PATIENT POSITIONING

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Goals of Proper Positioning

- To maintain patient's airway and avoid constriction or pressure on the chest cavity
- To maintain circulation
- To prevent nerve damage
- To provide adequate exposure of the operative site
- To provide comfort and safety to the patient

Assessment

- Need to assess the following prior to positioning of the patient:
  - Procedure length
  - Surgeon's preference of position
  - Required position for procedure
  - Anesthesia to be administered
  - Patient's risk factors
    - age, weight, skin condition, mobility/limitations, pre-existing conditions, etc.
  - Patient's privacy and medical needs
  - Basics of anatomy & physiology

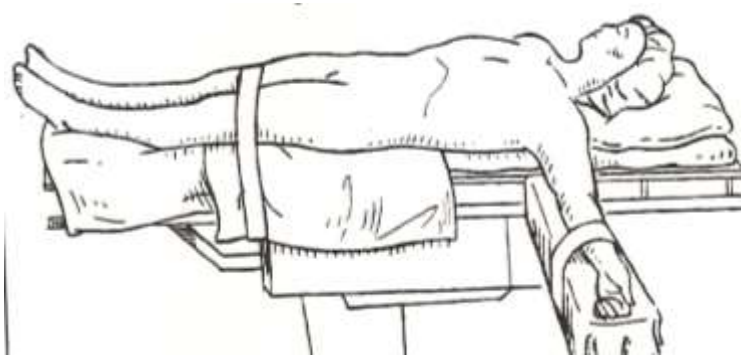
Positions

- Supine
- Prone
- Lateral

- Variations include:
  - Trendelenburg
  - Reverse Trendelenburg
  - Sitting
  - Semi Sitting
  - Lithotomy

Supine

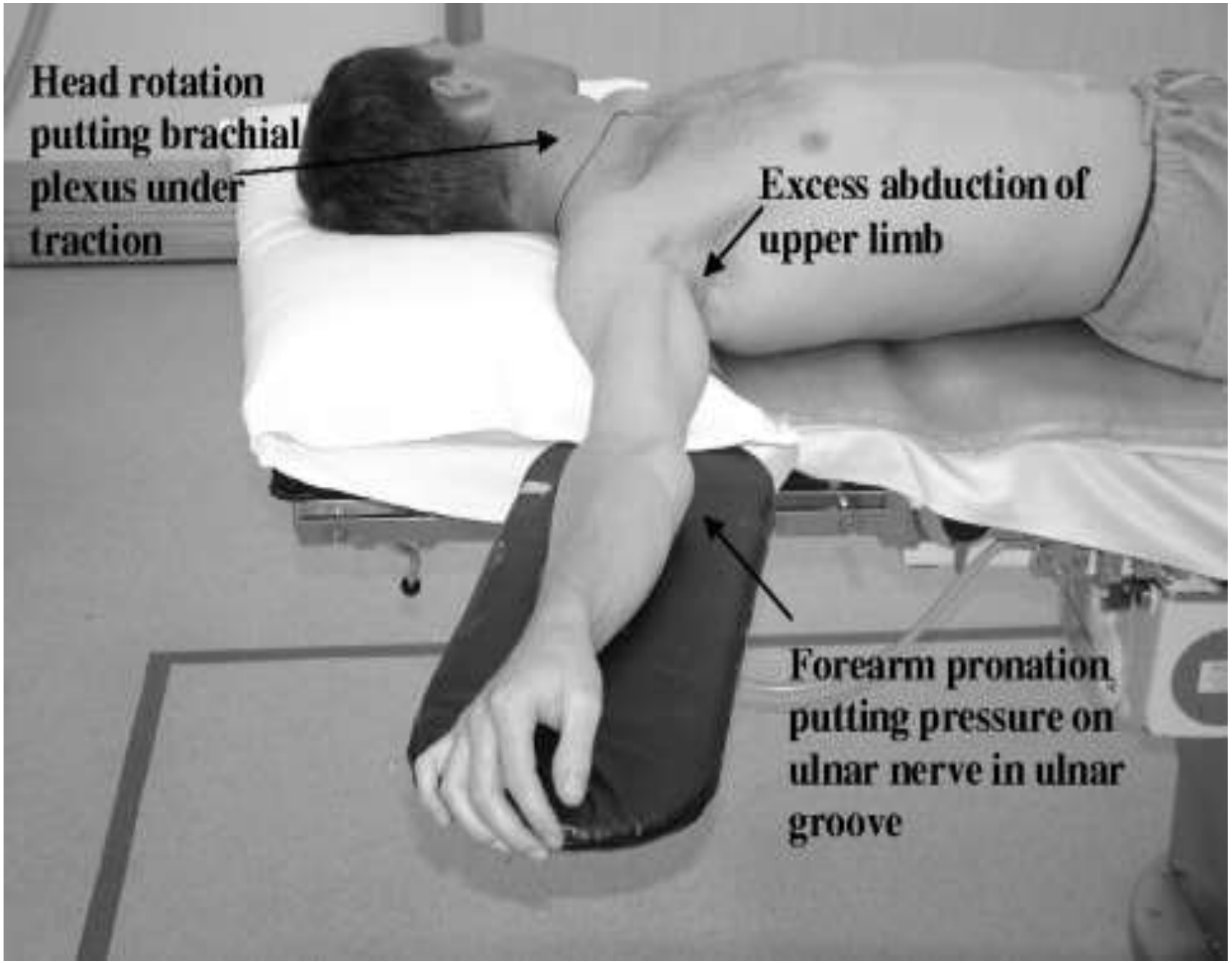
- Most common with the least amount of harm
- Placed on back with legs extended and uncrossed at the ankles
- Arms either on arm boards abducted <90* with palms up or tucked (not touching metal or constricted)
- Spinal column should be in alignment with legs parallel to the OR bed
  - Head in line with the spine and the face is upward
  - Hips are parallel to the spine
- Padding is placed under the head, arms, and heels with a pillow placed under the knees



