American Society of Orthopedic Professionals

Orthopedic Lecture Series©

Bone/ Structures, Fracture Types and Skeletal Disorders/ Specialty Casts and Appliances/Surgical Procedures, Positioning and Devices

Lesson 12: Surgery

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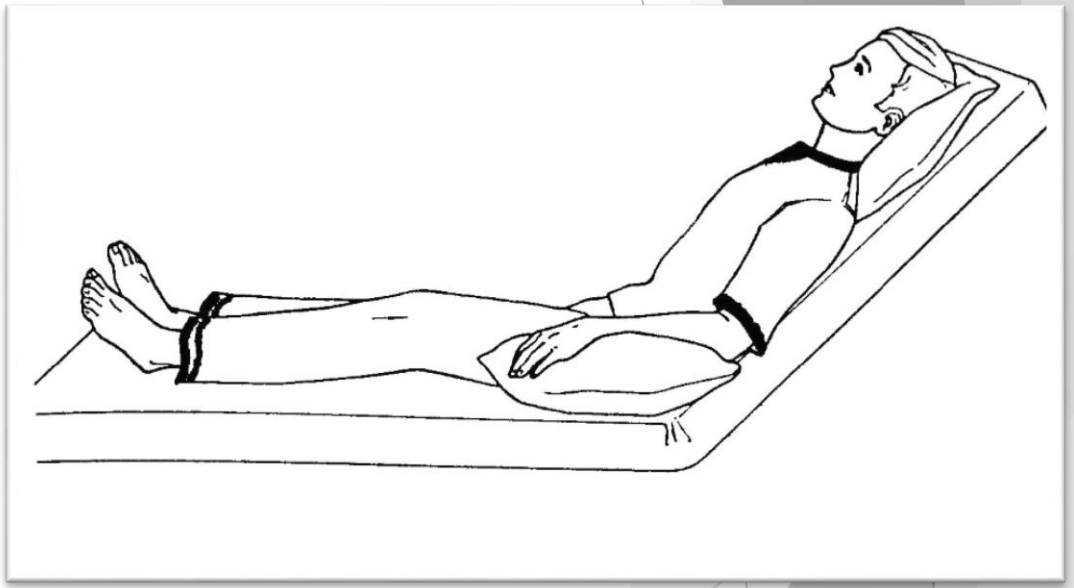
Supine Position

- The patient is positioned flat on the back, with the arms secured at the sides of the body, palms facing inward
- The legs are positioned straight out, so that the vertebrae are in a straight line with the hips
- A safety belt is positioned across the thighs approximately 2 inches above the knees
- If arm boards are used, these are positions so that the arm is at no more than a 90 degree angle to the table
  - This is to ensure that the shoulder is not hyperextended
- The elbows may be padded
- Pillows may be placed under the head, and the curve of the lumbar spine
- Bony sites of the body contact with the table should be padded
- A pillow, or padded footboards, may be used to support the feet so that they are not in plantar flexion for prolonged period of time

http://biology-forums.com/index.php?action=gallery;sa=view;id=8751

Fowler's Position

1. Fowler's position
   - A modified supine position.
   - It provides better access to certain surgical sites than the supine position
2. This position decreases blood circulation to the upper body, and encourages
venous drainage.
   - An air embolism is a potential hazard of the position
3. Fowler's position allows easy access to the breast, head and neck, and shoulder
4. Before being placed in Fowler's position, the patient is placed in the supine position
   - A padded foot rest is attached to the operating table
   - The arms are secured across the stomach on a pillow, or arm boards
   - The hips are placed at the bend of the table
   - The lower section of the table is lowered
   - The upper section of the table is raised so that it is at a 45 degree angle
   - The whole table is then tilted downward to the desired level
     - Pressure points should be protected with padding



http://www.brooksidepress.org/Products/Nursing_Care_of_the_Surgical_Patient/images/md0915_img_12.jpg

Prone Position

- The patient is anesthetized before being placed on the operating table in the prone position.
- The body regions which can be reached with the patient in this position include the posterior lower limb, the dorsal surface of the body, the spine, and the posterior cranium.
- Pads are applied as needed to the bony prominences of the knees ankles, and elbows.
- Chest rolls are positioned.
- The head is either turned to the side to rest on a pillow, or positioned face down to rest on a special head rest.
- The arms are secured alone the length of the body with the palms facing upward, or toward the body.
- Alternatively, the arms may be positioned on arm boards so that the palms face downward.
- A pillow is positioned under the patient's ankles.
- The safety strap is applied on the thighs, above the knees.

