FRCA Podcast

Episode 8 - Pain Management for Burns

Dermis

Papillary dermis (superficial)	20% of dermal thickness Loose connective tissue; dermal papillae projecting into the connecting with the epidermis.
Reticular dermis (deep)	80% of dermal thickness Dense, compact network of collagen and elastic fibres.

Sensory structures in the dermis

Papillary dermis (superficial)	
Free nerve endings	Pain and temperature
Meissner's corpuscles	Light touch, texture, low-frequency vibration
Reticular dermis (deep)	
Pacinian corpuscles	Deep pressure, rapid high-frequency vibration
Ruffini endings	Continuous pressure, stretch, tension
Hair follicle receptors	Mechanoreceptors for movement and displacement of hairs

Note: given this structure, it follows that burns of the superficial dermis result in painful injuries (nociceptors still intact) whereas burns of the deep dermis are less painful (obliteration of the nociceptors). Similarly, destruction of blood vessels in deep dermal burns leads to the absence of blister formation, which is seen in more superficial burns.

Types of pain

Background - burn wounds, immobility, pressure sores, heat, cold, pruritus, lines/drains
Breakthrough - contractures, repositioning, physiotherapy, washing
Procedural - dressing changes, debridements, grafting

Physiological - urinary retention, gastritis, constipation, disordered sleep
Surgical - traumatic injuries, compartment syndrome, intestinal obstruction or perforation

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Analgesic modalities

Analgesic choice is dictated by the nature of the burn wound and the physiological condition of the patient. There is a difference between a 5% burn wound to an extremity and a 50% burn with physiological derangement, or a burn involving the face, hands or genitalia etc.

Background	Paracetamol; long-acting opioids or an opioid infusion.
Breakthrough	Opioids (oral, intranasal, intravenous), Ketamine, Midazolam, Nitrous oxide
Procedural	
Pruritis	Chlorpheniaramine (competitive H1 receptor antagonist)
Physiological	Mechanical correction (nasogastric tube, urinary catheter), laxatives

Critical illness

Oral absorption may be unpredictable. The subcutaneous and intramuscular routes are equally unreliable. The side effects of drugs such as NSAIDs and opioids may limit their use. Patient controlled analgesia infusions may also be difficult to manage.

Regional and neuraxial analgesia

Regional and neuraxial analgesia are limited by:

- Location of the burn - needle puncture site; distribution of analgesia (inadequate cover)
- Cather and dressings - focus of infection; liable to displacement
- Limited duration of action (up to 72 hours) inadequate for longer term analgesia.
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- Haemodynamic side effects of neuraxial block in the context of critical illness.
- LAST - hypoalbuminaemia; surgical infiltration of large volumes of local anaesthetic and adrenaline to minimise bleeding during escharotomy or skin grafting. Combining this technique with regional or neuraxial administration may increase the likelihood of local anaesthetic systemic toxicity.