Supine Concerns

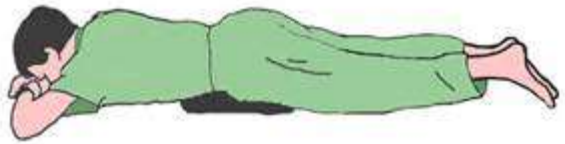
- Greatest concerns are circulation and pressure points

- Most Common Nerve Damage:
  - Brachial Plexus: positioning the arm >90*
  - Radial and Ulnar
  - Peroneal and Tibial: Crossing of feet and plantar flexion of ankles and feet


Head rotation putting brachial plexus under traction
Excess abduction of upper limb
Forearm pronation putting pressure on ulnar nerve in ulnar groove

Prone

- Face down, resting on the abdomen and chest
- One roll is placed at the iliac or pelvic level
- Head is face down and turned to one side with accessible airway
- Forehead, eyes and chin are protected
- Padding to bilateral arms and under knees
- Safety strap placed 2" above knees



Prone Concerns

- Concerns:
  Respiratory/circulatory systems
  pressure points
- Most Common Nerve Damage:
  - Brachial, radial, median, ulnar
- Vulnerable Bony Prominences:
  - Temporal, acromion, clavicle, iliac
- Vulnerable Vessels:
  - Carotid, aorta, vena cava, saphenous
- Susceptible to hyperextension of
  the joints

Lateral(Sims)

- Shoulder & hips turned simultaneously to prevent torsion of the spine & great vessels
- Lower leg is flexed at the hip; upper leg is straight
- Head must be in cervical alignment with the spine
- Breasts and genitalia to be free from torsion and pressure
- Padding placed under lower leg, to ankle and foot of upper leg, and to lower arm (palm up) and upper arm
- Pillow placed lengthwise between legs and between arms

Used for Sigmoidoscopy

Lateral Concerns

- Concerns : Respiratory, circulatory, and pressure points
- Most Common Nerve Damage:
  - Brachial, radial, median, ulnar, peroneal
- Vulnerable Bony Prominences:
  - Temporal, acromion, olecranon, iliac, greater trochanter
- Vulnerable Vessels:
  - Carotid, axillary, brachial, aorta, vena cava,

Trendelenburg

- The foot of bed is raised to desired angle
- Used for procedures in the lower abdomen or pelvis
  - Enables the abdominal viscera to be moved away from the pelvic area for better exposure

Trendelenburg Concerns

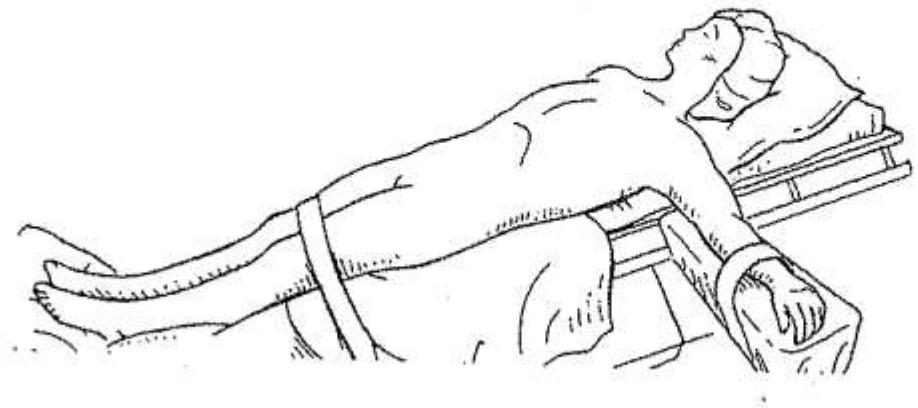
- Lung volume is decreased
- The pressure of the organs against the diaphragm mechanically compresses the heart