http://biology-forums.com/index.php?action=gallery;sa=view;id=8752

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Beach Chair Positioning for Shoulder Surgery

- The patient is place on the table, and after induction of anesthesia the back of the chair is raised to a slightly reclined sitting position.
- The patient's lower back must be positioned against the chair to avoid damage.
- The neck and head should be put in a neutral position, and a towel placed across the forehead.
- The head should then be fixed to the head rest of the table by taping across the towel.
  - This will prevent damage to the skin and eyebrows
- The non-operative arm should be positioned on a padded arm board so that the bony prominences are protected.
- The medial epicondylar region is of particular concern due to possible injury to the ulnar nerve.
- Posteriorly, the draping should hug the medial border of the scapula.
- Anteriorly, draping must be medial to the coracoid pr
  - The top drape should hug the mid clavicle

http://www.shoulderdoc.co.uk/article/1011

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Lateral Position

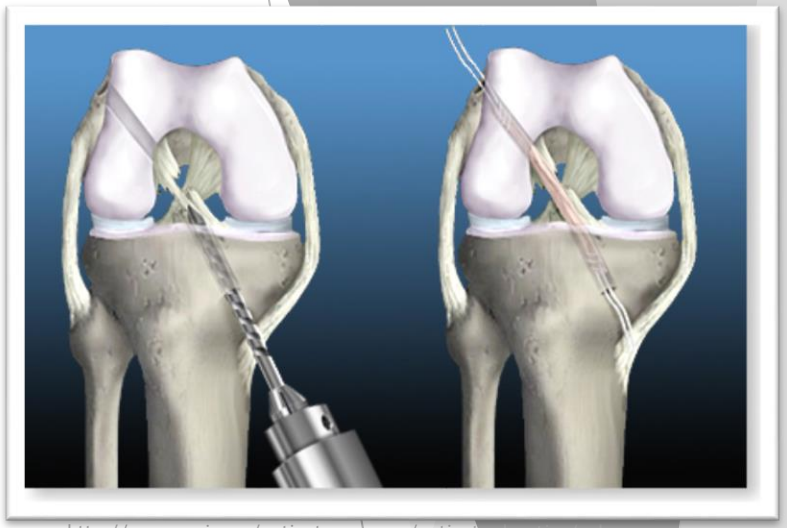
1. Lateral position
   - Also called the lateral recumbent position, and the lateral decubitus position
   - Patient is positioned on one side, with opposite side of the body facing upward
2. The areas of the body that can be accessed include the retroperitoneal space, the hip, and the hemithorax.
3. Before being placed in the lateral position, the patient is placed in the supine position.
   - Padding is used on the ankles, knees, and elbows
   - The patient is then rolled onto the side in question
   - The head is stabilized with a pillow
   - The lower leg is flexed, and two pillows are positioned between the legs
   - The upper leg is left straight
   - A safety strap is positioned over the hip
   - The shoulders and spine are put into alignment
   - The arms are placed on double arm boards with the palm of the lower arm facing upward, and the palm of the upper arm facing downward

http://www.pitt.edu/~position/Lateral/lateral_basic.htm

http://www.jaypeejournals.com/eJournals/ShowText.aspx?ID=547&Type=FREE&TYP=TOP&IN=_eJournals/images/JPLOGO.gif&IID=53&isPDF=NO

Anterior Cruciate Ligament (ACL) Reconstruction

1. Proper positioning is extremely important for achieving a successful outcome in ACL reconstruction surgery.
2. The tourniquet must be placed as proximally as possible on the thigh of the affected leg.
   - A leg holder, or lateral post, attached to the bed by brackets on the side rails is used to hold the leg in position for surgery
3. Proper positioning places the patient's knee at the break in the table.
   - This permits the extremity in question to be flexed to at least 90 degrees for surgery
   - The other leg should be well padded to protect it from injury
   - The leg is draped after prepping
   - The thigh proximal to the knee must be exposed to allow for bone tunnel and graft placement
   - Improper draping and positioning may lead to a lack of sufficient room for these
     - This may result in the guide pin exiting the thigh and entering a non-sterile area contaminating the field



http://www.scoi.com/patient-resources/patient-education/acl-reconstruction

http://www.healio.com/orthopedics/journals/ortho/2012-8-35-8/%7B83b014ca-7b04-43a4-a052-16ff155662e4%7D/femoral-tunnel-drilling-from-the-anteromedial-portal-using-the-figure-4-position-in-acl-reconstruction

