INTRAVENOUS REGIONAL ANESTHESIA (BIERS BLOCK)

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Objectives:

Definition
Indications & contraindications
Procedure
Complications (Prevention & Treatment)
Was first introduced by the German surgeon August Bier in 1908, but became popular in the 1960s when it was reintroduced by Holmes.

A Bier block essentially consists of injecting local anesthetic solutions into the venous system of an extremity that has been exsanguinated by compression or gravity and that has been isolated by means of a tourniquet from the central circulation.
Indications:

- Surgical procedures involving the **arm below the elbow**.
- Surgical procedures involving the **leg below the knee**.
- Surgical procedures that will be completed within **40-60 minutes**.

Examples:

- Reduction of fractures and dislocations, repair of major lacerations, removal of foreign bodies, debridement of burns, carpal tunnel surgery or tendon repair.
Contraindications

- Patient refusal.
- Allergy to the anaesthetic agent
- Severe hypertension & peripheral vascular disease
- Inability to locate peripheral veins
- Sickle cell disease
- Local skin infection
- Raynaud's disease
- Open and comminuted fracture
Advantages:

- Easy to administer
- Low incidence of block failure
- Safe technique
- Rapid onset and recovery
- Muscle relaxation
Equipments:

Double cuff tourniquet
Intravenous catheter
Esmarch bandage
Local anaesthetic solution.
Functioning resuscitation equipment and drugs.
Pneumatic tourniquets
**Procedure**

1- An indwelling plastic catheter is inserted in the dorsum of the hand or foot.

2- A double-pneumatic tourniquet is placed on the proximal cuff high in the upper arm or thigh.

3- The extremity is elevated and exsanguinated by tightly wrapping an Esmarch elastic bandage from a distal to proximal direction.

4- Inflate the proximal cuff (50–100 mm Hg above the systolic arterial BP).

5- Remove the Esmarch bandage and inject 0.5% lidocaine (25 mL for a forearm or ankle, 50 mL for an arm or below the knee, and 100 mL for a thigh tourniquet) injected over 2 to 3 min through the catheter, which is subsequently removed. Anesthesia start in 5-10 min and can start the surgery.

6- About 25–30 minutes after the onset of anesthesia or when a patient complains of tourniquet pain, the distal cuff is inflated and the proximal cuff is deflated to minimize the development of tourniquet pain.
**INTRAVENOUS REGIONAL ANESTHESIA**

**1.** Place an IV catheter or butterfly needle as close to the pathologic site as possible. The site should be at least 10 cm distal to the tourniquet. A dorsal hand vein is ideal.

**2.** Ekpuncture the extremity by elevating and wrapping it in a distal-to-proximal fashion. Here, an Esmarch bandage is being used.

**3.** Apply the tourniquet to the patient’s arm.

**4.** Inflate the tourniquet to 250 mm Hg or 100 mm Hg above systolic pressure. In the leg, inflate the cuff to 300 mm Hg or twice the systolic pressure measured in the arm.

**5.** Place the patient’s arm by his side and remove the Esmarch bandage. The tourniquet remains inflated.

**6.** Slowly inject the 0.5% lidocaine solution into the infusion catheter at the calculated dose. See text for details and dosing information.

**7.** Remove the infusing needle/catheter, and tightly tape the puncture site to prevent extravasation of the anesthetic agent. Perform the procedure, including postreduction films and casting.

**8.** Once the procedure is complete, deflate the tourniquet in a cycling fashion (deflate for 5 seconds, reflate for 1 to 2 minutes) 2 or 3 times. Then remove the tourniquet.
Complications may be classified either as drug or equipment.

Drug related:
Lidocaine: excessive plasma concentrations of lidocaine, result in peripheral vasodilation and diminished cardiac contractility, usually seen clinically as hypotension.
Tx: Consider lipid emulsion therapy
Prevention: - Ensure appropriate drug selection
- Minimize Drug leakage
Lidocaine becomes tissue bound in 30min, the cuff should not be deflated before 30mins to prevent systematic toxicity.
prilocaine: is metabolized to orthotoluidine, an oxidizing compound capable of converting hemoglobin to methemoglobin which occurs about 4 to 8 hours after its administration.

Tx: methylene blue

**Signs suggestive of toxicity:**
- perioral paraesthesia (lips, tongue, nose)
- hypotension
  - cyanosis and dyspnea
- dizziness
Device related:

1- Tourniquet pain due to direct pressure that applied on nerves.
Prevention:
Use double cuff tourniquet.

2- Compartment syndrome may occur rarely following IVRA, may be due both to the large volume of local anesthetic injected and to inadequate or incomplete exsanguination of the limb prior to performing the block.
Tx: Fasciotomy

3- Nerve injury
It is very rare, may occur from direct pressure on the nerves which subsequently exhibit histologic changes resembling crush injuries.