Extravasation injuries

Extravasation is defined as the inadvertent leakage of infused fluid into the surrounding tissue. The resultant damage to tissue can be very serious ranging from skin loss and tendon damage to loss of digits or limb.

About 4% of infants leave neonatal intensive care units with cosmetically or functionally significant scars, thought to be caused by extravasation injuries.

A survey of regional neonatal units in the United Kingdom determined a prevalence of 38 per 1000 neonates who sustained an extravasation injury that caused skin necrosis with 70% of these injuries occurring in infants of 26 weeks or less gestation.

Most extravasations occur from extravasation of peripheral venous cannulae (93%) with the veins in the dorsum of the foot and the back of the hand being most vulnerable.

Extravasation Grading.

Assessment:

<table>
<thead>
<tr>
<th>Grade1</th>
<th>Grade2</th>
<th>Grade3</th>
<th>Grade4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain at infusion site</td>
<td>Pain at infusion site</td>
<td>Pain at infusion site</td>
<td>Pain at infusion site</td>
</tr>
<tr>
<td>No swelling</td>
<td>Swelling</td>
<td>Swelling</td>
<td>Swelling</td>
</tr>
<tr>
<td>No skin blanching</td>
<td>Skin blanching</td>
<td>Skin blanching</td>
<td>Skin blanching</td>
</tr>
<tr>
<td></td>
<td>Capillary refill normal</td>
<td>Reduced capillary refill</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/- Decreased or absent distal pulse</td>
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<tr>
<td></td>
<td></td>
<td>+/- Blistering or skin breakdown</td>
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</tbody>
</table>
Risk factors and drugs/infusion commonly associated with tissue damage include:

<table>
<thead>
<tr>
<th>Patient Factors</th>
<th>Drugs and Fluids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Prematurity</td>
<td>Dextrose greater than 12.5% Concentration</td>
</tr>
<tr>
<td>Infusion of irritant or Vasoactive drugs and fluids via peripheral venous canulae</td>
<td>Parental Nutrition (TPN) Fluids containing calcium, Potassium, Bicarbonate, Hypertonic dextrose, Vasoactive drugs eg: Dopamine, Dobutamine, Adrenaline and Antibiotics Blood</td>
</tr>
</tbody>
</table>

The management of extravasation is partially dependent on the characteristics of the extravasated agent and include limb elevation, exposure of affected site, occlusive dressing, use of hyaluronidase and use of topical nitroglycerin.

Once extravasation has occurred it may be difficult to predict whether a soft tissue complication will occur or whether the leak will dissipate without problems.

**NOTE: Once a significant extravasation has occurred,**

1. Notify the neonatal doctor immediately
2. Fill in a wound assessment form
3. Complete Datix form
4. Take a photograph of the site. Parental consent MUST be obtained before the pictures are printed and attached to the patient’s records, but treatment should be initiated without delay. If consent is refused, then pictures must be deleted
5. Use Hyaluronidase as soon as possible
**Action**

<table>
<thead>
<tr>
<th>Grade1</th>
<th>Grade2</th>
<th>Grade3</th>
<th>Grade4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove all splints and tapes</td>
<td>1. Remove all splints and tapes</td>
<td>3. Document and communicate findings</td>
<td>4. Inform Consultant</td>
</tr>
<tr>
<td>2. Elevate limb</td>
<td>2. Elevate limb</td>
<td>4. Inform Consultant</td>
<td>5. Photograph site</td>
</tr>
</tbody>
</table>

**HYALURONIDASE for extravasation injuries**

**Materials**

0.5% Lignocaine/Xylocaine (no adrenaline)

1 vial Hyaluronidase (1500 units). Dilute with 1.5ml of normal saline as per neonatal formulary

250ml Normal saline

20 or 50cc syringe

2x 10ml/50ml syringes

2 x 21G green needles 2 x 25G orange needles

23/25 gauge cannula

1 kidney dish.

**Method (Aseptic conditions)**

Remove the cannula

**Give sucrose**

1. Infiltrate local anaesthetic agent in and around the extravasation site (0.3ml/kg maximum) Wait 3-5 minutes after infiltrating the anaesthetic agent
2. Using a 25G needle, infiltrate hyaluronidase in 0.3 – 0.5 ml aliquots into the subcutaneous tissue (1 vial is diluted with 1.5ml of normal saline) in 3-4 separate sites around the extravasation aiming at the centre of the site. Wait 3 – 5 minutes after administrating the hyaluronidase

3. Make multiple small exit wounds with a green needle around the periphery of the area and within the affected area

4. * Flush 20-50ml of normal saline through the subcutaneous space in 3-5ml aliquots. The saline is irrigated through 4-5 of the exit wound sites, exiting as a shower through the remainder. (*The amount of fluid used depends on the size of the baby and extent of the wound)

5. Gentle massage of the limb can be done to express fluid through the injection site

6. Apply a sterile non-stick dressing and place the limb in a comfortable neutral position.

7. The site must be reviewed on a regular basis

8. Post procedural photographs are recommended

9. If necessary, the patient will be followed up by the plastic surgery service in conjunction with the neonatal service (community and outpatient follow up)
GLYCERINE TRINITRATE (GTN) for extravasation injuries and ischaemic injuries

Nitroglycerin increases collateral circulation to the local area of peripheral venous ischemia and has been found to be useful to use after extravasation with certain agents. These have included dopamine, adrenaline and TPN. It has also been found to reduce peripheral vasospasm caused by indwelling umbilical arterial catheters and peripheral arterial lines. A patch or ointment can be used. The latter is preferred when used on irregular joints.

The main side effect is systemic vasodilatation and a rise in methaemoglobin level. The blood pressure needs to be monitored on regular basis. If used for prolonged periods, measure methb levels.

Current indications for use

Ischaemia secondary to arterial cannulation

Treatment

If there is persistent blanching or duskeness of the peripheries of the affected limb, remove the catheter/cannula

Keep under close observation

If the vasospasm does not improve in a few minutes, apply a GTN patch

Dosage and duration

Transdermal patch

Apply a 18.5mg patch (delivers 5mg/day) to the affected area for 24 hours or less

Review and reassess on a regular basis
If required reapply a patch and review at regular intervals

**Document** all findings and actions, with timings, very carefully in the notes. Make drawings and take photos (parental consent needed) where possible.

**REFERENCES**


Joyce Generali, Dennis J Cada Nitroglycerin (Topical): Extravasation treatment, Hospital Pharmacy, Volume 36 No 10 pp 1091-1095 2001


**Additional reading**


Lamb H et al. Newborn services Clinical Guideline, May 2006

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