Fracture Table for Hip and Femur Fractures

- Fractures of the hip and femur often displace as a result of tension from the thigh and groin muscles attached to the bone
- Without direct muscular opposition, the bone fragments get pulled in opposite directions.
- Fractures of the hip and thigh require surgical treatment using open reduction internal fixation, or intra-medullary rodding.
- A standard operating table is not appropriate for these procedures because these techniques require maintained traction.
- The fracture table allows the necessary traction to be maintained.
  - The fracture table includes a boot which is fixed to a mobile post by a bracket
    - The foot on the affected leg is placed in this boot
  - The bracket has a winch that ensures the desired tension is maintained on the muscles
  - The non-operative leg is placed in a leg holder to keep the hip flexed, and away from the patients midline to allow imaging studies of the injured leg

http://amhejournal.com/journal/?page_id=821

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Leg Positioner for Hip Replacement/ Hemi-Arthroplasty Surgery

- The lateral hip positioner, used in hip replacement surgery and bipolar hemi-arthroplasty. allows the patient to be firmly secured during the procedure, and provides a stable platform on which to operate.
- The patient is turned so that he/ she is lying on the non-operative side.
  - The posterior positioner is then put into use
  - This apparatus consists of a pad that locks into place with a bracket that attaches to the table
  - The pad should be positioned so that it lies in the center of the patient's lumbar spine at the L4-L5 level
  - The anterior pad, also affixed to the table via brackets, is then pressed closely to the anterior superior iliac spine
  - The positioning must allow the operative leg to be flexed to 90 degrees for the femoral stem placement
  - All bony prominences should be well padded to avoid nerve injuries

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Info Surgeons Need & CPM

Information Surgeon Should Know Regarding a Fracture

- The surgeon needs to know the location of the fracture.
  - This covers what bone is broken and where on the bone the fracture is located
  - Next point to consider is whether the fracture is open or closed
  - The third piece of information needed by the surgeon is the type of fracture present
- After describing the location and severity of the fracture, its anatomical alignment should be described
  - The degree angulation will be a particular concern to the surgeon
  - The final step in describing a fracture involves the neurovascular status of the limb

Continuous Passive Range-of-Motion

- Continuous Passive Motion (CPM)
  - Uses a machine to start moving the joint gradually
    - It can help decrease pain and swelling of the surgical site, improve joint mobility, decrease stiffness of soft tissue, inhibit the formation of adhesions, and prevent muscle wasting

www.kneereplacement-stickclub.blogspot.com

Radiography

1. Radiography
   - This technology is particularly useful in the surgical repair and reduction of fractures.
   - Most commonly used:
     - Standard x-ray
     - Fluoroscopy
2. Fluoroscopy
   - Allows surgeon to view the site of the injury as the surgical procedure progresses
   - Allows the surgeon to confirm that the procedures used in the surgery have been performed correctly, and successfully

www.nmu.edu

http://centenoschultz.com/services/c-arm-fluoroscopy/

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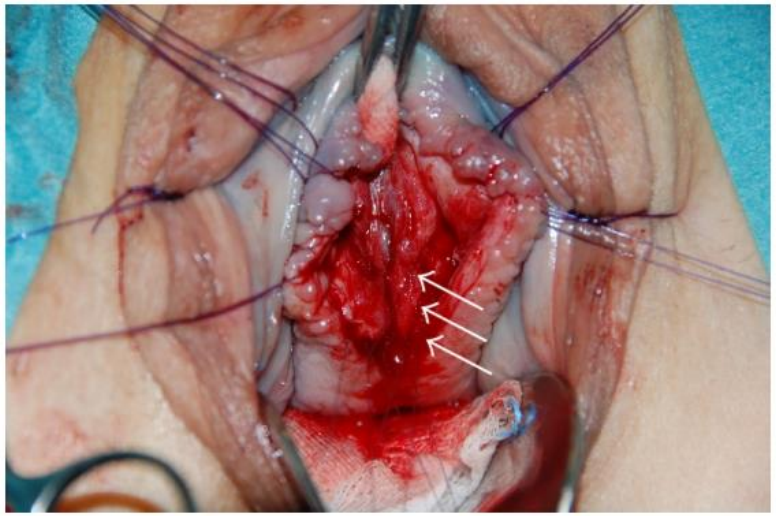
Sutures & Cutting Internal

