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A regional block is a specific anesthetic technique that inhibits nerve transmission to avoid or relieve pain. This activity reviews the indications, contraindications, complications, and other key elements related to the essential points needed by members of an interprofessional team managing the care of patients undergoing surgical procedures. Objectives: Review the indications for using regional blocks. Describe the equipment, personnel, preparation, and technique in regards to regional blocks. Outline the potential complications and their clinical significance when using regional blocks. Summarize interprofessional team strategies for improving care coordination and communication to advance regional block performance and improve outcomes. Access free multiple choice questions on this topic. Regional anesthesia consists of infiltrating a peripheral nerve with an anesthetic agent and blocking transmission to avoid or relieve pain. It differs from general anesthesia as it does not affect the patient's consciousness level to relieve pain. There are several advantages over general anesthesia, such as avoidance of airway manipulation, reduced doses, side effects of systemic drugs, faster recovery time, and significantly lower pain levels after surgery.[1] Postprocedural recovery time has shown to be reduced with markedly lower pain levels after surgery and earlier participation in physical therapy. Regional anesthesia can be used in conjunction with general anesthesia, postprocedural, and often for many acute and chronic pain conditions. Anatomy and landmarks depend on the different types of blocks being performed. For neuraxial anesthesia, medication (local anesthetic, opioids, etc.) is injected near the central nervous system's nerves. This is performed with techniques by directly injecting into the spinal cord's epidural space or subarachnoid space. The most common neuraxial techniques are epidural, spinal, and combined spinal-epidural. For spinal anesthesia, a needle is placed between the lumbar vertebrae, usually at the level of approximately L4-L5 (conus medularis ends at approximately L1/L2 in adults); the needle is then advanced through the supraspinal ligament, interspinal ligament, and ligamentum flavum until it reaches the subarachnoid space where the medication (local anesthetic with/without opioid) is injected. For epidural anesthesia, a needle is placed between vertebrae (may be cervical, thoracic, or lumbar) passing through the spinal ligaments to reach the epidural space just outside the subarachnoid space. For peripheral nerve blocks, the local anesthetic agent is injected near the nerve and diffuses along with the nerve's mantle layer to the core. Anesthesia is achieved slowly after infiltration in a proximal to distal direction on the nerve distribution to the injection point. A type of intravenous regional anesthesia, also called Bier block, is also used to inject an intravenous local anesthetic medication at the most distal venous portion of a lower or upper extremity. The anesthetized limb has a tourniquet to avoid the spread of the anesthetic agent to the systemic circulation. With the advancement in regional techniques and ultrasound-guided blocks, intravenous regional anesthesia is rarely used. The use of regional anesthesia has widely been implemented among anesthesiologists and pain providers. It requires training and in-depth knowledge of anatomy. Whether to perform a regional block depends on the type of procedure, patient's characteristics, and anesthesiologist's preferences. Some of the indications are to avoid side effects of general anesthetics (like respiratory depression), postoperative pain control, and to treat certain chronic pain conditions.[2] The main types of regional anesthesia are Neuraxial anesthesia (spinal anesthesia and epidural anesthesia) Peripheral nerve blocks Intravenous regional anesthesia Absolute contraindications to the use of regional anesthesia include: The patient's refusal Allergy to local anesthetics Relative contraindications are: Active infection at the site of the injection Patients with coagulopathies Preexisting neurologic deficit Inability to cooperate [2] Equipment needed depends on the type of technique utilized. A proper injecting needle will be required for each block. During a regional block placement, patients should be oxygenated and monitored with pulse oximetry, electrocardiography, and blood pressure monitoring. [3] A regional cart containing emergency medications like lipid emulsion and ACLS medications should be available to treat regional blocks related complications. For epidural procedures, a Tuohy needle and a loss of resistance syringe are required to locate the epidural space. Spinal needles have been refined over the years, with pencil-point needles having shown to reduce post-dural puncture headache incidence. There are numerous premade neuraxial kits available containing the required equipment. [3] When performing a peripheral nerve block, the goal is to deposit the local anesthetic close to the nerve. The nerve may be located by anatomic landmarks in conjunction with one or more nerve identification techniques. A nerve stimulator is a portable device that delivers an adjustable electrical current to a needle's tip. An electrical pulse is transmitted to stimulate the nerve, and if the tip of the needle is close enough, a specific muscular group response can be evaluated. Ultrasound guidance permits direct visualization of the needle location relative to the target nerve and other known structures. Portable ultrasound machines are available, with high and low-frequency probes, to identify both superficial and deep structures. Both devices can be used together to improve the success rate of the block, decrease the onset of the block, reduce the volume of local anesthetic required, and reduce the risk of vascular puncture. Drugs used are local anesthetics and adjuvants, are chosen according to the onset and duration of action, degree of motor blockade, and toxicity. Local anesthetics with a shorter duration of action and quicker onset include lidocaine and mepivacaine, and the longer-acting ones are bupivacaine and ropivacaine. More than one can be combined to decrease onset time while providing a longer duration of analgesia. A complete checklist assessment should be performed before preparing the patients. Such checklists have shown to reduce medical errors, and