Adverse effects: Trendelenburg Position

- Increased preload→increased cardiac output
- Increased cerebral venous and intracranial pressure
- The abdominal viscera displaces the diaphragm cephalad, reducing lung volume compliance→decreased tidal volume
- If a large abdominal mass is present, venous return from the heart can be compromised
- The normal lordotic curve of the back is lost, which can possibly exacerbate lower back pain

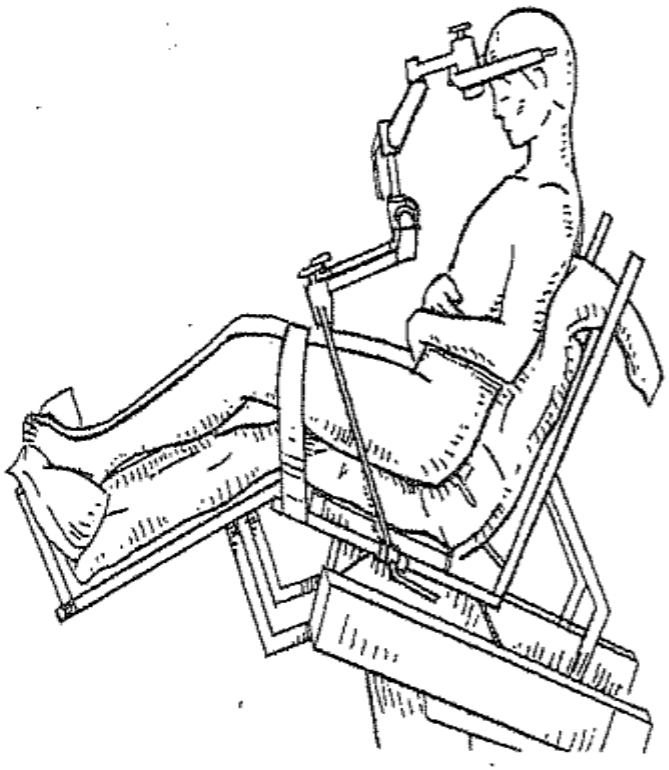
Reverse Trendelenburg

- The entire OR bed is tilted so the head is higher than the feet
- Used for head and neck procedures
- Facilitates exposure, aids in breathing and decreases blood supply to the area
- A padded footboard is used to prevent the patient from sliding toward the foot



Sitting Position

- The entire OR bed is tilted to 90 degrees with the head end downward (preventing the patient from sliding)
- Feet rest against a padded footboard
- Arms are crossed loosely over the abdomen and taped or placed on a pillow on the patient's lap
- A pillow is placed under the knees.
- For cranial procedures, the head is supported in a head rest and/or with sterile tongs
- This position can be used for shoulder or breast reconstruction procedures



Semi Sitting

- 60-85 degrees

Figure 44-47 ■ Low Fowler's (semi-Fowler's) position (supported). Note that arm support is omitted in this instance. The amount of support depends on the needs of the individual client.

Lithotomy

- With the patient in the supine position, the legs are raised and abducted to expose the perineal region
- The patient's buttocks are even with the lower back to prevent lumbosacral strain
- The arms are placed on padded arm boards, tucked at the sides, or placed across the abdomen
- The legs and feet are placed in stirrups that support the lower extremities
- Stirrups should be placed at an even height
- The legs are raised, positioned, and lowered slowly and simultaneously, with the permission of the anesthesia care provider
- The position must be symmetrical
- The perineum should be in line with the longitudinal axis of the OR bed
- The pelvis should be level
- The head and trunk should be in a straight line

PUT ON THE SCDs

SCDs PREVENT DVTs!!!