- Used (by orthopedic surgeon) to hold bone, skin, muscles, blood vessels, ligaments, and tendon together
- 2 Different Types of Sutures
  - Absorbable sutures
    - Break down in the body over time
    - Do not require removal
    - Used internally
    - Generally used to close periosteum
  - Non-absorbable
    - Do not breakdown
    - Must be manually removed
    - Used externally
    - Generally used to repair ligaments, tendons, and bone



http://www.hindawi.com/journals/criu/2014/176073/fig9/

www.gettyimages.lu

Cutting Internal

- The first assistant in surgery cuts the suture for the surgeon after tying.
- The suture should be cut several millimeters above the knot, leaving a tail
- The suture should not be cut too close to the knot, because this could lead to the knot coming untied

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Anesthesia

1. General anesthesia
   - Produces a change in level of consciousness, and level of perception
   - It is used for extensive procedures, or for procedures that need a higher level of anesthesia than regional anesthesia can provide
   - The agents used to produce general anesthesia are administered by injection, instillation, or inhalation
2. Local Anesthesia
   - Injection of an agent that blocks nerve conduction into the tissues around a peripheral nerve
   - This type of anesthesia blocks pain in a specific area of the body
   - It does not affect alertness
   - Used for skin biopsies, or stiches in the skin
   - Types of local anesthesia
     - Procaine
     - Lidocaine
     - Tetracaine
3. Topical anesthesia
   - Blocks nerve conduction after being placed directly on a tissue layer
   - Achieved by means of cryoanesthesia, or a pharmaceutical agent
   - Cryonanesthesia
     - Produced by ice, or cryoanesthesia machine, or a localized freeze spray

https://www.healthtap.com/topics/general-anesthesia

Conscious Sedation & Regional Anesthesia

1. Conscious sedation
   - Also called intravenous sedation
   - Used to induce relaxation, and sleepiness
   - Protective reflexes, such as swallowing, or coughing are unaffected

2. Regional anesthesia
   - Produced by the administration of an anesthetic along a major nerve tract
   - Used to block the sensation of pain in a region of the body
   - Does not cause loss of consciousness, or loss of alertness
   - There are different types of regional anesthesia, including spinal block, and epidural block

http://www.hotfrog.com/Companies/Conscious-Sedation-Consulting/Dental-Sedation-Permit-Renewals-Sedation-Team-Monitoring-Course-1368638

http://apt.med.ubc.ca/hospital-sites/vancouver-general-hospital/subspecialties-divisions/regional-anesthesia/

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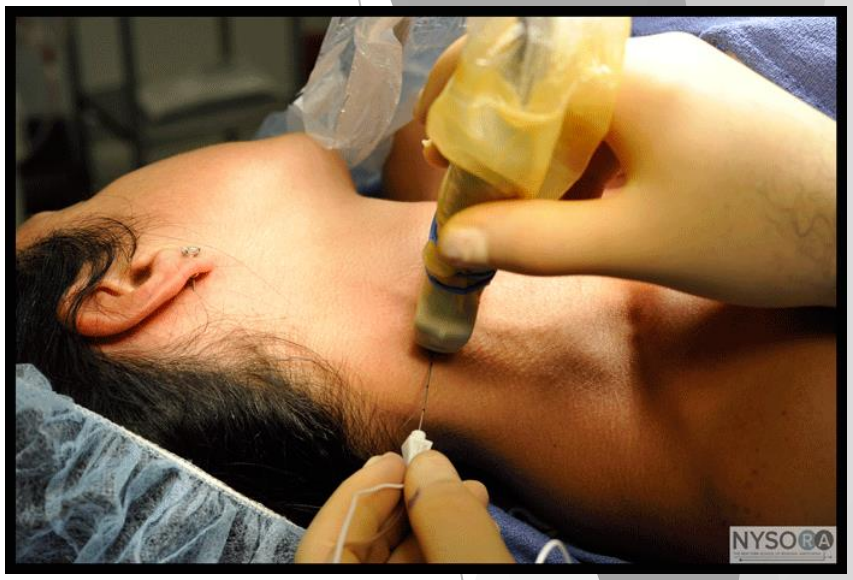
Nerve Plexus & Spinal Blocks

1. Nerve Plexus Block
   - Involves the injection of an anesthetic agent into the site of a major plexus
   - Examples of nerve plexus blocks are injections into the brachial plexus, or the cervical plexus
   - This type of nerve block has surgical, diagnostic, and therapeutic uses
   - It can also be used to determine prognosis of a permanent intervention

