Sodium-ypochlorite injection in antecubital fossa: A case report and literature review

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ABSTRACT

Introduction: Caustic cutaneous injections are rare and may result in challenging soft tissue defects necessitating urgent surgical reconstruction to preserve vital structures.

We report a unique case of self-inflicted sodium hypochlorite injection to the left antecubital fossa as a suicidal attempt, which resulted in an exposed median nerve and brachial artery. The adventitia of the brachial artery was injured in this case; hence, the risk of an arterial blowout was considerable.

After thorough debridement, the defect was reconstructed successfully with a reverse lateral arm flap.

Conclusion: Household bleach (sodium hypochlorite) injections are rare and may result in challenging soft tissue defects necessitating urgent surgical reconstruction to preserve vital structures.

1. Introduction

Suicide attempts involving self-inflicted injuries using various methods are common among psychiatric patients. Unfortunately, some of these injuries lead to significant soft tissue defects, which may necessitate complex reconstruction in poorly cooperative patients at times of psychological crisis.

Different caustic materials are used for suicidal attempts or aesthetic disfigurement. However, the majority of incidents were related to the ingestion of chemicals rather than cutaneous injection. To the best of our knowledge, intradermal sodium hypochlorite (house bleach) injections have not been previously reported in the literature.

Two similar cases related to the intradermal injection of hypochlorite acid have been reported in the literature [2,3]. In 1996, the first case of hypochlorite acid injection in the antecubital fossa was reported, which resulted in a 5 × 7 cm ulcer managed by surgical debridement and skin graft [3]. The second case was of a young patient with a 3 × 1.5 cm defect and symptoms of median nerve compression resulting from a hypochlorite acid injection in the distal forearm. The patient was managed by surgical decompression of the median nerve and debridement of the wound, followed by vacuum-assisted closure (VAC) therapy to accomplish full wound closure at 6 weeks after injury [2].

We present a case of self-inflicted sodium hypochlorite injection into the antecubital fossa, resulting in a soft tissue defect with exposure of the brachial artery and the median nerve.

2. Case report

A 22-year-old male, known case of schizophrenia and substance-induced psychosis, was brought comatose to the Emergency Department with hypoglycemia secondary to ingestion of 22 tablets of sulfonylurea, insulin injection, and household sodium hypochlorite (bleaching solution) injected to the left antecubital fossa. The family found multiple empty 50 ml syringes next to the patient along with the sodium hypochlorite bottle.

After resuscitation by the Emergency Team, an initial examination of the left upper limb showed a 7 × 9 cm swelling with greenish discoloration at the left antecubital fossa (Fig. 1). Peripheral pulses were palpable with normal digital oxygen saturation and no signs of acute compartment syndrome. The neurological examination was unreliable as the patient was not cooperative. CT angiogram of the left upper extremity showed stenosis of the ulnar artery attributed to spasm and significant subcutaneous soft tissue edema of the antecubital region without signs of deep tissue penetration.

After stabilization, he was transferred from the Intensive Care Unit and evaluated by the psychiatry team to optimize his psychiatric condition.

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condition.

The chemical burn on the left antecubital region was managed conservatively by local antimicrobial dressing until demarcation of necrosis. Once the patient was clinically stable, he was taken for debridement, which resulted in the exposure of the brachial artery and the median nerve with a 7 × 9 cm soft tissue defect in the antecubital region (Fig. 2). This defect was covered temporarily with a xenograft as a biologic dressing to test wound bed viability before the second look debridement and nerve graft were not indicated as the clinical status of the nerve function could not be assessed at this stage due to poor patient cooperation.

Therefore, the senior plastic surgeon decided to proceed with immediate vascularized soft tissue reconstruction of the defect as a reverse lateral arm flap to cover all vital structures due to its proximity to the defect, limited vascular variability, and well-known anatomy.

As the patient was hostile and aggressive, he was kept in a long-arm cast, and the primary dressing was performed in the operating room under general anesthesia in the early postoperative days.

The postoperative hospital course was uneventful and the wound went on to complete healing (Fig. 3). The patient was kept in the hospital for two weeks to monitor for a brachial artery blowout. During this period, he was evaluated frequently, and a healed scar and an acceptable range of motion of the left elbow joint were observed. Then, he was transferred to a psychiatric facility for further management.

