Patient Positioning During Surgery
Objectives

- Exam importance of proper positioning in various surgical procedures
- Define and demonstrate appropriate patient positioning during general and regional anesthesia
- Identify common injuries related to inappropriate positioning
- Define expected and potential physiologic changes related to patient positioning
Why is positioning important?

- Patient cannot make clinician aware of compromising positions
- Enables IV lines and catheters to remain patent
- Enables monitors to function properly
- Facilitates the surgeon’s technical approach
- Patient safety (aka Don’t Let The Patient Fall Off The Table)
Various Positions

- Supine
- Prone
- Lateral
- Lithotomy
- Lawnchair
- Jackknife
- Lateral Jackknife

- Prone Jackknife
- Prone/Kneeling
- Prone/Knee-chest
- Sitting
- What ever bizarre position the surgeon wants the patient in
Supine
Supine

- Patient on back
- Arms on arm boards
  - Check orientation of arm (arms < 90 degrees)
  - Make sure arm is supinated (palm up)
  - Place additional padding under elbow if able
- Arms tucked
  - Check fingers
  - Check IV lines and SaO2 probe
Prone
Prone

- Face down

**HEAD PLACEMENT**

- Head straight forward
  - ET tube placement and patentcy
  - Check bilateral eyes/ears for pressure points
- Head turned
  - Check dependent eye/ear ETT placement
  - Be aware of potential vascular occlusion
Prone continued

- Arm placement
  - Tucked – similar concerns to supine
  - Abducted
    - Check neck rotation and arm extension to avoid possible brachial plexus injury
    - Make sure elbows are padded

- Chest Rolls
  - Often up to surgeon as to what type of rolls are used
Prone continued

- Iliac support
- Make sure some sort of padding is placed under iliac crests
Lateral
Lateral

- Patient on side (lateral decubitus position)
  - i.e. left lateral decubitus position means right side up
- Most important to maintain **body alignment**
  - Keep neck in neutral position
  - Always place axillary roll
  - Place padding between knees
  - Try and place padding below lateral aspect of dependent leg (prevent peroneal nerve damage)
Lateral continued

- Position arms to parallel to one another
- Place padding between arms or place non-dependent are on padded surface
- Check pulses
Lithotomy
Lithotomy

- Various types of stirrups
  - Candy cane
  - Allen stirrups
  - Knee cradles
- Various degrees of lithotomy
  - Low
  - High
- Move legs at same time when positioning patient in and out of lithotomy
Stirrups
Sitting Position
Sitting Position

- Position used in neurosurgery procedure to facilitate access to posterior fossa
- Potential complications from sitting position
  - Venous air emboli
    - Need to take measures to detect and extract VAE
  - Hypotension
  - Brainstem manipulations resulting in hemodynamic changes
  - Risk of airway obstruction
Jack-Knife
Common Injuries Secondary to Positioning

- **Ulnar Nerve Injury**
  - Most common nerve injury in anesthetized patient
  - Often injured when compressed between the posterior aspect of medial epicondyle of elbow and armboard or bed
  - More likely with elbow flexed or forearm pronated
  - Symptoms include loss of sensation of lateral portion of hand and inability to abduct or oppose the fifth finger (claw hand)
Common Injuries continued

- Brachial plexus nerve injury
  - Second most common type of nerve injury
  - Injury occurs often when plexus is stretched or compressed between the clavical and first rib
  - Seen in prone and supine procedures where head rotated and laterally flexed to the same side and/or arm is extended posteriorly past the plane of the torso
  - Can occur due to compression from shoulder braces placed too close to the neck
Common Injuries continued

- Manifestations depend on which nerves are injured in the plexus:
  - Median – “Ape hand” deformity, inability to oppose thumb
  - Axillary – inability to abduct the arm
  - Ulnar – “Claw hand” deformity
  - Musculocutaneous – inability to flex forearm
  - Radial – wrist drop
Common Injuries continued

- Radial nerve injury
  - Can be injured if compressed against spiral groove of humerus and other object (i.e. ether screen or excessive cycling of NIBP)
  - Symptoms include wrist drop, weakness of abduction of thumb, and loss of sensation in web space between thumb and index finger
Common Injuries continued

- Common peroneal nerve injury
  - Injured when lateral aspect of knee is compressed against stirrup

- Sciatic nerve injury
  - Can become stretched by exaggerate flexion of hips (foot drop)

- Femoral nerve injury
  - May become kinked under inguinal ligament from extreme flexion and abduction of thighs
Common Injuries continued

- Saphenous nerve injury
  - May be injured when the medial tibial condyle is compress by leg supports.

- Obturator nerve injury
  - May be injured during difficult forceps delivery or by excessive flexion of the thigh to the groin

- Anterior tibial nerve injury
  - Foot drop will occur if the feet are plantar flexed for extended periods of time (sitting or prone)
Injuries Occurring From Prolonged Positioning

- **Eye compression in prone position**
  - The retinal artery can be compressed by external pressure resulting in retinal ischemia and blindness
  - Constantly check eyes during such positioning and make sure they are lubricated and taped to decrease incidence of corneal abrasions

- **Skin breakdown due to prolonged positioning**
  - Make sure bony prominences are well padded
  - Avoid direct focused pressure on scalp (can lead to alopecia)? Head straps?
Physiological Changes Related to Change In Body Position

- Most changes are related to gravitational effects on cardiovascular and respiratory systems.
- Changes in position redistribute blood within the venous, arterial, and pulmonary vasculature.
- Pulmonary mechanics also change with varying body positions.
Cardiovascular Changes with Positioning

- Changing from erect to supine increases venous return and stroke volume.
  - Parasympathetic stimulation regulate heart rate and contractility to adjust to increased preload.
  - Obesity, pregnancy, and abdominal tumors can reduce venous return (preload) when in the supine procedure.
Pulmonary Changes with Positioning

- In supine position, functional residual capacity and total lung capacity are reduced
- This is exaggerated in obese patients
- Anesthesia and muscle relaxants further reduce these volumes due to diaphragm position with relaxation
- Trendelenburg position also reduces lung volumes
Questions