

The Occupational Hazards of the Pregnant Surgeon: What Modifications in Practice and Techniques are Necessary to Avoid or Minimize Them

Venita Chandra, MD
Clinical Professor of Surgery
Division of Vascular Surgery
Stanford Medical School, Stanford, CA

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Disclosures

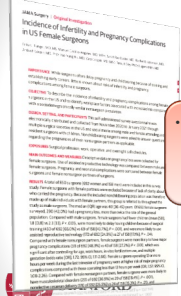
- Cook Medical, Gore, Medtronic Inc, Shockwave, Evident Vascular
- VIVA Board Member

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The Pregnant Surgeon

- Growing number of women entering surgical professions including vascular surgery
 - Since 2017 more women than men entering medical schools
- Increasing number of young surgeons that are in their child-bearing years
- Pregnancy during surgical career/training poses particular challenges

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Abstract *Background:* The incidence of infertility and pregnancy complications in US female surgeons is unknown. *Methods:* We conducted a cross-sectional survey of 1,000 US female surgeons. *Results:* The prevalence of infertility was 48.3% (95% CI 44.3-52.3) and the prevalence of pregnancy complications was 27.2% (95% CI 23.2-31.2). *Conclusions:* The prevalence of infertility and pregnancy complications in US female surgeons is high. *Keywords:* Infertility, pregnancy complications, female surgeons.

- Compared to female non-surgeons:
 - More likely to have pregnancy complications (48.3% vs. 27.2%, p<.001)
 - Even with controlling for: age, hours worked/week, IVF usage and multiple gestation (OR:1.72)

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Occupational Hazards for the Pregnant Surgeon

- Anesthetic gases
- Working conditions
- Radiation

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Occupational Hazards for the Pregnant Surgeon

- Anesthetic gases
 - Exposure primarily waste
 - Following OSHA guidelines eliminates these hazards
- Working conditions
- Radiation

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Working Conditions

- Night shifts, long working hours, prolonged standing and high physical workload
 - Known to adversely affect fertility and pregnancy outcomes
 - Known musculoskeletal and physical consequences
 - Not well studied
- Rangel et. al.:
 - Operating more than 12 hours/week in 3rd trimester associated with major pregnancy complication (OR 1.57)

1. Palmer KT, et al. Work activities and risk of prematurity, low birth weight and pre-eclampsia: an updated review with meta-analysis. *Occup Environ Med.* 2013;70(4):213-222.
 2. Cai C, et al. The impact of occupational shift work and working hours during pregnancy on health outcomes: a systematic review and meta-analysis. *J Am J Obstet Gynecol.* 2015;202(2):937(1-9) 30884-1.

Working Conditions

Long working hours and pregnancy complications: women physicians survey in Japan

Figure 3 Frequency of threatened abortion (PTB) and no threatened abortion, preterm birth (PTB) and no preterm birth, according to weekly working hour quartile. The frequency of a preterm birth increased as the number of working hours increased (P=0.0004 for PTB and 0.0001 for both births).

- 939 Japanese physicians
- Compared outcomes based on mean weekly working hours: 40, 41-50, 51-70 and >71 during 1st trimester
 - 12% pre-term birth (PTB)
 - Women who worked >71 hours a week had 3X risk of PTB
 - Even after adjusting for maternal age and household income

Working Conditions, What can we do?

- What can we do?
 - Cultural Shift
 - Area of research and evaluation
 - Need to provide alternative working conditions for pregnant surgeons without penalties

Challenges by trimester	Practical recommendations
First	Keep snacks in your pocket Eat frequent and small meals Other medical advice needed Talk to your OB about medication options if symptoms are refractory
Second	Minimize overnight call if possible Minimize workday and other obligations Rest in the weekends
Third	Get small low fat meals, and avoid alcohol, cigarettes, opiates, and caffeine Take antacids or talk to your obstetrician about medication options
Recovery situation	Stay well-hydrated despite the recommendation of drinking less Plan appropriate times to take bathroom breaks during long cases
If you are feeling better	Schedule longer cases Make up any missed call
Third	
Edema	Wear compression stockings Other non-sitting advice
Oversleeping	Stay well-hydrated Exercise twice per day/night Take a shower and drink a glass of cool water
Upper limb	Minimize heavy-lifting and ambulatory Take breaks and stretch wrists frequently Wear a wrist splint
Back pain	Stretch frequently Use standing pad Wear a maternity back support belt

Harnsberger et al. Pregnant Surgeons Clinics in Colon and Rectal Surgery 2019

Radiation

- 50-75% of vascular interventions are now being done endovascular = MORE radiation exposure
- Concern for men and women, but particularly for women of child-bearing age:
 - Human embryo/fetus particularly sensitive to ionizing radiation
 - Miscarriage, neurologic defects, mental retardation, and childhood cancer

* AAMC 2010 survey
 * Harris LM, Chaikof EL, Eidi JF. Altering the career choice: can we attract more women to vascular surgery? *JVS* 2007 Apr;4(4):846-8.

Radiation

- National Council on Radiation Protection and Measurement (NCRP) recommendations:
 - Occupational exposure of expectant mother ≤ 500 mRem and <50 mRem/month
- Fetal monitors: Under-lead dosimetry badges
 - Not all institutions mandate fetal monitoring

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Monitoring of fetal radiation exposure during pregnancy

From the Society for Vascular Medicine

- Multi-institutional review of radiation safety records
- Comparison of external (maternal) and fetal (under-lead) dosimetry readings pre, during and post pregnancy
- Essentially undetectable "fetal" exposure without significant change in external exposure

What Can we Do: Radiation

- Step back from the table
- Limit Fluoroscopy Time
 - Be aware of stepping on/off pedal
- Minimize frame rates
- Use low dose fluoroscopy modes
- Minimize use of DSA (use fluoro looping instead)

- Keep the table height high
- Keep the image receptor close to the patient
- Minimize use of magnification (try digital mag instead)
- Minimize steep angles
- If gantry is angled stand on the opposite side of the x-ray tube

What can we Do: Radiation

- Education/Awareness!!

In Conclusion

- Many unique occupational hazards for the pregnant surgeon
- Several steps that can be taken to minimize these concerns
- Good radiation safety skills makes a big difference
- Need an overhaul in our systems/culture to provide a safer pregnancy for the growing number of surgeons of childbearing age