POSITION THE STIRRUPS ON THE O.R. BED

- For gyne surgeries, the patient is usually in lithotomy position
  - Their legs are raised and flexed in stirrups

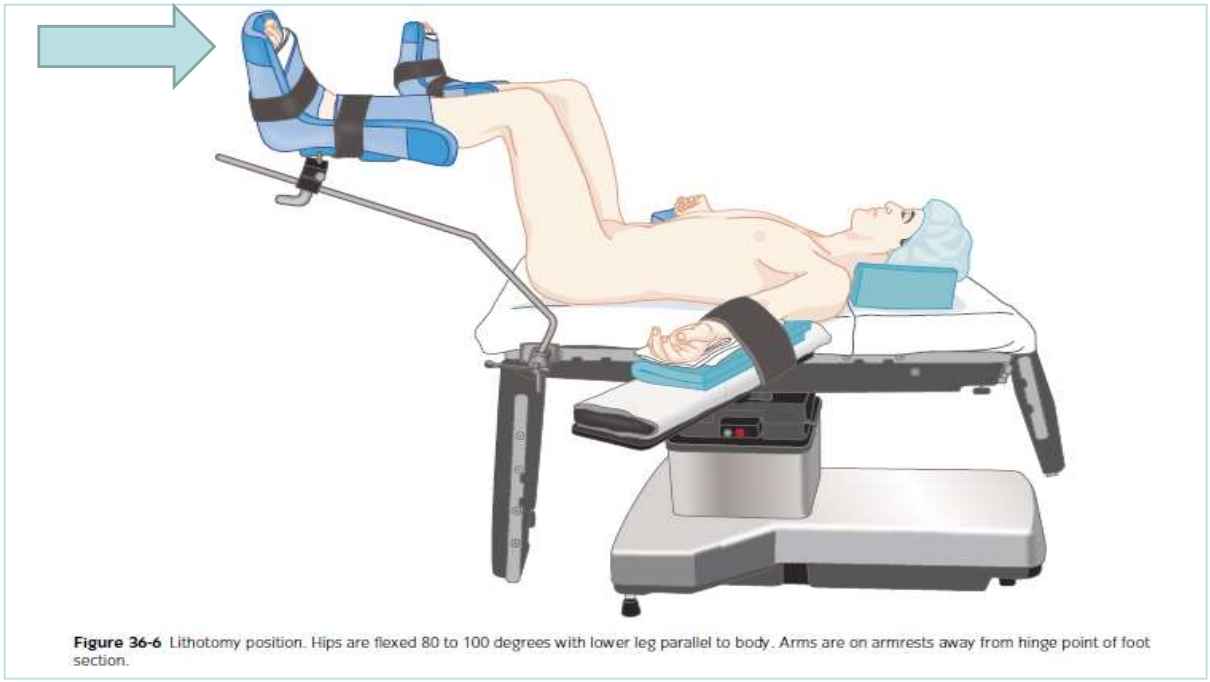


Figure 36-6 Lithotomy position. Hips are flexed 80 to 100 degrees with lower leg parallel to body. Arms are on armrests away from hinge point of foot section.

Lithotomy Concerns

- Particular attention needs to be given to the popliteal space behind the knee where the legs rest in the stirrups

Adverse effects: Lithotomy Position

- Common peroneal nerve (78% of all nerve injuries in lithotomy position)
  - Occurs when the lateral fibular head is compressed against the stirrups
- Femoral nerve injury
  - From exaggerated hip flexion or abduction

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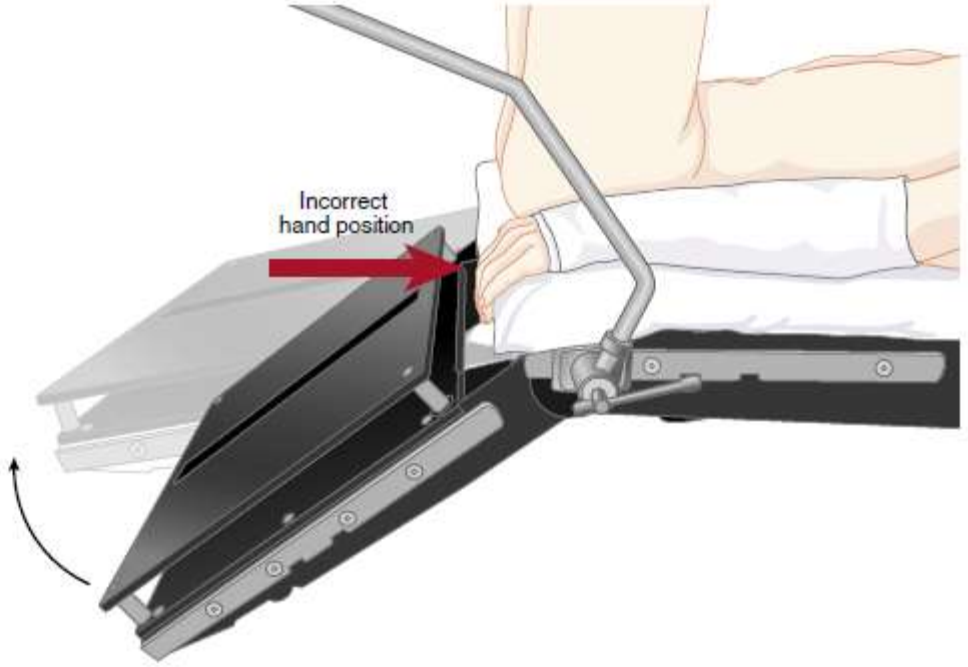

Figure 36-9 Improper position of arms in lithotomy position with fingers at risk for compression when the lower section of the bed is raised.

