



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 position

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 patency
 - 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 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 arm 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

The background of the slide is a solid, warm brown color. Overlaid on this background are several stylized, semi-transparent leaf patterns in a lighter shade of brown and orange. The leaves are arranged in a scattered, overlapping manner, creating a textured, autumnal feel. The word "Questions" is centered at the top in a bold, serif font with a slight shadow effect.