sensitivity to local anesthetics, vasodilation & ↓ response to norepinephrine and angiotensin
  - Dependence on sympathetic tone to maintain hemodynamic stability + lack of autoregulation to low blood pressure
- The effects of neuraxial anesthesia on the cardiovascular system depends on: the degree of sympathetic blockade from rostral spread of the anesthetic, degree of patient sedation and central sympathetic inhibition.
- Blockade of the sympathetic nervous system causes arterial vasodilation, decreased systemic vascular resistance, venous pooling, and a reduction in venous return.
- If block reaches T1-T4 cardiac accelerator fibers, an imbalance between vagal fibers further slows heart rate
- Baroreceptor reflexes, volume receptor reflexes, and decreased central sympathetic outflow all contribute to the complexity of the cardiovascular response in the OB population

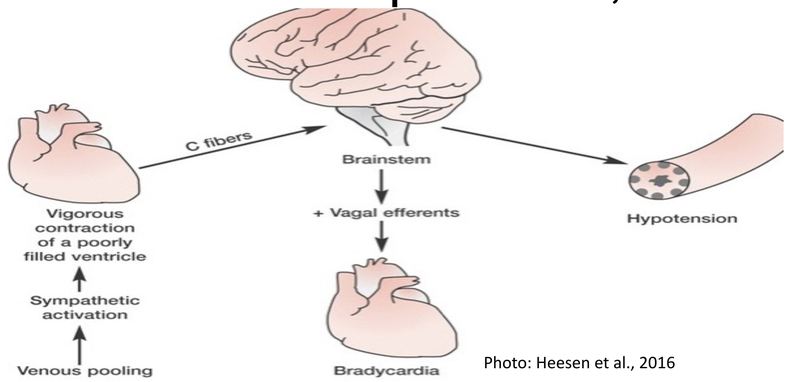

Photo: Heesen et al., 2016

Benzold-Jarisch Reflex (BJR)

- Triad of bradycardia, hypotension, and vasodilation in response to cardiac receptor stimulation
- Decreased filling to right atrium reduces outflow of intrinsic chronotropic stretch mechanoreceptors in ventricle wall
- Serotonin receptors within ventricle wall become stimulated, leading to cardioinhibitory reflex
- Parasympathetic nervous system becomes dominant, leading to vasovagal response
- Ondansetron, a 5-HT3 serotonin receptor antagonist works on peripheral receptors located in the cardiac vagal afferents, which blocks the BJR, and centrally in the CTZ
- Ondansetron is useful in preventing hypotension, bradycardia, nausea, and use of vasopressors. Treatment of spinal-induced bradycardia and hypotension can avoid complications of maternal cardiovascular collapse and fetal hypoxia/demise

Methods

- With SRC and IRB approval, an educational PowerPoint presentation representative of current literature was presented to the 2019 AHU SRNA cohort
- Pretests were utilized as baseline knowledge. After educational PowerPoint presentation, an identical posttest was administered. Data was analyzed by ADU statistician, Roy Lukman, using an SPSS program and paired sample t-test

Analysis & Conclusions

The mean scores increased from pretest (75%) to posttest (97.273%). The paired samples test indicated that the increase is statistically significant (t = -6.087, p < .001). This indicates an increase in knowledge base.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreTest	75%	22	17.92843	3.82235
	PostTest	97.273%	22	4.55842	.97186

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair	Pretest – PostTest	-22.27273	17.16359	3.65929	-29.88264	-14.66282	-6.087	21	.000

Findings

- In conclusion, knowledge based was improved regarding evidence-based practice to reduce the risk of spinal-induced hemodynamic effects through the use of intravenous ondansetron
- Decreases in DBP, MAP, and vasopressor requirements were significantly lower in parturients receiving prophylactic ondansetron compared to placebo
- Ondansetron comes with minimal side effects and is best given 5 minutes before neuraxial block.

Limitations

- Single site study with homogenous sample size
- Convenience sampling; small sample size (n=22)

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References available upon request