may include patient's name and date of birth, planned surgical procedure, completion of consents, patient allergies, coagulation status, and the surgical site marked by the surgeon. Before placing a block, the patient should be monitored with pulse oximetry, electrocardiography, and blood pressure monitoring, as described in the American Society of Anesthesiologists' standards for basic anesthetic monitoring. An IV access should be secured to administer rescue medication in an emergency or sedation if needed, and supplemental oxygen therapy should be started. As an anesthetic procedure, the standard and emergency anesthesia equipment and medications should be prepared, including airway equipment. Aseptic skin preparation is needed as a strict aseptic technique must be used for all the blocks, including sterile gloves, masks, and surgical drapes. Neuraxial Anesthesia (Spinal/Epidural/Combined) Neuraxial blocks consist of placing a needle through the back to inject a specific drug into the subarachnoid space for spinal anesthesia or in epidural space for epidural anesthesia. Both techniques can be applied together. [4] Epidural Anesthesia Epidural anesthesia is administered by introducing a needle between the lumbar, thoracic, or cervical vertebrae and injecting the anesthetic agents into the epidural space, directly or through a catheter. The sitting and lateral decubitus positions are commonly used. The epidural needle can be inserted using a midline or a paramedian approach; the latter is used more frequently for thoracic insertions. Once a spinal level is chosen, the epidural needle is placed in the interspace between two spinous processes and advanced through skin, soft tissue, and spinal ligaments until the needle's tip enters the epidural space, the loss of resistance can be recognized. The anesthetic solution may be injected directly through the epidural needle into the epidural space, but more commonly, a catheter is inserted into space, and an anesthetic solution is administered. A transparent, occlusive, sterile dressing should be placed over the catheter insertion site, and the catheter should be marked and secured to the patient body. Spinal Anesthesia To perform a spinal block, a local anesthetic is injected into cerebrospinal fluid in the lumbar spine to numb nerves that exit the spinal cord. This is achieved by placing a needle between the lumbar vertebrae and through the dura to inject the medication. As the spinal cord usually ends between the first and second lumbar vertebral bodies, spinal anesthesia should be performed no higher than that level to avoid damage to the cord. Spinal anesthesia is administered as a single injection, whereas when performing an epidural block, a catheter is usually placed to use a continuous infusion or subsequent boluses. The most frequent use is for surgeries involving the lower abdominal, pelvis, and lower extremities. Peripheral Nerve Blocks Peripheral nerve blocks are particularly used for surgical procedures involving the upper or lower extremities and nonsurgical analgesia. Ultrasound guidance and nerve stimulator techniques are typically used to locate the anatomic structures and define the placement of the needle or catheter. Different techniques are described depending on the specific body area that needs to be numbed and if the local anesthetic is placed near a nerve or group of nerves, or spread between muscle planes. The commonly used blocks are: [5][6] Upper extremity blocks (interscalene, suprascapular, infraclavicular, axillary, intercostobrachial, wrist, and digital nerve blocks.) Lower extremity blocks (lumbar plexus (psoas compartment), femoral nerve block, fascia iliaca, obturator nerve, popliteal, saphenous, ankle, and digital nerve block.) Scalp block Cervical plexus block Thoracic nerve blocks (intercostal, paravertebral, interfascial plane blocks) Abdominal nerve blocks (transversus abdominis plane, subcostal, rectus, ilioinguinal and iliohypogastric, transversalis fascia plane, and quadratus lumborum block) Pudendal and paracervical blocks Please refer to the specific chapter for further information on peripheral nerve blocks. Intravenous Regional Anesthesia Intravenous regional anesthesia or Bier block is a technique used for short procedures on the hand and forearm. It consists of replacing venous blood of the arm with local anesthetics. To perform a Bier block, an intravenous catheter is placed in the operative hand. Afterward, the arm is exsanguinated by lifting and allowing passive exsanguination, and then wrapping with an Esmarch bandage. A double pneumatic tourniquet is then placed and insufflated (first the distal, followed by the proximal one) 100 mmHg above the patient's systolic blood pressure. After checking the correct placement of the tourniquets, the Esmarch bandage can be removed once the distal cuff is released. Typically a short-acting local anesthetic is given through the IV (usually 0.5% lidocaine or prilocaine if available), over 3 minutes, and waiting at least 30 minutes before the tourniquet is deflated to avoid the potential complication of local anesthetic toxicity. Intravenous regional anesthesia is not usually performed for lower limb surgery because larger amounts of local anesthetics would be required. Complications of this technique involve major local anesthetic toxicity (usually after deflation or tourniquet malfunction, where high systemic concentration may occur), dizziness, facial numbness, blurred vision, tinnitus, nerve damage, thrombophlebitis, and compartment syndrome. The benefit of the Bier block is that no special equipment is required, but in turn, no residual analgesia is provided; therefore, postoperative pain would need to be treated by systemic drugs or a surgical block. [7] The safe practice of neuraxial anesthesia requires a profound knowledge of potential complications, incidence, and risk factors. Each technique is associated with specific complications. The main complications seen in regional anesthesia are block failure, neural injury, and local anesthetic toxicity. Permanent neurological injury in central neural blockades is rare, but transient injuries may occur more frequently (0.01 to 0.8%). Local anesthetics toxicity is rare (0.01%) and is more frequently associated with a regional nerve block. Although not frequent, allergic reactions to local anesthetics may occur. [8][9] Postdural puncture headache is a common (



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