

Epidural Management Standard Operating Procedure

1) SUMMARY

This SOP covers the insertion of non-obstetric epidurals and the management of epidural infections. It also provides guidance on tunnelling epidurals, re-dressing epidural sites and troubleshooting epidurals.

2) INTRODUCTION

Insertion of an epidural catheter is a commonly performed procedure. As part of a program to reduce epidural infections this SOP aims to standardise insertion procedures and the management of any infections.

3) DEFINITIONS

CRP	C-reactive protein
FBC	Full blood count
G	Gauge
LOR	Loss of resistance
LMWH	Low molecular weight heparin
MC&S	Microscopy, culture & sensitivity
MRI	Magnetic resonance imaging

4) SCOPE

This SOP describes the insertion of non-obstetric epidural catheters and management of epidural infections. This SOP is to be used by staff in Anaesthesia, Acute Pain Service and Critical Care. It should be used in conjunction with the Imperial Healthcare NHS Trust Epidural guideline.

5) FULL SOP

1. Epidural insertion

Locations for Epidural Insertion

Epidurals can be inserted in Theatres, Critical Care and A&E Resus.

There should be an appropriately trained individual present to assist the anaesthetist during the epidural insertion.

Epidural insertion

- Full asepsis (mask, gown, hat, gloves, sterile drape).
- Skin preparation 0.5% chlorhexidine spray or 2% chlorhexidine sponge by the operator.
- Skin must be dry before epidural inserted.
- Standard LOR epidural technique & insertion of catheter.
- If multiple attempts or change of operator use a new epidural set.

- Ensure skin is clean & dry before applying dressings.
- Secure epidural with transparent adhesive dressings or tunnel epidural catheter (see Appendix 2 Tunnelling an epidural).
- To secure epidural do not use lockit devices or non-transparent dressings such as mefix. These occlude the insertion site which is key for monitoring the epidural catheter post insertion.
- Label epidural at the patient end & at giving set.
- Document the epidural insertion on Cerner.

2. Management of epidural Infections

Identification of an epidural infection

All epidural insertion sites should be checked every 12 hours.

If there are any signs of infection (redness, swelling, local pain, discharge) then the patient should be reviewed by the Acute Pain Service in hours or the anaesthetic SHO out of hours.

Following review if the epidural site is felt to be infected then the epidural should be removed at the earliest opportunity (see Epidural Guideline 5.5.4, Procedure removal of an epidural catheter).

Look for any red flags indicating severe infection.

Red Flags indicating severe infection

- Severe back pain
- Any neurological deficit
- Systemically unwell
- Headache
- Drowsiness/reduced conscious level
- Signs of meningism

Removal of an epidural catheter

Prior to removal check for last dose of LMWH or the presence of any clotting abnormalities.

Epidurals can be removed 12 hours after the last dose of prophylactic LMWH or 24 hours after treatment dose LMWH (It is not advised that patients should receive continuous epidural analgesia if they require treatment dose LMWH).

For patient with abnormal coagulation discuss with haematology, correct coagulation and then remove the epidural.

Please ensure patient has alternative analgesia prescribed and consider other regional techniques where appropriate, for example for patients with rib fractures.

A further epidural should not be sited until any epidural infection has completely resolved.

Management of epidural infections

- Remove epidural catheter – see above
- Send tip to microbiology for MC&S
- Send swab of any pus/discharge to microbiology for MC&S
- Send FBC & CRP
- Ward nursing epidural observations should be continued until the infection has resolved
- Patient should be reviewed daily by the Acute pain service (Monday- Friday) or the anaesthetic SHO (weekends/bank holidays) until the infection has resolved.
- Patient reviews should be documented on Cerner and the patient included in the Pain Handover.
- **Consider progression of infection, look for presence of any Red Flags indicating a severe epidural infection.**

In addition for patients with signs of moderate infection (pus at site/fever/raised WCC or CRP):

- Discuss antibiotics with microbiology
- Discuss need for imaging (MRI spine) with neurosurgery

Any patient with an epidural infection who has a red flag symptom should be discussed with the anaesthetic consultant on-call, microbiology & neurosurgery.

3. Re-dressing an epidural

Occasionally epidurals will need to be redressed but this should be kept to a minimum due to the risk of introducing infection.

You will need to have an assistant to help you position the patient and to reduce the risk of accidentally removing the epidural (they can hold the filter end of the epidural catheter).

