Flexor tendon lacerations due to high-pressure water injection injury: a case report

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Introduction

The non-dominant hand and index finger are the most frequently involved in high-pressure injection injuries [6, 7]. The magnitude and extent of the injury are related to the chemical properties of, as well as the velocity of, the pressured substance. Many different materials have been reported as offending substances in high-pressure injection injuries, including paint, paint thinner, diesel fuel, organic solvents, grease, and water [6, 7, 11, 12]. It is commonly accepted that, unlike with other materials, high-pressure injection injuries involving water create a minimal inflammatory response that may recover with conservative treatment [2, 8, 9, 11]. Even though the majority of high-pressure water injection injuries are benign, the mechanical force of the compressed water can cause significant soft tissue injuries [1, 3, 12, 13]. To our knowledge, there is only one previously reported case of extensor tendon and superficial branch of radial nerve laceration after high-pressure water injection injury to the hand [1]. In this study, we present a laceration to the flexor digitorum superficialis and profundus tendons of the left index finger caused by a high-pressure water injection injury.

Case Report

A 47-year-old right-hand dominant male was using a high-pressure water injection machine with a 3,700 psi for paint removal. The machine became clogged, and the patient attempted to manually unclog it by tapping it against his non-dominant hand. In doing so, release of high-pressure water occurred. When the patient presented to the emergency room, he complained of excruciating pain to the left index finger. Initial physical examination revealed a 3-cm longitudinal wound on the volar aspect of the left index finger at the level of the middle phalanx (Fig. 1). The finger was mildly swollen; however, the capillary refill was less than 2 s. Two-point discrimination evaluation was less than 4 mm. We were unable to adequately assess range of motion of the affected digit due to the patient's expressed level of pain. Radiographic evaluation of the left index finger revealed no abnormalities. The patient received tetanus prophylaxis and surgical exploration was recommended.

At operation, the flexor digitorum superficialis (FDS) and profundus (FDP) tendons of the left index finger were found to be 100% lacerated. The A3 and A4 pulleys were ruptured (Fig. 2). Bilateral neurovascular structures of the left index finger were explored and noted to be intact. Both tendons were repaired primarily, using figure of eight suture for FDS ulnar and radial legs, and using a six-strand Tsai technique for the FDP [5]. The A4 pulley repaired using remnants of A4 pulley, A3 pulley was not repaired. Post-operatively, the patient was admitted to the hospital for administration of IV rocephin. The patient was discharged the following day on an oral course of bactrim. Physical therapy was initiated on postoperative day 5. At 8 months follow-up visit, the patient was noted to have recovered full range of motion (Figs. 3–4).

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Fig. 1 Volar aspect of the left index finger. The injection entrance can be seen easily

Discussion

It is commonly believed that high-pressure water injection injuries are much safer than injection injuries involving diesel fuel, paint, paint thinner, or other chemicals due to the inert qualities of water [7, 10]. Several authors, including Kon, Curka, Pai, and Snarski, describe managing these injuries in a conservative fashion and obtaining favorable results [4, 8, 9, 11]. However, high-pressure water injection accidents have been described in case reports as causing significant tendon, muscle, and vascular injuries [1, 3, 12, 13].

In this study, we presented a case of flexor tendon lacerations due to high-pressure water injection injury of a non-dominant index finger. This is consistent with studies that reveal this to be the most commonly affected body part for all high-pressure injection injuries [6, 7]. Although generally rare, the anatomical

Fig. 2 The left index finger. Surgical exploration performed and both flexor digitorum superficialis and profundus tendons were cut. Please note that the injection injury was on the volar side of index finger at the middle phalanx level

Fig. 3 The left hand full flexion view. Please note that patient can make full fist

distribution of high-pressure water injection injuries is more diverse and has been known to involve the abdomen, chest, hand, thigh and calf, feet, the arm, and forearm [12, 13].

We agree with Hart et al. and their view that the ideal treatment of high-pressure injection injuries should be prevention through an emphasis on education [6]. We believe that despite an often clinically benign course, high-pressure water injection injuries should not be underestimated. The properties of the high-pressure machine, including the source of water and its temperature, should be obtained and noted. Broad spectrum antibiotics, tetanus prophylaxis, and extremity elevation should be promptly initiated. A high index of suspicion is to be maintained and if there is any indication, surgical exploration should be performed.

Fig. 4 The left hand full extension view

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