



# Correction to: Management of industrial high-pressure fluid injection injuries (IHPFII): the Water Jetting Association (WJA) experience with water driven injuries

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**Correction to:**  
**European Journal of Trauma and Emergency Surgery**  
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The original version of this article, unfortunately, contained three mistakes:

1. The abbreviation psi was incorrectly explained. The correct explanation is:

“psi **Pounds** per square inch”.

2. The legend of Fig. 3 contained a part c where only parts a and b should be given. The correct legend of Fig. 3 should read:

**Fig. 3 a** The patient was admitted to hospital after an accident cleaning concrete, he underwent an urgent decompression and extensive debridement, the wound left open and had three more consecutive and increasingly extensive surgical explorations at incident plus 1 day and incident plus 4 days. **b** Forearm and hand after almost 1 year elapsed time from an accident and after two plastic surgery reconstructions requiring an abdominal flap.

3. In Fig. 6, in the section of “**Antimicrobial prophylaxis**”, “**Patient presenting for immediate debridement after HPWJ injury < 24 h**”, “*Alternative for penicillin allergic patients*” the word “Meropenem\*” needs to be replaced by “Metronidazole”. Please find the corrected Fig. 6 below.

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The original article can be found online at <https://doi.org/10.1007/s00068-019-01106-4>.

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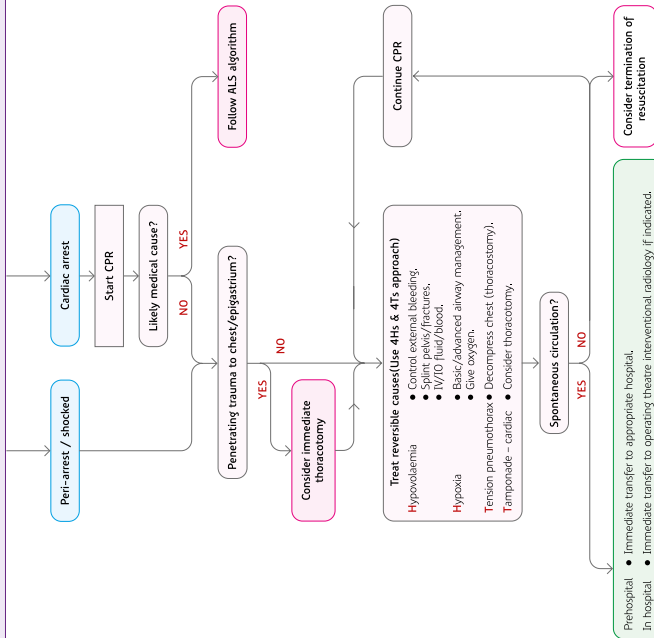
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**WATER JETTING INJURY FIRST AID AT SCENE**

- **SAFE APPROACH** and call for **HELP ALWAYS**.
- **C-ABC approach** as per ATLS<sup>®</sup> guidelines.
  - Direct pressure to bleeding wounds. Where **TRAUMA KIT(s)** are available on site, the application of pressure using a haemostatic agent (such as **QuickClot<sup>®</sup>** or **Celox<sup>®</sup>**) and a trauma bandage and/or tourniquet. Otherwise, application of pressure over the bleeding site and elevation of the injured limb where possible.
  - Pack any severed body parts in a sterile cloth or clean plastic bag and chill, if possible.
  - Note the time of the injury, nature of the material in the jet and environment e.g. sewer, drains.
  - If clinical circumstance allow and there is clean water available, wound irrigation should be done.
  - Monitor vital signs if possible.
  - Keep warm, nil by mouth and reassure casualty.
- **Arrange TRANSPORT/EVACUATION of the patient to a hospital /medical facility nearby urgent in the first instance.** Initiate evacuation planning at the scene. Consider the need for **TRAUMA/VASCULAR SURGEON** assessment to be organised post base.



**Clinical stable and/or isolated limb wounds**

**CASUALTY (A&E) or EMERGENCY DEPARTMENT (ED)**  
 This is initially a CONTAMINATED injury which requires an EMERGENCY SURGERY to be performed - until clinically proven otherwise.

**Trauma team**

- Headwears: MIST (mechanism, injuries, signs and symptoms and treatment received).
- Primary assessment as per ATLS<sup>®</sup> guidelines (debilly by surgeon).
- If patient is in shock, all traumatic causes must be considered and treated.

**Medical history**

- Time of the incident.
- Details of the contaminant. Check for paints or solvents and EXCLUDE general intoxication.
- Any allergies.
- Past medical history.
- Date of last Tetanus injection.

**Examination**

- General examination.
- Inspect injured limb site (note the size and side of the entry wound). Check for local swelling, erythema and skin colour change. Assess the range of movement and tendon function (strength, grade) and neurological weakness and numbness. Watch for compartmental syndrome. Wounds MUST NOT be surgically explored in ED.

**Investigations**

- **Imaging:** If patient haemodynamically unstable: EFAS<sup>†</sup>/portable pelvic X-ray and chest X-ray can be considered. If patient is haemodynamically stable: a CT-scan can be considered. ALWAYS obtain X-rays of the injured area to check for presence of subcutaneous air, foreign bodies or fractures, preferably obtain an urgent CT-angiogram scan.
- **Laboratory:** basal blood cultures, cross match, full blood account (FBC), arterial blood gas (ABG), urea and electrolytes (U&E's, BUN), liver function tests (LFT), direct (conjugated) bilirubin, hepatitis screening A, B and C, clotting (including fibrinogen and calcium levels) especially if it is a haemorrhagic trauma, biochemistry, basal procalcitonin, C-reactive protein and creatinine kinase (CK).