Equipment

- Metal trolley
- Universal pack
- Sterile gloves x2
- Sterile saline
- New transparent dressings
- Additional sterile gauze if the reason for re-dressing is to clean the insertion site.

Procedure

- Set up the trolley including a second pair of sterile gloves.
- Ensure that you will have space to work, ideally the patient should be sat on the bed in a similar position to having an epidural inserted.
- Remove the dressings furthest away from the catheter first.
- Wearing sterile gloves and a facemask remove the dressing overlying the insertion point. Your assistant can help you by holding the epidural catheter filter to reduce the chance of you accidentally pulling out the epidural.
- Change sterile gloves.

- Clean the skin around the insertion point with sterile saline & gauze.
- Ensure the skin is clean & dry before re-dressing the epidural with transparent dressings.

4. Optimising Epidural Analgesia (for Anaesthetists)

- If you are called to see a patient because the epidural “is not working”, please make every effort to attend as soon as possible.
- Make sure you have **metaraminol**, **ephedrine** and **atropine** within reach before administering any medication via the epidural.
- The patient should be **on the bed** with **working IV access** before a top up is given, in case the blood pressure drops after the top up.

ASSESSMENT:

- Check the epidural pump set up, contents and the connections.
 - Ensure that the filter is taped to patient.
 - Check the upper and lower cold level with ethyl chloride spray.
 - Assess the ability of the patient to take a deep breath and cough.
 - Assess the ability of the patient to bend both knees and push themselves up in the bed.
 - Assess for motor block (See Bromage Scale, above).
- It does not matter if there is no block to cold if the patient can cough and move comfortably.
 - Complaints occur frequently in this area- **ensure that you document** clearly in the patients notes what you do.

MANAGEMENT:

- Provided there is no motor block, manage pain with an epidural bolus.
- Nursing staff must be aware of any epidural boluses or diamorphine and it must be charted on the drug chart.
- If pain is unilateral, position the most painful side down if possible.
- If there is motor block, go to section on epidural haematoma.
- Consider a metaraminol infusion (see metaraminol guideline) if the BP remains low. This would involve moving the patient to an area where metaraminol infusions can be managed.
- **If the top up has worked**, increase the rate of the epidural infusion.

For minor discomfort:

- Check the type of infusion then review the dressing and insertion site.
- Bolus 10mls via the epidural pump and increase the rate of epidural infusion.

How to bolus from the Bodyguard infusion pumps:

- Press STOP/NO
- Press BOLUS
- Enter Clinician bolus access code, press START/OK
- Follow on-screen prompt to enter the bolus dose required, press START/OK to commence delivery
- Press STOP at any time to stop delivery
- On completion of bolus delivery, the infusion running screen displays

How to change rate of infusion from the Bodyguard infusion pumps:

- With the infusion in progress, enter the new rate using the numerical keypad, press START/OK
- Enter relevant code, press START/OK
- Check the rate change is complete on the infusion running screen.
- Make sure that new rate is prescribed

For major discomfort:

- Check the epidural insertion site (in case catheter has become dislodged).
- Prepare 10mls of 0.25% bupivacaine and give 3mls initially (ensuring no hypotension or motor block develops), and the rest slowly over 10 minutes. Another 10mls may be needed.
- Avoid hypotension (use metaraminol/ephedrine if needed).
- Instead of bupivacaine, epidural diamorphine can be given.
- Nursing staff must be aware of top up and it must be charted on the drug chart. Consider a metaraminol infusion (see metaraminol guideline) if the BP remains low. This would involve moving the patient to an area where metaraminol infusions can be managed.

Epidural Diamorphine

- This is a useful adjunct and can be given alongside the low dose epidural mix (levobupivacaine 0.125% + fentanyl 2µg/ml). Consider adding it to the bolus or just give it on its own.
- If you are unsure of the dose to use, please speak to a more senior anaesthetist. Usually 2 mg in the elderly and 3 to 4mg in younger patients. It does not cause hypotension. It can be given four hourly. The main side effects are itch, urinary retention and nausea.
- For the itch 40 – 100 microgrammes of naloxone **subcutaneously** should be prescribed. It can be given hourly prn; usually two doses are enough.

