Nerve Block Catheter for Post-Operative Pain - Brachial Plexus - Full Clinical Guideline

Reference no.: CG-PM/2011/011

1. Introduction

Brachial Plexus catheterisation is a specialised method of administering analgesia to produce pain relief, improvement of blood flow and aid mobilisation following trauma or surgery to the upper limb

2. Aim and Purpose

The following guideline outlines the safe and effective use of Brachial plexus catheters following discussion with suitable patients. This procedure is to be carried out by Consultant anaesthetists, experienced SPR's and SAS Doctors, who are competent in the technique. Patients are to be cared for by appropriately trained staff.

3. Definitions

Brachial Plexus	The nerve supply to the arm
Catheter	A small plastic tube used to infuse drugs continuously
Infusion	The continuous delivery of solution via an infusion or elastomeric pump

4. Guideline

Implementation

Advantages

- Prolongation of the analgesic effect of local anaesthetics using a much smaller total dose of drug administered continuously, close to the nerve supply of the affected area
- Facilitation of physiotherapy and mobilisation e.g. continuous passive movement (CPM)
- Improved blood flow in cases of vascular compromise

Disadvantages

- Specialist technique that can only be performed by experienced practitioners
- Requirement for specialist infusion equipment
- Duration of catheter placement limited by potential for infection
- Arrangements for direct contact to physician supervising infusion

Care and Monitoring

- Informed consent is required
- Placement of catheter to be performed under full aseptic conditions
- A Transparent dressing to be used to ensure visible entry site: Tegaderm IV Advanced - **DO NOT USE NORMAL TEGADERM**,
- Dedicated elastomeric pump for local anaesthetics to be used with an appropriate clear infusion line, line labelled as nerve block
- The infusion drug, strength and rate should be prescribed on the Electronic Prescribing System (EPMA)
- A clear indication of the intended duration and plan of care should be documented in the medical notes or anaesthetic chart
- Observations of effectiveness of block, temp, pulse rate, blood pressure and oxygen saturation hourly for four hours, thereafter 4 hrly for inpatients and recorded on Patientrack.
- Specific questioning of suggestion of Phrenic nerve blockade (shortness of breath, chest discomfort) and signs of local anaesthetic toxicity (peri-oral tingling, tinnitus)
- Daily checking of injection site for signs of redness, swelling, dislodgement, leakage
- The arm will be heavy and partially numb so must be protected from heat and being accidentally knocked
- Accidental disconnection of catheter line requires removal unless directly observed and immediate reconnection of line following disinfection using alcohol swab
- Removal of the line is performed as a nursing sterile dressing procedure.
- On removal of the catheter(s), ensure the radio-opaque tip is seen. If it is not present – keep the catheter and contact the Acute Pain Team (during office hours) or the patient's surgical team to discuss as there may be a remnant left in the wound
- The catheter tip need only be sent for microbial culture if there is any sign of infection.

Pain Management following Brachial Plexus Catheterisation

- Establish an effective initial block using Local Anaesthetic bolus of reasonable strength, e.g. Bupivacaine 0.25% 20mls, followed by continuous infusion;
    - Pre-filled 400 ml reservoir multi-rate elastomeric pump of 0.125% plain (Levo) Bupivacaine available from Pharmacy

- Ideally a multi-rate elastomeric pump should be used in the first instance. The multi-rate pump can vary from 0-14ml/hr in 2ml increments, by using the blue plastic key provided with the kit. Rate range should be set at between 2ml and 10ml per hour with a suggested starting rate of 6 ml/hour.
- The Elective Orthopaedic Pharmacist should be contacted via bleep 3042 to order the multi-rate elastomeric pump after prescribing this on EPMA. This will need to be done first thing in the morning to enable pharmacy time to fill the device, as it is made up on a patient-to-patient basis and can only be made up in hours. The anaesthetist has ultimate responsibility to ensure this is done in time. Also please ensure the ward where the patient is being looked after post-operatively have ordered a replacement device.
- Please ensure a pouch is used to secure the device to the patient to avoid inadvertent catheter dislodgement.
- The blue plastic key should not be kept on the line and should be kept with the notes, if a replacement is required please contact Hands theatre or the Acute Pain Team (in hours).
- Assess effectiveness of block after 4 and 12 hours and daily thereafter; adjust rate accordingly. Density and extent of block will frequently respond to changes in infusion rate.
- Please prescribe on EPMA 5-10ml 0.125% or 0.25% Levobupivacaine PRN up to 4-6hrs so that manual bolus can be given. The acute pain team (in hours) and anaesthetic team (out of hours) can assist with this.
- Further analgesics should be co-administered as required.
- Advice can be sought from the Acute Pain Team during normal hours Bleep 1283/3078/2284/3365 or Ext 85936/88322/88323
- Advice out of hours is directed to the person having placed the catheter, or the on call anaesthetist who may require to seek experienced advice.
- If a multi-rate elastomeric pump is initially used it is appropriate to switch to a standard rate elastomeric pump to allow for discharge home, this can be prescribed by an anaesthetist or the Acute Pain Team.
    - Pre-filled standard rate (5.2ml/hr) Elastomeric pump of 250ml 0.125% plain (Levo)Bupivacaine. This should be ordered via the ward pharmacist.