SMALL POINTS, BUT CRUCIAL!

Effects of Positioning - Obese Patients

- Supine:
  - Normal blood flow may be impeded due to compression of vena cava and aorta by abdominal contents
  - Impairs diaphragmatic movement and reduces lung capacity
- Trendelenburg:
  - Tolerated less well than supine
  - Added weight of abdominal contents on the diaphragm may lead to atelectasis and hypoxemia
- Prone:
  - Problematic
  - Requires additional support and monitoring of the patient and pressure on the abdomen
  - Ventilation may be markedly more difficult
- Lateral:
  - Well tolerated
  - Correct sizing and placement of axillary roll is important
  - Ensure that pendulous abdomen does not hang over side of OR bed
- Head-Up: (Reverse Trendelenburg/Semi-recumbent)
  - Most safe
  - Weight of abdominal contents unloaded from diaphragm
  - Use of well-padded footboard to prevent sliding

One last note…

Positioning problems can result in significant injuries and successful lawsuits.

Venous Air Embolism

- This life threatening condition may occur any time a surgical site is above the level of the heart.
- There are no valves in the cerebral venous circulation and the risk of venous air embolism is constant in the **sitting position** when the operative site evolves the posterior fossa or may occur in **spinal surgery** when prone! Remember this!
- Venous air embolism may be manifested as cardiac dysrhythmias, arterial oxygen desaturation, pulmonary hypertension or frank cardiac arrest.
- Actions to take if you suspect an air embolism is to ask the surgeons to flood the field with saline and to apply bone wax to boney edges. For further discussion refer to your neuro lecture.

Overview of Nerve injuries

- **Ulnar neuropathy remains the MOST frequent (28%) of all nerve injuries** followed by brachial plexus (20%).
- Etiology of peripheral nerve injuries remains largely unknown. Most of the nerve injuries to ulnar and brachial plexus occurred in patients with proper positioning and adequate padding.
- Ulnar neuropathy results in an **inability to abduct or oppose the fifth finger**, deminished sensation in the fourth and fifth fingers and eventual "**claw**" hand.

Ulnar Neuropathy

- Current thinking is that ulnar neuropathy is multifactorial and not always preventable despite routine use of arm boards and padding. Ulnar neuropathy is most common in older men, diabetes mellitus, vitamin deficiency, alcoholism, cigarette smoking and cancer.
- Prevention? Avoid excessive pressure on the postcondylar groove of the humerus, limit abduction of the arm to less than 90 degrees, keep the hand and forearm either supinated or in a neutral position with palms facing thigh.

Brachial Plexus Injury

- The brachial plexus is subject to injury due to stretching or compression as a result of its long superficial course in the axilla.
- Arm abduction greater than 90 degrees, lateral rotation of the head, asymmetric retraction of the sternum and direct trauma all may contribute to brachial plexus injury.
- Cardiac surgery and sternotomy is associated with a higher incidence of brachial plexus injury.
- Shoulder braces have historically been a culprit in brachial plexus injury leading to their rare use. The compression of proximal roots or lateral displacement of the braces can stretch the plexus when the shoulders are displaced.
- Use non sliding mattress instead of shoulder braces.

Lower Extremity Nerve injury

- Lithotomy position is associated with injury to common peroneal and sciatic nerves.
- The sciatic nerve may be stretched with external rotation of the leg or with hyperflexion of the hips and extension of the knees.
- The Saphenous nerve may be injured if the medial knee is compressed

Lower Extremity Nerve Injury

- The **common peroneal nerve** which is a branch of the sciatic may be injured with compression between the head of the fibula and the metal frame of “candy cane” stirrups when the patient is in the lithotomy position. This is the **Most common** nerve injury in lower extremities!
- Common peroneal nerve injury results in **Foot Drop!**

More nerve injury stuff

- Median nerve injury may be caused by “searching” for an IV in the anticubital fossa resulting in the inability to oppose thumb and the little finger.
- The postoperative neuropathy that must be referred to a neurologist immediately is any MOTOR deficit following surgery.

Thank you for your attention