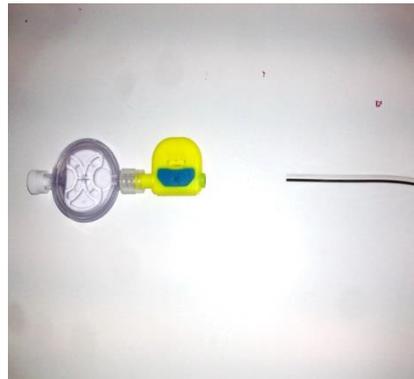
Unsuccessful Epidural Bolus

- **Do not dismiss the epidural as “not working” unless epidural diamorphine with or without 10mls of 0.25% bupivacaine has failed to make the patient comfortable.**
- **If the top up has failed** within 72 hrs of surgery, a repeat epidural may be indicated. An epidural cannot be inserted for 12 hours after a prophylactic dose or 24 hours after therapeutic dose of low molecular weight heparin (Enoxaparin). Consider delaying the next dose. Inform the anaesthetic registrar and surgical team.
- An anaesthetist should not leave the patient with only a PCA without having seen the patient, discussed the case with a senior anaesthetist, and having documented everything in the notes.
- If the patient is in considerable pain, remain with them and bolus intravenous morphine to make them as comfortable as possible (usually 2mg titrated every 5 minutes). If the decision is made to re-site the epidural but the 12 hours post Enoxaparin has not expired, use PCA morphine to act as a stop-gap.

Catheter disconnection

- If the catheter has become disconnected from the filter (open to air) and this was not witnessed, the epidural may need to be removed (see notes above about re-siting). Please discuss with a senior anaesthetist.
- If the catheter disconnection was witnessed by the nurse, but has not come in to contact with anything, consider shortening the catheter by at least 7cm with sterile scissors, and reconnecting to a fresh epidural filter.

Epidural catheter disconnection can occur between the filter and the hub (picture 1), or between the hub and the catheter (picture 2).



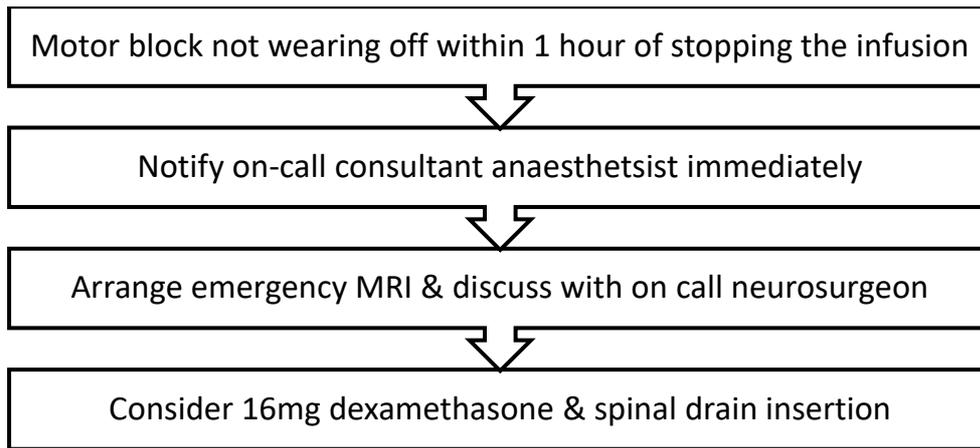
Suspected epidural haematoma

THE MOST RELIABLE SIGN OF A DEVELOPING EPIDURAL HAEMATOMA IN A PATIENT WITH AN EPIDURAL INFUSION IS THE DEVELOPMENT OF A MOTOR BLOCK.

Motor block should not occur with a correctly sited thoracic epidural - it may be too caudal.

If motor block develops at any time, even within 24 hours of removing the epidural catheter, you must suspect an epidural haematoma. 50% of epidural haematomas develop on removal of the epidural catheter. If the motor block is as a result of a top up, observe and ensure that it wears off appropriately. If in doubt, stop the epidural infusion and observe. Within an hour, the motor block should be starting to wear off. If the motor block is not starting to wear off within an hour, the cause could be a developing epidural haematoma which is an emergency. The consultant anaesthetist on-call should be notified immediately.