2. Spinal block
   - Also called an intrathecal block
   - It involves an injection of an anesthetic agent into the cerebral spinal fluid surrounding the spinal cord
   - A spinal block causes loss of sensation to the body below the diaphragm
   - The onset of the effect of a spinal block is quick, occurring in 3-10 minutes
     - The duration of this form of anesthesia depends upon the anesthetic used but is generally 1-1 1/2 hours



http://www.nysora.com/techniques/ultrasound-guided-techniques/upper-extremity/3013-ultrasound-guided-superficial-cervical-plexus-block.html

http://bookbing.org/total-spinal-block-facts-images-powerpoint-presentations/spinal-anasthetic-injected/

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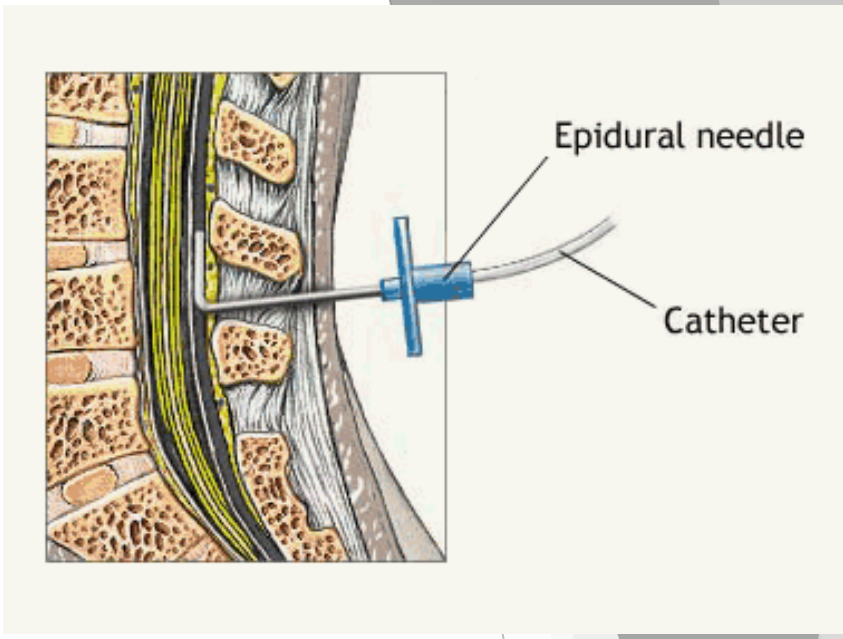
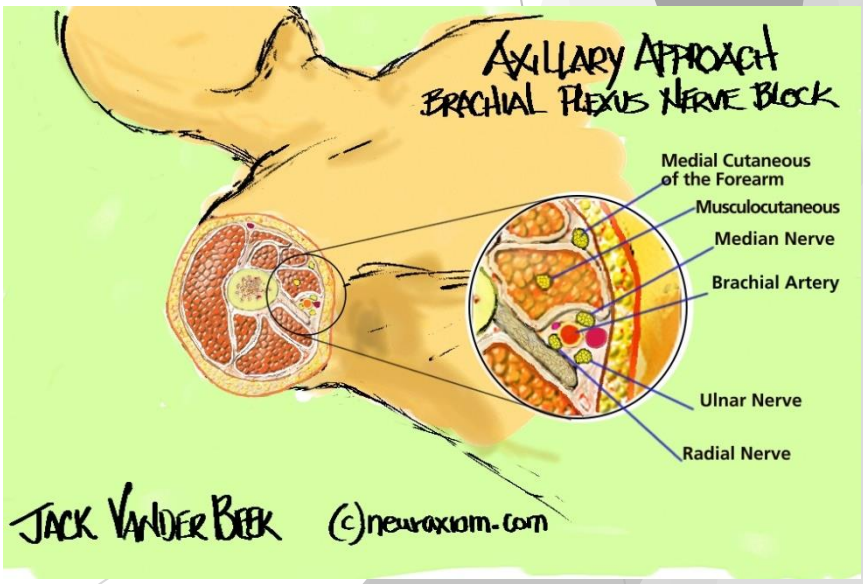
Epidural & Axillary Blocks

