

SURGICAL SERVICES DIRECTORATE
DEPARTMENT OF TRAUMA AND ORTHOPAEDICS

**Guidelines for Manipulation of Wrist Fractures under Bier's Block
(Intravenous Regional Anaesthesia)**

Ref No: CG-L/2024/010 Ver5.

Aim

These guidelines have been developed to help medical and nursing staff perform manipulation of wrist fractures under Bier's block anaesthesia safely.

Indications

Procedures requiring anaesthesia performed below the elbow that can be completed within 60 minutes.

Manipulation of distal radius fractures should be undertaken using regional anaesthesia, as opposed to local haematoma block (BOA, 2017). This provides better pain relief, which leads to better fracture reduction and lower risk of redisplacement.

Contra-indications

Bier's block is not suitable for patients in whom a tourniquet cannot be safely applied to the upper arm e.g.

- patients who are obese
- Homozygous Sickle Cell Disease
- Peripheral Vascular Disease
- Associated upper limb fractures (eg. Humerus, elbow)
- Where venous access cannot be obtained in both arms
- Hypertension > 200mmHg systolic
- Infection in the limb (RCEM, 2017)

Equipment

1. Tourniquet
2. Sphygmomanometer
3. 2 x 20 ml syringes
4. 1 x 5ml syringe
5. Butterfly needle (size 19/21)
6. Venflons (1 pink, 1 green)
7. Tegaderm / tape to secure IV needle

8. 20 ml 1% Prilocaine } mix to form 40ml 0.5 % Prilocaine
9. 20 ml Normal Saline }

10. 5 ml Normal Saline (flush)
11. Stockinette, velband and Plaster of Paris
12. Sling
13. Instruction leaflet
14. Resuscitation trolley / Oxygen

Guidelines for Manipulation of Wrist Fractures under Bier's Block

Two practitioners, one of whom is credentialed by the department to perform Bier's block, should be present for the entire procedure (RCEM, 2017). Oxygen and a resuscitation trolley should be close at hand.

Use the checklist to ensure that each step is correctly performed and recorded.

1. Explain procedure to patient and written consent obtained by doctor.
2. Inform X-ray that Bier's block procedure is being undertaken.
3. Take patient's blood pressure and record in the notes.
4. Doctor to set up and check tourniquet and cylinder.
5. IV access obtained in both arms.
6. Velband and tourniquet to be applied to patient's upper arm.
7. The arm should then be elevated for 2 minutes or formally exsanguinated with a crepe bandage.
8. Proximal cuff to be inflated to 100mmHg above systolic blood pressure and no higher than 300mmHg. Cuff checked by doctor and record time of inflation.
9. Check radial pulse is absent once cuff is inflated.
10. Recommended dose of IV Prilocaine is 3mg/kg (RCEM, 2017). Intravenous administration of 30-40ml 0.5% Prilocaine (1% Prilocaine diluted 1:1 with Normal Saline) into affected arm. Record dose given. Warn patient about hot/cold sensation, mottled skin.
11. Intravenous cannula removed from affected arm. Apply pressure. Blood diluted with Prilocaine clots very slowly!
12. Once anaesthesia has been achieved after approximately 15 minutes, the fracture can then be manipulated to a better position, plaster applied and moulded by doctor. When using a plaster cast to treat a distal radius fracture, the wrist should be in neutral flexion with 3-point moulding used to hold the fracture and not forced palmar flexion (BOA, 2017)
13. If patient is experiencing pain from the proximal cuff, the distal cuff can be inflated. Check that this is working and only then deflate the proximal cuff. This transfers the cuff to anaesthetised skin).
14. Check x-rays should then be taken in the plaster room, either with the Fluoroscan or mobile X ray.

15. X-rays must be checked by the doctor. If satisfactory the cuff can be deflated, **no less than 20 minutes and no more than 45 minutes following Prilocaine administration** (RCEM, 2017).
16. High arm sling to be applied to the patient's arm.
17. Patient to be given instruction leaflet and Fracture Clinic appointment.
18. Intravenous cannula to be removed from the unaffected arm and dressing applied.

Side Effects

Side effects are very rare, but can occur following cuff failure. Possible side effects experienced may include:

- Local anaesthetic toxicity
 - Tremor, anxiety
 - Circumoral paraesthesia
 - Nausea and vomiting
 - Muscle twitching, convulsions
 - Loss of consciousness/ coma
- Methaemoglobinaemia
 - Rare, idiosyncratic reaction to prilocaine. Patient turns blue but pulse oximeter shows normal oxygen saturation. Can cause nausea, dyspnoea, tachycardia.

Treatment of Side Effects

Note cuff pressure and inflate the cuff to 100mmHg above the pre operatively recorded blood pressure (RCEM, 2017)

- Airway** - maintain airway, administer 100% oxygen
CALL FOR HELP RESUS TEAM 2222
- Breathing** - Start ventilation if breathing inadequate
- Circulation** - Check pulse/BP/O₂ saturation, ECG, IV fluids if hypotensive

Treatment of local anaesthetic toxicity

- Refer to AAGBI guidelines (displayed locally and available at http://www.aagbi.org/sites/default/files/la_toxicity_2010_0.pdf)
- Lipid Emulsion (Intralipid ®) is available in ED resus trolley and in theatres resus trolley

Treatment of methaemoglobinaemia

- Slow IVI of methylene blue 1% solution, 1-2mg/kg
- Methylene blue is available from pharmacy

References

Fundamentals of Anaesthesia. 2nd edition. GMM. C. Pinnock, T. Lin, T. Smith

A Practice of Anaesthesia. 6th edition. Wyle and Churchill-Davidson. T. E. J. Healy, P. J. Cohen.

British Orthopaedic Association Standards for Trauma (2017) The Management for Distal Radius Fractures. Accessed via <https://www.boa.ac.uk/wp-content/uploads/2017/12/BOAST-Management-of-Distal-Radial-Fractures.pdf>

The Royal College of Emergency Medicine (2017) Intravenous Regional Anaesthesia for Distal Forearm Fractures (Bier's Block) (Revised) Accessed via

Documentation Controls

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