Grade	Criteria	Degree of block	
I	Free movement of legs and feet	Nil (0%)	EXPECTED
II	Just able to flex knees with free movement of feet	Partial (33%)	NOT IDEAL
III	Unable to flex knees but with free movement of feet	Almost complete (66%)	DANGER*
IV	Unable to move legs or feet	Complete (100%)	DANGER*



6) IMPLEMENTATION/ MONITORING / AUDIT

Training required for staff	Yes
If yes, who will provide training:	<p>Training is required for:</p> <p>Anaesthesia: Consultants and trainees</p> <p>Acute Pain Service: Pain nurses</p> <p>Critical Care: Consultants, trainees and nursing staff</p> <p>Training will be provided by the Acute Pain Service MDT.</p>
When will training be provided?	<ol style="list-style-type: none"> 1) Induction Days 2) Induction Booklet 3) Audit Days 4) Small Group Teaching 5) Informal Bedside Teaching
Date for implementation of SOP:	April 2020
When will this SOP be audited?	Ongoing

Who will be responsible for auditing this SOP?	MDT Leads/ Key Trainers
Are there any other specific recommendations for audit?	Incidence of epidural infections

7) REVIEW

Frequency of review	<p>Please indicate frequency of review:</p> <p>Every 3 years – April 2023</p> <p>Person and post responsible for the review:</p> <p>Anaesthesia: Dr Jenny Illingworth/Dr Alison Knaggs</p>
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8) REFERENCES

1. Bomberg H *et al.* Tunnelling of thoracic epidural catheters is associated with fewer catheter-related infections: a retrospective registry analysis BJA 2016; 116(4):546-53

Appendix 1: Management of Epidural Infection Flowsheet

	Signs/Symptoms	Actions/Considerations
 <p>Normal</p>	<p>Normal skin colour at insertion site and tunnel site (if tunneled epidural)</p> <p>No tenderness on palpation</p>	<ul style="list-style-type: none"> No signs of epidural infection at present. Twelve hourly checks of epidural site. The insertion site and tunnel site should be covered with a clear, occlusive dressing. Continue to manage the epidural as per Trust guidelines.
<p>Mild infection</p>  <p>Moderate infection</p> 	<p>2 of the following:</p> <ul style="list-style-type: none"> Redness Swelling Local pain <p>In addition to ≥ 1 of</p> <ul style="list-style-type: none"> Raised inflammatory markers (CRP; WCC) Pyrexia Pus 	<ul style="list-style-type: none"> Contact the Acute Pain Service in hours or the Anaesthetic SHO out of hours. If the epidural site is felt to be infected then the epidural should be removed as per removal of epidural catheter protocol. Send catheter tip to microbiology for MC&S. Send FBC & CRP. <hr/> <ul style="list-style-type: none"> Send swab of any pus/discharge to microbiology for MC&S Continue epidural observations until the infection has resolved. Daily review by the Acute Pain Service in hours or the Anaesthetic SHO out of hours. Discuss need for imaging (MRI spine) with neurosurgery. Discuss case with Anaesthetic Consultant. Discuss antibiotics with microbiology.
<p>Severe infection</p> 	<p>RED flags:</p> <ul style="list-style-type: none"> Severe back pain Any neurological deficit Systemically unwell Headache Drowsiness or reduced conscious level Signs of meningism 	<ul style="list-style-type: none"> Action all points outlined in 'mild/moderate' infection The patient requires an urgent neurosurgical review. The Anaesthetic consultant on call must be informed.

Appendix 2: Tunnelling an epidural

Tunnelling an epidural

Tunnelling is an additional procedure that can be performed when inserting an epidural. It carries two principle benefits:

- The catheter can remain in situ for longer given the greater distance between the site the catheter emerges from the skin & the area prone to infection (the epidural space)^[1].
- The catheter can be safely redirected away from pressure points and/or surgical incisions which approach the midline (e.g. tunnelling leftwards to avoid the right thoracotomy in oesophagectomies).

Risks of tunnelling are minimal if proper technique is followed, but theoretically entail:

- A slightly longer and more uncomfortable procedure for the patient
- The risk of shearing the catheter if proper “guarding” isn’t followed
- Introducing additional points where a catheter may kink rendering it unusable
- A slightly poorer cosmetic result, leaving a small scar in the midline

Procedure

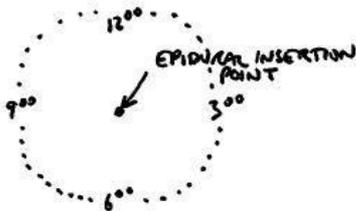
- Additional equipment: 11 scalpel blade, long 16G or 14G angiocath, and dermabond.
- Insert the epidural following the standard procedure including threading the catheter to approximately 20cm.