**General management**

- In isolated limb wounds, steroids (if irritant material (petroleum based products) and continue for a minimum of 24 hours or up to 7 days (depending on the case). Hydrocortisone 200 mg/IV/Stat, followed by 50 mg/6h/IV or prednisolone 0.5 mg/kg/OD. Coniverty. It is not advised on open wounds.
- Pain control: e.g. morphine boluses 2.5-5mg PRN or ketamine 50-100 mg (as required) IV and a antiemetic such ondansetron 4-8 mg/6h/IV or cyclazine 50 mg/8h/IV.
- Preoperative CT-ANGIOGRAM is advisable IF possible. Distal pulse does not exclude arterial injury in these circumstances.

**Antimicrobials**

- Tetanus status: If uncertain: vaccinate !!

Antimicrobial prophylaxis	Comments
<b>Co-amoxiclav 1.2 g/IV/TDS</b>	Extensive debridement essential. Send sample for culture and sensitivity. Modify treatment according to culture results. Assess need for MBSA cover in areas with high prevalence.
<b>Alternative for penicillin allergic patients after HPWV injury &lt;24 h</b>	Close monitoring and start antifungal if:
<b>*Amoxicillin 500mg/IV/TDS for 5 days</b>	• Wound becomes infected/necrotic tissue.
<b>Meropenem 500mg/IV/TDS for 5 days</b>	• Wound becomes infected/necrotic tissue.
<b>Alternative for penicillin allergic patients with established soft tissue infection</b>	Extensive debridement essential. Send samples for microscopy, culture and sensitivity. Continue antibiotic treatment until first surgical debridement/washout. Modify treatment according to culture results. Total duration will depend on extent of injuries and intra-operative findings.
<b>Piperacillin-tazobactam 4.5g/IV/TDS plus</b>	
<b>Posaconazole 400mg/IV/OD</b>	
<b>Alternative for penicillin allergic patients</b>	
<b>Ciprofloxacin 400mg/IV/BD Plus</b>	
<b>Clindamycin 1.2 g/IV/QDS Plus</b>	
<b>Posaconazole 400mg/IV/OD</b>	
<b>Meropenem 1g/IV/TDS Plus</b>	Extensive debridement essential. Send samples for microscopy, culture and sensitivity. Modify treatment according to culture results.
<b>Posaconazole 400mg/BD for 14 days</b>	

- DISCHARGE (Thinking of discharging such a patient? Think twice!!!)**
- If discharging from **A&E or ED:**
    - Normal examination at this stage does not exclude serious and potentially limb-threatening complications developing also pain may not be present initially.
    - Keep the patient in observation for at least 24h BEFORE discharge without fail.
    - Watch for early signs of infection, keep in mind the possibility of unusual organisms being present and compartmental syndrome development.
  - If discharge from **hospital ward:**
    - Encourage the patient to come back to hospital if presence of loss functionality, pain, fever, swelling or any other symptoms.
    - Makes sure you arrange a follow up by the appropriate specialist.
    - PLEASE encourage the patient to contact The Water Jetting Association via their website: [www.waterjetting.org.uk](http://www.waterjetting.org.uk) or Tel: +44 (0) 2083 201 090 for the most up-to-date treatment, development and clinical research findings.

- COMPLICATIONS (usually after a week)**
- **From surgical wound:**
    - Check results from **WOUND SWABS** and **TISSUE SAMPLES** taken and sent previously for microbiological and histological examination. If unusual pathogens or any filamentous fungi detected, please liaise with Infectious Disease expert for advice on management and antimicrobial treatment. Consider urgent surgical review if patient deteriorates. Consider **NEW DEBRIDEMENT** and **DECOMPRESSION** and closure by second intention. For high grade injuries already on temporary NPWT (negative pressure wound therapy) there would be a need for a new "wash out" use the earliest possible definitive plastic surgical wound closure.
  - **Systemic presentation:**
    - Unusual infections with micro-aeophilic organisms (usually GBM negative) and fungal. Check for previous cultures. Leptospirosis (Weil's disease) presents as a febrile illness, meningitis, muscle aches, and sometimes aseptic meningitis. Classical tissue invaders: *Juncea*, *mal* (fungal and haemorrhage). Check (IgM) ELISA, Hepatitis A, B, C.

- THEATRE (Surgical Emergency)**
- The initial **DEBRIDEMENT** and **DECOMPRESSION** should start as soon as an experienced trauma surgeon is available. **WOUND SWABS** and **TISSUE SAMPLES** should be taken and sent for microbiological and histological examination so that the presence of fungal spores at high risk there of.
  - **DECOMPRESSION, FASCOTOMY** of all compartments must be done if patient is having a compartment syndrome or considered to be at high risk there of.
  - Tissue that is definitely avital will have to be removed, whereas traumatized but potentially surviving tissue areas will be evaluated in a "SECOND-LOOK" 36-48 hours later.
  - In cases of contamination (often the case), manual wound IRRIGATION 3-9 L will be useful with additives such polyhexanide, octenidine or superoxidized water.
  - NEVER primary close, as this is a contaminated wound. Primary closure ONLY in the case of certain decontamination and overall vitality of the wound. For high grade injuries, a temporary NPWT (negative pressure wound therapy) could be used until the earliest possible definitive plastic surgical wound closure.