3. Discussion

Ingestion of caustic materials as a suicidal tool and its devastating consequences are well documented in the literature, including, but not limited to, mucosal injury, esophageal stenosis, perforation, and subsequent risk of sepsis and shock [4]. However, two cases of cutaneous injection with a high concentration of chemicals to the upper limbs as suicidal attempts have been reported [2,3]. The first case was reported in 1996, where a 54-year-old female injected hypochlorite acid in the antecubital fossa, which resulted in a 5 × 7 cm necrotic eschar with no other associated symptoms. She was managed successfully with surgical debridement and skin graft [3] without exposure of the vital structures. The second patient was a young female with bipolar disease who had a 3 × 1.5 cm defect at the volar aspect of the distal forearm with median nerve compression secondary to a suicide attempt using hypochlorite acid self-injection. Initially, she underwent surgical decompression of the median nerve and debridement of the wound. Then, noninvasive interventions, including local wound care dressing and VAC therapy, were used to accomplish full wound closure over a 6-week period [2].

Drug abusers have been using household sodium hypochlorite parenterally to clean syringes to avoid the transmission of immunodeficiency virus, but the deleterious complications were minimal due to the scant amount used [6,10]. The extent of a chemical burn resulting from the caustic material injection is difficult to be assessed at first observation, and the extent of the injury is determined over 2–3 weeks. Further, the severity of the resulting damage is related to material concentration, duration of contact, degree of penetration into soft tissue, and the material form [1,5]. The damage produced by sodium hypochlorite can be attributed to several mechanisms. First, it is considered a potent oxidizing agent as a strong alkali that causes protein coagulation. Second, the active ion is the hypochlorous, and the free ions are the chloride. This facilitates the denaturation of tissue proteins forming a necrotic eschar [3,7,8]. Third, coagulative necrosis occurs due to a local drop in tissue pH level, leading to the consolidation of the surrounding soft tissues, intramural thrombosis, ulceration, and fibrosis [9].

Household bleach comes in different concentrations varying from 1% to 6%. Sodium hypochlorite is a strong alkali, with pH 11, and has multiple commercial uses. Moreover, sodium hypochlorite converts to HOCl and generates superoxide radicals upon contact with plasma. It may cause cellular death and hemolysis, which might be complicated with rhabdomyolysis [11].

Caustic injection in antecubital fossa harbors several challenges.

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**Fig. 1.** Full-thickness soft tissue necrosis of the left antecubital region before surgical debridement (2 weeks after presentation).

**Fig. 2.** a: Soft tissue defect following serial surgical debridement. b: Close-up of the defect showing the brachial artery and median nerve.
Very minimal subcutaneous fat exists; hence, penetration of the material to deeper structures is not unexpected. Therefore, the needle injection depth can reach the subfascial plane leading to more severe soft tissue damage. Moreover, vital structures enter the forearm at this region and are at risk of injury and/or exposure. In this case, the adventitia of the brachial artery was injured; hence, the risk of an arterial blowout was considerable. Vascularized soft tissue coverage is urgent in such cases to decrease the chance of devastating complications. Lastly, the median nerve lies in the same fascial plane and hence remains at risk of chemical burn. Because the zone of injury is uncertain, early debridement of the median nerve (in continuity) is not indicated until complete soft tissue healing is achieved and further reconstruction can be planned as indicated clinically (nerve graft, nerve transfer, and tendon transfer).

4. Conclusion and summary

Sodium hypochlorite injections are rare and may result in challenging soft tissue defects necessitating urgent surgical reconstruction to preserve vital structures.

Although House Held bleach is considered a safe chemical for domestic use, unexpected complications can occur if used inappropriately.

Ethical approval

Research protocol was approved by the Local Ethical Committee of King Abdullah International Medical Research Center (KAIMRC), with reference number: RYD-20-419812-100861

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CRediT authorship contribution statement

Dr. Asmaa Bin Mahmoud collected the data and wrote the report, Dr. Salah reviewed the manuscript and edit the manuscript.

Guarantor

Dr. Asmaa Bin Mahmoud

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal upon request.

Declaration of competing interest

The authors have no conflicts of interest or financial support.

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Fig. 3. Two weeks post-reconstruction of the soft tissue defect and coverage of vital structures using reverse lateral arm flap and skin graft of donor site.