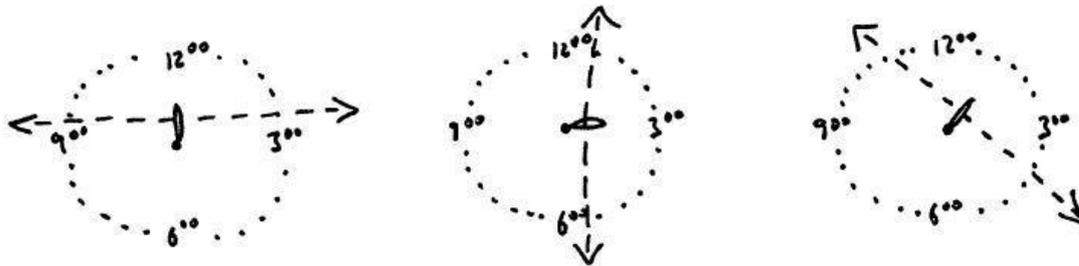
- DO NOT REMOVE THE TUOHY NEEDLE .
- Pull the Tuohy needle back 1-2cm to decrease the risk of an inadvertent dural puncture whilst tunnelling. You have to guard the catheter at the level of the skin/subcutaneous tissue until you are no longer using sharps.
- Make a deep, narrow stab incision down onto the Tuohy needle.
- Make sure there is no skin between the incision and the Tuohy (you must feel metal).



Angle it at 90° to the intended direction of the tunnel so the angiocath needle is easy to insert and the Tuohy needle is not in the way .



Imagine you were standing on the 8cm mark looking right down the barrel of the Tuohy at an imaginary clock on the back

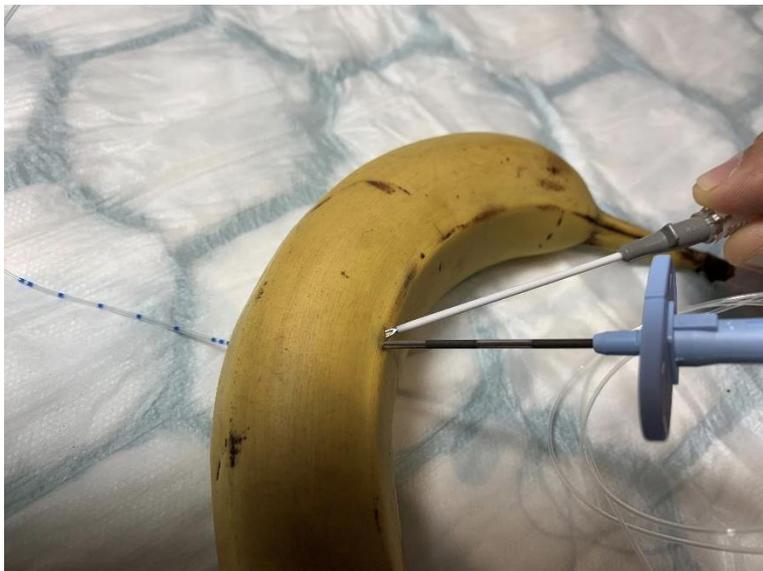


To tunnel left or right make an incision towards 12:00
 To tunnel superiorly or inferiorly make an incision towards 03:00
 To tunnel left & superiorly or right & inferiorly make an incision towards 01:30

- Unsheathe the angiocath (but keep the sheath), remove the end cap, and attach your syringe of lignocaine.



- Keep the angiocath sheath to help depress skin later.
- Insert the angiocath using the 5mm incision you've made.



Infiltrating lignocaine

Infiltrating lignocaine can give you useful depth information:

- If you see blanching or puckering of the skin you are too superficial
- If you see nothing you are too deep
- If you see a slight rise in the skin you are at the correct depth

- Advance the angiocath from medial to lateral in the intended direction of the tunnel aiming to keep it subcutaneous.
- Infiltrate lignocaine as you go to keep the patient comfortable during the procedure.
- Palpate for the end of the catheter regularly.
- Do not palpate whilst advancing as you risk a needlestick if you are more superficial than you think and do not palpate lengthways onto the needle tip, only from above.



Exiting at the skin

- If you are too deep you will struggle to get the angiocath back out.
- You can use the sheath of the angiocath to depress skin and encourage the angiocath back out through the skin.
- Paradoxically tunnelling further is often easier, because the natural curvature of the back makes the angiocath come back to the surface straight; a short tunnel requires a sharper change in direction

- When approximately 75% of the length of the angiocath is used up, start to consider your strategy to get the catheter back out through skin:
 - Aim to have 1cm of catheter poking out of skin at the tunnel exit site
 - Aim to have 2cm of catheter left in the midline (the next bit is fiddly and you need space).
- Once you've identified the position the catheter will exit, take the syringe containing lignocaine off the angiocath and reattach your orange needle to administer an intradermal injection at the tunnel exit site.
- Push the angiocath back out through the skin and remove the needle leaving the catheter in place.



