Rotation Title: Anesthesia for Orthopedic and Plastic Surgery (Also included in the General Rotations)

I. Definition: During general rotations, residents are assigned many orthopedic and plastic surgical cases.

II. Curriculum: The resident is assigned to major and minor procedures involving elective, emergency and trauma surgery involving orthopedics and plastic surgery .A manual which defines the clinical issues and academic content is provided prior to the start of the rotation. The clinical experience is supplemented by relevant assigned readings and didactic lectures

III. Performance Assessments:

A. Self Assessment
You (the resident) are to check each box as the material is mastered. Self reflection on your own competencies is critical.

B. Faculty Assessment
Faculty will periodically review your self assessment and discuss their assessments of your competencies. The overall scores on the six competencies will be reported to you at least weekly.

C. Mentor Assessment
Your mentor should meet with you quarterly and review your entire portfolio. The mentor should report areas in which you have deficiencies (for your level of training). This report may be to you and/or to the program director as determined by your mentor.

IV. Assessed Competencies (Performance Criteria):

A. Patient Care At the conclusion of the rotation, residents should be able to ...

- ☐ 1. Perform a spinal anesthetic with the correct equipment and agent and manage the patient intraoperatively with minimal staff intervention.
- ☐ 2. Conduct a similar case with an epidural anesthetic.
- ☐ 3. Perform an axillary block, with correct selection of equipment and agents.
- ☐ 4. Perform an interscalene block for shoulder surgery, with correct equipment and agents.
- 5. Provide appropriate, safe anesthesia for:
  - ☐ a. Total hip arthroplasty
  - ☐ b. Revision total hip arthroplasty
  - ☐ c. Total knee arthroplasty
  - ☐ d. Treatment of fractured hip
  - ☐ e. Anterior cruciate ligament repair
  - ☐ f. Elective lumbar spine procedure (disc or spinal stenosis)
  - ☐ g. ORIF of major long bone fracture
  - ☐ h. Hand surgery
  - ☐ i. Major skeletal tumor resection
  - ☐ j. Posterior spinal fusion
  - ☐ k. Flap procedures
  - ☐ l. Abdominoplasty
  - ☐ m. Breast reduction
  - ☐ n. Skin grafting

B Medical Knowledge: At the conclusion of the rotation, the resident should be able to describe …

1. Anesthesia for certain common procedures
   - a. Lower extremity joint replacement
   - b. Reconstructive surgery, e.g., shoulder, hip, knee
   - c. Arthroscopy
   - d. Hand surgery
   - e. Hip fracture repair
   - f. Limb trauma
   - g. Pelvic fracture
   - h. Orthopedic oncology
   - i. Flap procedures
   - j. Abdominoplasty
   - k. Breast reduction
2. Skin grafting
3. Use of pneumatic tourniquets
4. Pathophysiology of fat embolism
5. Consequences of methylmethacrylate use
6. Rheumatoid arthritis
7. Prophylaxis of deep venous thrombosis
8. Regional anesthesia and anticoagulants

The CA-1 resident on their clinical Orthopedic and Plastic Surgery rotations, shall be responsible for mastering all material listed in Appendix A. These will be assessed by written and oral examinations.

C. Practice Based Learning and Improvement: At the conclusion of this rotation, the resident, based on experience and the literature should be able to …

1. Identify common preoperative issues in reconstructive surgery patients, and explain how they impact on an anesthesia plan.
2. Create a reasonable anesthesia plan for most common, reconstructive surgical procedures.
3. Identify and manage the common problems in trauma.
4. Plan and select equipment and local anesthetic agents for most regional anesthetic procedures. Select and defend these local anesthetic choices for surgical procedures, depending on duration, location and severity of illness of the patient.
5. Describe the basic pharmacology of a local anesthetic including the characteristics which determine onset, duration, potency and toxicity.
6. Discuss the unique topics within anesthesia for orthopedic and plastic surgery , including pneumatic tourniquets, fat embolism, hemodynamic implications of methylmethacrylate and etiology of deep venous thrombosis.
7. Describe the preoperative implications of co-existing diseases in reconstructive surgery patients, including hypertension, coronary artery disease, rheumatoid arthritis, diabetes mellitus, and ankylosing spondylitis.
8. Explain and contrast postoperative pain control strategies including patient controlled analgesia (PCA) with various opiates, subarachnoid opiates, epidural analgesia, continuous peripheral nerve catheters, intra-articular local anesthetic and opiate, and non-steroidal anti-inflammatory drugs.
9. Describe the techniques of autologous blood programs, cell salvage, hemodilution and perioperative blood conservation.