1. Epidural Block
   - Involves the injection of an anesthetic agent into the epidural space between the vertebrae
   - The anesthetic is injected in such a manner as to spread out and cover all the nerve roots in the area of injection
2. Axillary Block
   - Involves the injection of an anesthetic agent into the nerve surrounding the axillary artery
   - It is useful surgeries involving the hand and forearm
   - The effects of the anesthetic will last 4-18 hours depending upon the medication, and the amount of medication, used



https://theadequatemother.wordpress.com/2012/07/09/when-a-good-anesthetic-goes-bad-anesthetic-failure-during-c-section/



http://http://www.neuraxiom.com/html/axillary_bp.php

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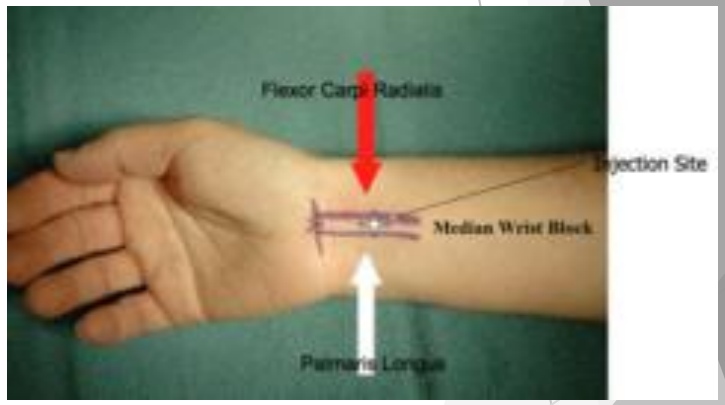
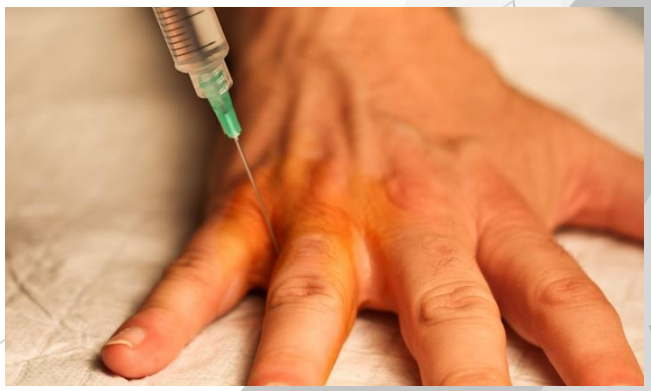
Elbow, Wrist, Digital, & Transthecal Blocks

Elbow Blocks, Wrist Blocks, Digital Blocks, and Transthecal Blocks

- Methods of regional anesthesia
- All involve the injection of anesthetic agents

1. Elbow block
   - Rarely used method of anesthesia for procedures on the upper limbs
2. Wrist block
   - Common form of anesthesia for procedures on the hand
3. Digital block (*not pictured*)
   - Most common method of anesthesia used for procedures on the hand
4. Transthecal block
   - Used to anesthetize the digits





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Surgical Drapes

Surgical drapes

- Used to protect the surgical site from contamination that could cause an infection
  - Drape material should not contain lint, as this can provide airborne particles with a way into the wound
  - Drapes should be fluid resistant to stop strike-through contamination of the surgical wound
  - Drapes must be antistatic to ensure sparking does not occur
- The color of drapes must not reflect the operating lights, as this could interfere with vision

www.tradeindia.com

www.wayson.com

Specialty Dressings

A. **Bolster dressing** - One that is sutured into place

B. **Wet-to-dry dressing** - Placed on the site wet, and allowed to dry

C. **Wet-to-wet dressing** - Involves the application of a wet dressing which is removed before it is dry

D. **Thyroid collar** - Neck wrap applied to hold the dressing over a thyroid incision in place

E. **Ostomy bag** - Attached over an intestinal stoma to catch secretions

F. **Drain dressing** - It is shaped to accommodate the drain in a wound

8. **Tracheotomy dressing** - Positioned around a tracheotomy tube

G. **Eye** pad - A piece of oval-shaped gauze positioned over the eye to hold medication and ensure that eye stays closed

H. **Eye shield** - An inflexible oval shield positioned over the eye to protect it from pressure

I. **Perineal pad** - Used to absorb vaginal or perineal fluids

Double Gloving

http://ehealth.eletsonline.com/2014/01/j-k-ansell-strengthens-medical-gloves-portfolio-in-india/

Double-gloving

- Provides extra protection from injury and disease
- As the sharp object passes through the glove material, biological material (bioburden) is removed
- Fat breaks down latex, allowing passage of contaminants
- Latex gloves contain spaces, they may become saturated with blood and other bodily fluids
  - This can create passageways through the gloves which allow the fluids to reach the skin of the wearer

http://www.outpatientsurgery.net/surgical-facility-administration/personal-safety/busting-5-double-gloving-myths--02-15

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