


The Silver Tsunami: Are You Prepared?

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Disclosures: NONE




Objectives

- Better understand the “geriatric imperative.”
- Review basic physiology of the aging patient
- Review the current data for anesthesia in hip fracture patients and how we can impact outcomes.

What is the Silver Tsunami?

- 1950-2005: 8-12% increase in Seniors
- 2013: 13% of population (40 million)
- 2011-2030: Baby boomers!!!
- “Old” old is fastest growing:
 - 2010: 5 mil over 85
 - 2050: 21 million!



-Data from US Census Bureau

Geriatric Imperative’s Healthcare Impact

- ≥65 year olds made up 13% of the population in 2013, but
 - 25% of medications
 - 33% of hospital admissions
 - 44% of hospital bed days
 - Majority of nursing home beds

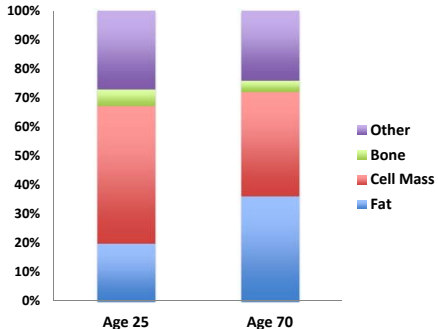
What will happen in 2030 when % of population doubles!?!?!?

The Effects of Time . . .

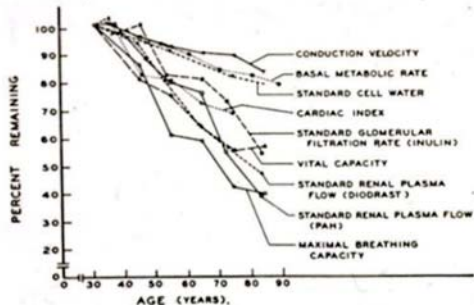
Weight



The Effects of Time . . . Body Composition



Physiologic Decline with Aging



CNS Changes

- Decrease in number of nerve cells in the CNS
- Accumulation of metabolic products that may play a role in increased sensitivity to sedatives
- Decreased dopamine and increased muscular rigidity
- Increased reaction time
- Increased risk for postoperative delirium
- **Decrease in MAC (6% per decade after age 40)**

Musculoskeletal System

- Osteoarthritis
- Osteopenia

Renal System

- GFR decreased 30-46%
- Not always manifested in creatinine (dependent on muscle mass and body weight)
- Decreased renal plasma flow by about 50%

Pulmonary System

- Loss of elastic recoil and collagen matrix (increased compliance)
- **Prolonged expiratory phase, decreased maximal expiratory flow**
- Decreased diffusion capacity
- Increased dead space
- Decreased FRC
- Increased alveolar-arterial gradient (A-a)
- Increased work of breathing

Cardiovascular System

- Maintenance of resting LV function
- Less cardiomyocytes → less myocardial contractility
- Decreased response to beta-receptor stimulation → lower max heart rate (requires compensatory increase in stroke volume to increase CO)
- Increased vessel stiffness → higher systolic pressure and increased LV afterload.
- Decreased VO₂ Max

Summary of Physiologic Changes

Loss of functional reserve capacity

Loss of ability to compensate in the face of stress

Surgery=Stress

When Should We be Operating?

Predictors of Mortality in Elderly Patients With an Intertrochanteric or a Femoral Neck Fracture

Hayrettin Kenmezacar, MD, Egemen Ayhan, MD, Mehmet C. Unlu, MD, Ali Seker, MD, and Saffet Karaca, MD

The effect of early surgery after hip fracture on 1-year mortality

Paola Colais¹, Mirko Di Martino¹, Danilo Fusco¹, Carlo Alberto Perucci² and Marina Davoli³

When Should We be Operating?

Clin J Anesth. 2008 Mar 25(3):148-54. doi: 10.1007/s001400800006.
Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression.
Shen J¹, Hsueh J, Chen Y.