- Use the 11 scalpel blade to cut the hub off the angiocath in the midline – the hub will not pass through the tunnel.
- Use the sharpest part of the blade as using a blunted blade will crush the catheter closed and you will be unable to insert the epidural catheter.
- Keep the sharp part of the scalpel blade facing away from the patient to avoid accidental injury
- No sharps are used for the remainder of the procedure, so remove your Tuohy in the usual way pushing catheter through as you go.



If you have crushed the end of the angiocath catheter closed you can either:

- Thread the epidural catheter the other way through the tunnel (lateral to medial) to try and force it open or
- Cut the angiocath again at the epidural site slightly further along (although you risk running out of catheter)



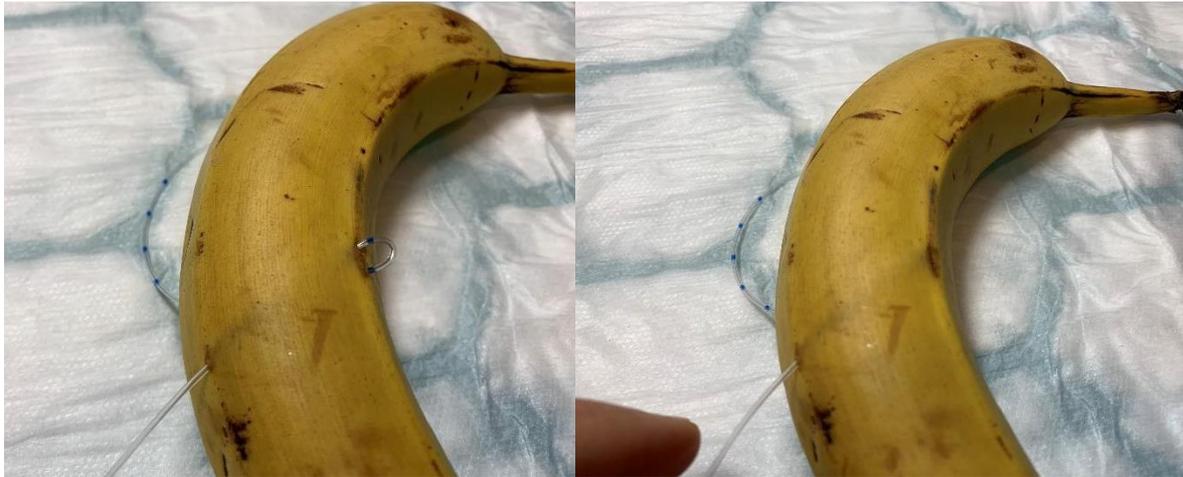
- Ensure there are no knots or tangles in your epidural catheter, then thread the end through the tunnelled angiocath.



- Once the end of the epidural catheter is visible through the angiocath at the tunnel exit site, pinch both together and pull both through, thereby removing the tunnelled angiocath laterally.
- You will be left with a loop of epidural catheter at the epidural insertion point in the midline.



- At this point, at the epidural insertion site, pull back the epidural catheter to the desired depth in the epidural space, but leave an extra 1cm. For example, LOR at 6cm with the intention of leaving 6cm in the space, pull back the catheter to 13cm.
- Then take hold of the catheter at the tunnel exit site and pull back so that the slack in the midline is taken up.
- The epidural catheter should easily slide through the tunnel. Eventually you will be left with a small loop of catheter outside the skin, which looks like it will kink. A very small pull will make this kink disappear under the skin.



- At this point, the epidural catheter is entirely under the skin but also kinked (you might see puckering of the skin at the epidural insertion point and/or feel the kinked catheter subcutaneously), so pinch the epidural catheter hard at the tunnel exit site and pull back until 1cm of catheter is visible, you will feel a slight “give”. This is the extra 1cm you left earlier – to reconstitute any subcutaneous kinks.
 - Use dermabond at the epidural insertion site.
 - Secure the tunnel exit site and the epidural insertion site with a Tegaderm or equivalent transparent dressing.
- Do not use a Lockit or catheter securing device at the tunnel site – it will kink the catheter at the tunnel exit point by twisting it back on itself.