D. Interpersonal and Communication Skills: The resident will …

- ☐ 1. Learn to establish a joint anesthesia-surgical plan for procedures prior to entering the OR.
- ☐ 2. Identify needs to the OR team to support anesthetic procedures, such as regional anesthesia and invasive monitoring.
- ☐ 3. Ensure adequate personnel for patient positioning and bed-transfer.
- ☐ 4. Identify antibiotic needs of the patient from the surgical team
- ☐ 5. Verify blood availability
- ☐ 6. Notify the surgeon of tourniquet times

E. Professionalism: The resident must …

- ☐ 1. Identify the surgical plan
- ☐ 2. Facilitate the surgical procedure through timely arrival and preparation
- ☐ 3. Notify the surgeon preoperatively of any patient / medical concerns
- ☐ 4. Facilitate individualized PACU care
- ☐ 5. Ensure optimum postoperative analgesia

F. Systems-Based Practice: At the conclusion of this rotation, the resident should be able to …

- ☐ 1. Understand the types, availability, and rationing of synthetic orthopedic joints
- ☐ 2. Understand costs of pain management in the orthopedic patient, with emphasis on regional analgesic modalities
- ☐ 3. Understand end-of-life issues as related to orthopedic trauma

Revised: **April 18, 2007**

Appendix A: Medical Knowledge expected to be mastered during CA-1 Rotations involving Anesthesia for Orthopedic and Plastic Surgery

Lecture 12

Monitoring Methods for Temperature and Oxygen Saturation

1) Temperature
2) Oxygen: Oximetry, CO-oximetry, Pulse Oximetry, Mixed Venous Oxygen Saturation (SvO_2)

Lecture 20

Drug Delivery Devices

1) Patient-Controlled Intravenous and Epidural Analgesia, Epidural and Subarachnoid Continuous Drug Delivery Devices

Lecture 48

Controlled Hypotension

1) Choice of Drugs
2) Use of Posture
3) Ventilation

Lecture 54

Respiratory Physiology – Part 1

Respiration: Lung Functions and Cellular Processes

1) Lung Volumes
   - (a) definitions; methods of measurement; normal values; time constants
   - (b) spirometry; static and dynamic volumes; deadspace; nitrogen washout, O_2 uptake, CO_2 production, exercise testing
2) Lung Mechanics
   - (a) static and dynamic compliance, pleural pressure gradient, flow-volume loops and hysteresis, surfactant, LaPlace Law
   - (b) resistances; principles of gas flow measurement
   - (c) methods of measurement
   - (d) work of breathing
   - (e) regulation of airway caliber

Lecture 55

Respiratory Physiology – Part 2

1) Ventilation - Perfusion
   - (a) distribution of ventilation
   - (b) distribution of perfusion, zones, hypoxic pulmonary vasoconstriction
   - (c) measurement of Ventilation/Perfusion (V/Q) ratio, implications of Alveolar-arterial O_2 gradient (A-aDO_2), arterial-Alveolar CO_2 gradient (a-ADCO_2), dead space to Tidal Volume Ratio (V_d/V_t), Shunt Fraction (Q_s/Q_t), lung scan
2) diffusion
   - (a) definition, pulmonary diffusion capacity
   - (b) apneic oxygenation, diffusion hypoxia

Lecture 56

Respiratory Physiology – Part 3

1 Blood Gas Transport
   - (a) O_2, transport; O_2 physical solubility; oxyhemoglobin (Hb-O_2) saturation, Hb-O_2 dissociation curve; 2,3-diphosphoglycerate (2,3,DPG), P_{50}, respiratory enzymes; hemoglobin (Hb) as a buffer
   - (b) CO_2 transport; blood CO_2 content; carbonic anhydrase; CO_2 dissociation curve; Bohr effect, Haldane effect
   - (c) systemic effects of hypercarbia and hypocarbia
   - (d) systemic effects of hyperoxia and hypoxemia
2) Regulation of Ventilation
   - (a) respiratory center
   - (b) central and peripheral chemoreceptors; proprioceptive receptors; respiratory muscles and reflexes; innervation
   - (c) CO_2 and O_2 response curves
3) Non-respiratory Functions of Lungs, metabolic, immune

Lecture 61

Evaluation of Diseases of the Respiratory System

1) history and physical examination
2) chest X-ray
3) Arterial Blood Gases (ABGs)
4) Pulmonary Function Tests (PFTs)
5) assessment of perioperative risk

Lecture 62

Bronchodilator Therapy

1) modes of respiratory therapy
2) drug therapy (antibiotics, bronchodilators, mucolytics, steroids)

Lecture 156

Anesthesia for Plastic Surgery, Liposuction and Laparoscopic Surgery

1) Liposuction
   (a) Anesthetic Management
   (b) Complications
2) Cholecystectomy
   (a) Anesthetic Management
   (b) Complications
3) Gynecologic Surgery
   (a) Anesthetic Management
   (b) Complications
4) Gastric Stapling
   (a) Anesthetic Management
   (b) Complications
5) Hiatal Hernia Repair
   (a) Anesthetic Management
   (b) Complications

Lecture 158

Anesthesia for Ambulatory and Orthopedic Surgery

1) tourniquet management
2) complications
3) regional vs. general anesthesia
4. Patient Selection in Ambulatory Surgery
   a) Anesthetic Management
   b) Discharge Criteria
5. Organization:
   a) Safety requirements (equipment, emergency plan)

b) Office-Based Anesthesia: Special Considerations