  Patients cannot be sent home with a multi-rate elastomeric pump.
- If the patient lives within the Orthopaedic Outreach team's catchment area they can go home with the device and have the catheter removed at home. Please ensure the Ortho Outreach team have been contacted and the patient knows how to contact the outreach team prior to discharge. If they are not within the catchment area the patient will need to remain in hospital until the catheter is removed.

5. References

The Association of Anaesthetists of Great Britain & Ireland, 2010. **Guidelines for the Management of Severe Local Anaesthetic Toxicity.**

Available at:
www.aagbi.org/sites/default/files/la_toxicity_2010_0.pdf

6. Documentation Control

Development of Guideline:	Clinical Nurse Specialist, Acute Pain Team (Vicki Yates), updated May 2023 by Dr Sarno
Consultation with:	
Approved By:	Acute Pain & Anaesthetics BU - 16/5/23 Surgery Division - 23/06/2023
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Key Contact:	Dr S Sarno Anaesthetic and Acute Pain Consultant

7. Appendices

Brachial Plexus Catheters
Treatment of Problems – aide memoire

Following plexus catheter insertion start infusion in theatres or in recovery, patient should be observed for at least 30 min in recovery.

Poor pain relief

- Assess and document pain severity / location.
- Check extent of block achieved
- Has catheter migrated out?
- Administer bolus dose from the same infusion mix - (On call anaesthetist to do) Observe patient for at least 20 min following the bolus.
- If multi-rate elastomeric pump used, increase infusion rate to a maximum of 10 ml / hr. Consider withdrawing catheter to leave shorter length in plexus sheath - (on call anaesthetist to do).
- Do not strive for 100% pain relief; breakthrough pain should be treated by oral analgesics administered regularly.
- If pain persists after maximum infusion rates of 10 ml/ hr for two hours then; abandon technique and use alternative analgesia regime

Excessive block

- Stop infusion completely to allow resolution
- If multi-rate elastomeric pump used, adjust infusion rate
- If standard rate elastomeric pump (5.2ml/hr) used, stop infusion and switch to intermittent manual boluses
- For **shortness of breath**, consider possibility of Phrenic Nerve blockade – check for reduced diaphragmatic excursion, discomfort on deep breathing
- Horner's syndrome (constricted pupil, blurred vision, slightly closed eye, nasal stuffiness, facial flushing) indicates sympathetic blockade. Reduce infusion rate only if problematic

If elastomeric pump appears not to be infusing

- Inspect pump, line for clamps.
- Check tubing for kinks.
- Attempt a manual bolus injection to test for high resistance and withdraw catheter if high resistance is encountered - (on call anaesthetist to do)
- Ensure NR fit lock hub is not screwed down too hard and obstructing tubing.

Disconnections

- Line disconnection usually occurs at the catheter/hub point. It represents a considerably increased risk of infection of the line and plexus.
- **If** the disconnection occurs and is observed and immediately disinfected with an alcohol swab, it is permissible to continue with the infusion. If not immediately dealt with, the infusion must be terminated and a suitable alternative regime prescribed.

For Advice Contact:
During office hours - The Acute Pain Team, Bleep 3365/1283 or 3078
Out of Hours - the on - call anaesthetist, via switchboard

Local Anaesthetic Toxicity (LAT)

Monitor for signs of local anaesthetic toxicity

- Tingling around mouth +/- lips
- Numbness of tongue
- Tinnitus or visual disturbances
- Convulsions
- Respiratory arrest or cardiac arrest

Actions

- Stop infusion immediately
- Insert IV cannula if not already in situ
- Patient alert and orientated – call contact personnel and ensure alternative analgesia is available. Observe closely
- Drowsy / Sedated – call ward doctor or on call anaesthetist, administer Oxygen via Hudson mask. Consider airway support

- Cardiac and/or Respiratory arrest – call cardiac arrest team; follow ALS protocol

- Severe Local Anaesthetic Toxicity - Consider use of 20% Intralipid emulsion under ICU guidance. Refer to AAGBI guidelines.

Management of Severe Local Anaesthetic Toxicity

Only To Be Used Under Intensive Care Guidance

Immediately

Give an initial intravenous bolus injection of 20% lipid emulsion **1.5 ml/kg** **over 1 minute**

AND

Start an intravenous infusion of 20% lipid emulsion at **15 ml/kg/hr**

After 5 min

1. Give **a maximum of two** repeat boluses (same dose) if:

   • cardiovascular stability has not been restored **or**
   • an adequate circulation deteriorates

   Leave **5 min** between boluses

2. A maximum of **three** boluses can be given (including the initial bolus)

   AND

   Continue infusion at same rate, but:

   Double the rate to **30 ml/kg/hr** at any time after 5 min, if:
   • cardiovascular stability has not been restored or
   • an adequate circulation deteriorates

   Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion

Do not exceed a maximum cumulative dose of 12 ml/kg

An approximate dose regimen for a 70kg patient would be as follows:

Immediately
Give an initial intravenous bolus injection of 20% lipid emulsion 100 ml over 1 min
AND
Start an intravenous infusion of 20% lipid emulsion at 1000 ml/hr

After 5 min
Give a **maximum of two** repeat boluses of 100 ml
AND
Continue infusion at same rate but **double** rate to 2000 ml/hr if indicated at any time

Do not exceed a maximum cumulative dose of 840 ml