

Introduction

Heterotopic ossification (HO) is a poorly-understood pathological process which can complicate the management of burns. It is thought to be mediated by tissue hypoxia amongst other factors and involves the deposition of lamellar bone around joints and in soft tissues resulting in debilitating pain, decreased range of motion (ROM), loss of function, increased length of hospital stay and, rarely, nerve entrapment. HO is a relatively rare occurrence affecting 0.2-4% of burn patients. The most commonly-affected sites are the elbows, with other joints including shoulders, hips and knees affected to a lesser extent.

There is no consensus regarding the timing of management and treatment. Intervention, if considered at all, is often delayed until maturation of the process for fear of recurrence or exacerbation.

We describe a rarely reported case of ulnar nerve entrapment at the elbow secondary to HO following a burn injury and its necessary, early treatment.

AIM

- 1) To outline our early intervention treatment strategy which resulted in a successful outcome.
- 2) To synthesise evidence from the literature on treatment approaches for HO following acute burns, with reference to rare instances of nerve entrapment in particular.

Case report

A 37-year-old man was admitted to the Mersey Burn Centre following 37% flame burns to the face, neck, bilateral upper limbs and thighs with associated inhalation injury. He required escharotomies to bilateral upper limbs immediately after admission and ultimately had delayed debridement and skin grafting due to requiring ECMO for the acute lung injury.

During the patient's extensive rehabilitation, approximately a month after his injury, he developed marked ulnar nerve palsy of the hand associated with severe pain and reduced ROM of his left elbow.

INVESTIGATIONS:

1. **Serial X-Rays:** focal area of HO inferior to medial humeral epicondyle only evident >2 weeks after onset of symptoms
2. **3D CT-Scan:** area of HO posterior to left trochlea and distal to medial epicondyle of humerus, 3.9x1.2x1.4cm
3. **Nerve Conduction Studies** - severe left ulnar axonal lesion at the level of the elbow

SURGICAL APPROACH:

1. Curvilinear medial elbow incision
2. Neurolysis with preservation of MABC nerve
3. Anterior transmuscular transposition of the ulnar nerve at the elbow
4. Decompression of Guyon's canal
5. Simultaneous HO resection not indicated as MUA achieved >90 degrees passive flexion

PERI-OPERATIVE TREATMENT:

1. Pharmacotherapy
 - a. Perioperative Pamidronate Disodium infusion reducing over 7 days
 - b. NSAIDs
2. Physiotherapy - early mobilisation, active and CPM



Fig 1: X-Rays of the left elbow taken two weeks apart showing HO related to trochlea (right image), absent in the image on the left



Fig 2: 3D reconstruction of CT scan shows HO related to trochlea

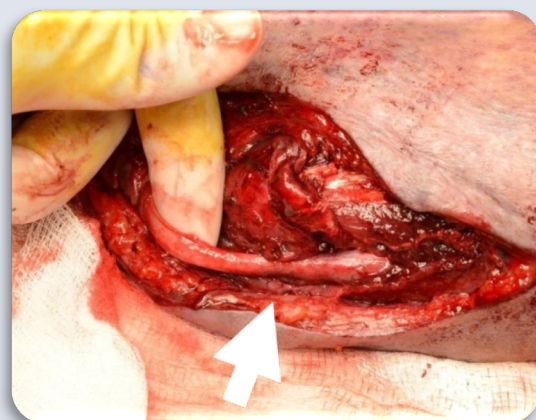


Fig 3: Neurolysis showing inflamed ulnar nerve and narrowing at point of compression

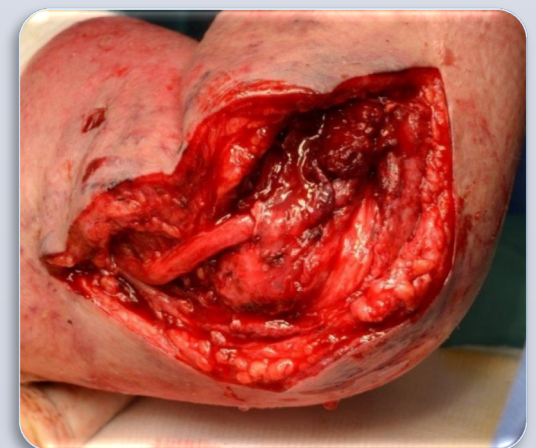


Fig 4: Tranposed ulnar nerve no longer impinged during elbow flexion

Discussion

Our patient made an uneventful recovery, regaining full sensorimotor function and ROM with no evidence of recurrence at 24 months. Our experience demonstrates a positive outcome from early surgery in the presence of HO. Experience of nerve entrapment related to HO is not readily found in the burns literature.

All the available literature identifies the severity of initial injury as a major risk factor associated with development of HO. In addition, Peterson (7) describes a model of burn-enhanced bone formation which may contribute to the pathophysiology of HO.

Risk factors:

- Large TBSA and deep burns
- M>F
- Intensive care stay
- Increased time to wound closure/grafting
- Inhalation injury and mechanical ventilation
- Immobilisation

Treatment modalities are subdivided into therapeutic and preventative modalities:

- Surgical
 - Resection - early(active HO) vs late(mature HO)
 - Nerve decompression - dictated by symptoms of acute entrapment
- Physiotherapy - passive vs active
- Pharmacotherapy
 - NSAIDs
 - Bisphosphonates (low evidence) with a potential role for early surgery
- Radiotherapy (low evidence, risk of soft tissue complications in healing burns in particular)

Conclusion

Our early surgical approach to HO associated nerve entrapment, enhanced with adjuvant pharmacotherapy and aggressive physiotherapy, resulted in a good outcome with no signs of recurrence at 2+ years.

More research is needed to understand the pathophysiology of the disease process and to guide prevention and management of HO. In the meantime, we highlight the successful, early management of a neurologically symptomatic patient with a multimodal approach of early surgical intervention with adjuvant pharmacotherapy and physiotherapy perioperatively.

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