- Meta-analysis of 16 observational studies
- Delays >48 hours associated with increase in 30-day mortality and 1-year mortality

Hip Fractures in the Elderly

- 1-year mortality is estimated to be 14-58%
- Most studies on morbidity/mortality done in Scandinavia
- In US: White men most likely to die
- Morbidity
- Loss of independence
- \$\$\$\$\$\$

Jacobsen SJ et al. Race and sex differences in mortality following fracture of the hip.

Comparative Effectiveness of Regional versus General Anesthesia for Hip Fracture Surgery in Adults

Mark D. Neuman, M.D., M.Sc.,* Jeffrey H. Silber, M.D., Ph.D.,† Nabil M. Elkassabany, M.D.,‡ Justin M. Ludwig, M.A.,§ Leo A. Fleisher, M.D.¶

- 2012 Retrospective cohort of 18,000 hip fracture surgery patients in NY state.
- Lower odds of in-hospital mortality & pulmonary complications with regional anesthesia.

2014 AAOS: "Doesn't Matter!"



2014 UK/Ireland Anesthesia Association: "Try to do neuraxial!"



Mode of Anesthesia in Hip Fracture: Does it Matter?

- Clinical/administrative databases lack specific info—type of block, amount of sedation, or meds used for GETA.
- Outcomes are also limited—no patient centered outcomes.

REGAIN

- Regional vs. General Anesthesia for Promoting Independence after Hip Fracture Surgery
- University Pennsylvania, Enrollment Spring '16
- 1600 patient multicenter randomized trial
- Primary outcome: Recovery of ambulation
- Secondary outcomes: Chronic pain, ability to return to prefracture residence, overall health, cognitive function

www.clinicaltrials.gov ID # NCT02507505

Hip Fractures in the Elderly

Osteoporosis Int (2007) 18:1583–1593
DOI 10.1007/s00198-007-6903-3

ORIGINAL ARTICLE

Increased mortality in patients with a hip fracture—effect of pre-morbid conditions and post-fracture complications

P. Vestergaard · L. Rejnmark · L. Moskilde

- Denmark 1977-2001
- >169,000 fracture cases compared with >500,000 controls followed for 20 years.
- Excess mortality of 19% within first year and then 1.8% per year for every additional year following the fracture .
- Major causes longitudinally were **due to complications to the fracture event**, not premorbid conditions

Hip Fractures in the Elderly

- Retrospective study; 2009-2013; patients with proximal femoral fracture
- follow-up for at least 1 year
- 115 patients after exclusions
- Things relating to mortality: **type** of surgery—THAs & hemiarthroplasty mortality >60% vs 24% in proximal femoral nail

Karademir G, Bilgin Y, et al. Hip fractures in patients older than 75 years old: Retrospective analysis for prognostic factors. Int J Surg. 2015 Dec; 24: 101-4.

Hip Fractures in the Elderly

Sedation Depth During Spinal Anesthesia and the Development of Postoperative Delirium in Elderly Patients Undergoing Hip Fracture Repair

FREDERICK E. SHERER, MD; KHWAJ J. ZAKRIYA, MBBS; ALLAN GOTTSCHALK, MD, PhD; MARY-RITA BLUTE, RN; HOCHANG B. LEE, MD; PAUL B. ROSENBERG, MD; AND SIMON C. MEARS, MD, PhD

- 114 patients age 65+ undergoing hip fracture repair with SAB and propofol.
- Excluded severe dementia and preop delirium
- BIS of ~50 for deep sedation group, BIS of 8+ for light sedation group. Standardized postop analgesia.
- Prevalence and mean days of delirium significantly greater in deep sedation group.

Controversies in anaesthesia for noncardiac surgery in older adults

S. Murthy^{1,*}, D. L. Hepner², Z. Cooper³, A. M. Bader² and M. D. Neuman¹

- 2015 Review of most recent hip fracture data
- Reviews info and risk factors of postop delirium
- Discusses frailty & impact on outcome