Analysis of Thumb and First Webspace Injuries Due to Fireworks

Brinkley K. Sandvall, MD; Kari A. Keys, MD; Jeffrey B. Friedrich, MD

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INTRODUCTION: Fireworks-related hand injuries can be devastating. We hypothesize that thumb and first webspace injuries are common among fireworks blasts and have distinct patterns of injury.

MATERIALS AND METHODS: We reviewed our hospital database to identify patients with fireworks-related injuries from 2005-2015. Patients with operative hand injuries were included. Chart review identified demographic information, injury characteristics, and operative details.

RESULTS: 105 patients had operative fireworks-related hand injuries. There were 102 males, 3 females, and mean age was 28 years. 6 underwent complete hand amputation through wrist or forearm. 16 patients (16%) had bilateral injuries. In the thumb and/or first webspace injury group, 88 patients (84%) sustained 92 hand injuries and there were: 80 thumb fractures, 8 thumb soft tissue-only injuries, 52 thumb carpometacarpal (CMC) joint fracture dislocations, and 36 thumb fractures outside the thumb CMC joint. 15 had both thumb CMC joint fracture dislocations as well as additional thumb fractures. 23 required thumb revision amputation. 63 hands had deep first webspace injuries, and 11 required flaps for first webspace reconstruction. 6 required secondary reconstruction of a first webspace contracture (4 local tissue rearrangement, 1 flap, 1 skin graft). An external fixator was applied to 6 hands to maintain the first webspace; none of these required secondary web reconstruction. The number of surgeries for acute reconstruction ranged 1 to 7 (mean 1.6), with 19% requiring 3 or more. Later-stage surgeries included: pin removal (35), flap debulking (1), tenolysis (3), osteotomy (2), nail ablation (2), stump revision (5), flap (groin or toe transfer) (3), neuroma excision (1), digital nerve reconstruction (1), capsulotomy (5), first webspace deepening (6), dressing changes in children (3). Excluding isolated pin removals and dressing changes under anesthesia, 17 patients (20%) required later-stage surgeries.

CONCLUSION:
Thumb injuries from fireworks result from high-energy avulsion, hyperextension, and hyperabduction, frequently injuring the thumb, destabilizing the CMC joint, and seriously damaging the first webspace. The first webspace requires particular consideration as deep injury may result in adduction contracture and require secondary reconstruction with tissue outside the zone of injury if not prevented. In our experience, application of thumb stabilization with either a miniature external fixation device or Kirschner wires to stabilize the CMC joint is imperative to maintain the first webspace and prevent thumb adduction contracture.