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

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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.

- Allergy to local anaesthetic
- Hypertension >200mm Hg systolic
- Infection in the limb
- Lymphoedema
- Methaemoglobinaemia
- Morbid obesity (as the cuff is unreliable on obese arms)
- Peripheral vascular disease
- Procedures needed in both arms
- Raynaud's phenomenon
- Scleroderma
- Severe hypertension
- Sickle cell disease or trait
- Pagets Disease
- Uncooperative or confused patient
- Associated upper limb fractures (e.g. Humerus, elbow)
- Where venous access cannot be obtained in both arms

Equipment

1. Tourniquet
2. Sphygmomanometer
3. 2 x 20 ml syringes

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4. 2 x Venflons (largest gauge achievable minimum 22G)
5. Tegaderm / tape to secure IV needle

6. 20 ml 1% Prilocaine ┐ mix to form 40ml 0.5 % Prilocaine
7. 20 ml Normal Saline ┘

8. 2 x 5 ml Normal Saline (flush)
9. Stockinette, Velband and Plaster of Paris
10. Fluroscan® Mini C-arm
11. Instruction leaflet
12. Resuscitation trolley / Oxygen
13. Intralipid

Guidelines for Manipulation of Wrist Fractures under Bier's Block

Minimum of two practitioners, lead clinician who is credentialed by the department to perform Bier's block and should be present for the entire procedure (RCEM, 2017). One clinician present who is trained and certified to use the Fluroscan® Mini C-arm as per IRMER regulations. One clinician appropriately trained/certified to apply plaster cast. 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 lead clinician.

2. Take patient's blood pressure and weight and record in the notes.

3. Lead clinician to set up and check tourniquet and cylinder.

4. IV access obtained in both arms.

5. Velband and tourniquet to be applied to patient's affected upper arm.

6. The arm should then be elevated for 2 minutes or formally exsanguinated with a crepe bandage.

7. Proximal cuff to be inflated to 100mmHg above systolic blood pressure and no higher than 300mmHg. Cuff checked by lead clinician and record time of inflation.

8. Check radial pulse is absent once cuff is inflated.

9. 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 and time administrated. Warn patient about hot/cold sensation, mottled skin. See below for dosing per weight guidance.

Weight (Kg)	Dose (at 3mg/kg)	Total volume of 0.5% Prilocane (ml)
80	240	48
70	210	42
60	180	36
50	150	30
40	120	24

10. Intravenous cannula removed from affected arm. Apply pressure. Blood diluted with Prilocaine clots very slowly!

11. Once anaesthesia has been achieved after approximately 15 minutes, the fracture can then be manipulated to a better position, plaster applied and moulded by lead clinician. 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)

12. 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).

13. Check x-rays should then be taken in the plaster room, with the Fluoroscan®.

14. Post manipulation x-rays must be checked by orthopaedic consultant in fracture clinic. If satisfactory the cuff can be deflated, **no less than 20 minutes and no more than 45 minutes following Prilocaine administration** (RCEM, 2017). Time of cuff deflation to be documented in notes along with neurovascular status post procedure.

15. Once post manipulation x-rays have been deemed satisfactory the cast should then be split along the ulna border if clinically indicated.

16. Patient to be given instruction leaflet and fracture clinic appointment in 1 week.

17. 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/O_2 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

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