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Reconstruction of a massive defect of the neck after a scorpion sting: A case report

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ABSTRACT

Introduction: Cutaneous traumas from scorpion sting envenomation are rare in European countries. Regarding Greece, *Euscorpis sicanus*' complex is the most widespread scorpion species. The venom of these small dark brown arthropods, which shelter in woods, usually provokes local cutaneous symptoms: erythema, edema, cellulitis, urticarial plaques, ulcers and rarely skin necrosis. We present a case of a massive soft tissue defect of the neck due to a scorpion sting managed by a Plastic Surgery Department in Greece.

Case report: In March 2020, a 60 year-old lumberjack was referred to our Clinic due to a neck wound resulting from *Euscorpis cf. sicanus* sting. After multiple surgical debridements in combination with negative pressure wound therapy healthy tissue was achieved. Reconstruction followed using a 7cmX15cm vertical island trapezius musculocutaneous flap based on the dorsal scapular artery and rotated to cover the defect. The trapezius flap, donor site and graft healed well and resulted in satisfying contouring at the one-year follow-up.

Conclusion: This case report is the first presenting Plastic Surgery reconstructive techniques for a massive neck defect after a *Euscorpis cf. sicanus* scorpion sting. Major complications of such stings need to be managed drastically for the optimum patient's outcome.

Introduction

Worldwide, an incidence of 1.2 million envenomations and 3250 deaths per year due to scorpion stings is estimated [1]. Developing and tropical countries are mostly affected [2]. Clinical manifestations vary from local reactions and soft tissue necrosis to systemic toxicity (scorpionism) and death [2]. In Europe, cutaneous traumas from scorpion stings are rare. Especially in Greece scorpion stings are mainly caused by several *Euscorpis* species, since they are abundant all over the country and they live in habitats close to human activities [3]. Its sting usually provokes cutaneous lesions such as urticarial plaques, erythema, cellulitis, abscesses and necrosis. We present a case of a massive soft tissue neck defect due to a scorpion sting managed by our Plastic Surgery Department in Greece.

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Case report

In March 2020, a 60 year-old lumberjack was referred to our Clinic from a Peripheral Hospital for a neck defect resulting from a scorpion sting 10 days before (Fig. 1). The patient had a medical history of unregulated Diabetes mellitus. During the incident, he was carrying woods when he felt a sharp burning pain at the sting point, on the posterior right side of his neck. The patient saw and killed a dark brown scorpion of 3–4 cm length of a common local species. Apart from a short-term headache, he initially felt no other symptoms. Shortly after the sting, redness and swelling were noticed in the entry point, which got worse day by day. A few days later, due to the remote area of living, the Covid restrictions and reluctance of people to seek hospital care, a painful abscess developed with fever and skin necrosis, for which he sought medical help.

In our department, the patient required local debridement to remove devitalized tissues, including purulent skin and subcutaneous tissues extending beyond the periphery of the wound, as well as underlying fascia and muscles. A negative pressure wound therapy (NPWT) dressing was applied to the wound bed. The procedure was repeated until healthy tissue was reached. Tissue specimens were sent for microscopy and histopathology in order to exclude pyoderma gangrenosum and fungal infection, with negative results. The surgical debridement resulted in a soft tissue defect extending from just below the nuchal line to the greatest part of posterior neck surface (Fig. 2). After appropriate antibiotic treatment and wound optimization, reconstruction was planned.

A vertical island trapezius musculocutaneous flap with a 7 cm × 15 cm skin paddle was elevated based on the dorsal scapular artery (DSA), since the pre- and intraoperative Doppler signal showed that this was the dominant supply to lower trapezius. The raised muscle was rotated 180° on the pedicle to cover the defect (Figs. 3, 4). The donor site was closed primarily and the remnant skin defect above the pedicle was closed with a splint thickness skin graft to avoid pedicle compression. The skin paddle was accommodated transversely into the defect. The trapezius flap, donor site and graft healed well apart from minor dehiscence of the flap margins due mainly to difficulties with positioning of the patient, which was managed conservatively. At the one-year follow-up functional and aesthetic results both of donor and recipient sites were assessed satisfactory (Fig. 5).

Discussion

Scorpion stings are a rare entity for clinical doctors in the European countries, since the prevalence of such traumas is low [4]. On the contrary scorpion stings are common in the tropical and subtropical regions, where the most dangerous species are met, posing a major public health problem. Almost all dangerous species belong to the family of *Buthidae*. Even in these cases the majority of scorpion stings are either dry or result in low amounts of injected venom, thus explaining why up to 95% of scorpion stings ensue only in local signs. Systemic manifestations occur in about 5% of cases after a scorpion envenomation causing an inflammatory reaction with catecholamine release and involving multiple systems including the gastrointestinal, neurological and cardio-pulmonary [5]. *Hemiscorpius lepturus*, a species reported in the area of Iran, produces venom containing lytic enzymes (including lysophospholipase D, which lyses cell membranes). These toxins cause severe tissue and organ necrosis and can induce intravascular hemolysis with disseminated intravascular coagulation [6].

Regarding Greece, a remarkable diversity of scorpion fauna and its distribution is noticed [7]. There are 32 confirmed species belonging to three scorpion families, one of *Buthidae*, seven of *Iuridae*, and twenty four of *Euscorpiidae* [7]. *Euscorpius sicanus*' complex



Fig. 1. Defect of the posterior right neck due to the *Euscorpius sicanus* sting, before surgical debridement.



Fig. 2. Defect of the posterior right neck due to the *Euscorpis sicanus* sting, after surgical debridement.



Fig. 3. Trapezius musculocutaneous flap design.

is the most widespread *Euscorpis* group in Greece, found from southern Peloponnisos to northern Greece, and from Epirus to many Aegean islands [7]. None of them produces a strong venom, capable of causing serious systemic manifestations.

Patient's description of the arthropod identifies with the features of *Euscorpis sicanus*. They have dark brown body with yellow-



Fig. 4. From surgery, a vertical island trapezius musculocutaneous flap with a 7 cm × 15 cm skin paddle was elevated based on the dorsal scapular artery (DSA). The raised muscle was rotated 180° on the pedicle to cover the defect. The donor site was closed primarily and the remnant skin defect above the pedicle was closed with a split thickness skin graft to avoid pedicle compression. The skin paddle was accommodated transversely into the defect.



Fig. 5. Final reconstruction at the one – year follow up.

brown legs and sting [8]. They also have strong pedipalps, a stout body, short legs, a short, thin “tail” and a total average adult body length of 4 cm [8]. Their nick name is “small wood-scorpions” as they shelter in woods. They have been seen before in Magnesia and Pelion area, where our patient comes from [8]. This characteristic reinforces the belief that this was the species that has stung our carpenter patient, which he recognized in photos showed to him.

The venom of *Euscorpilus* species is generally very weak and symptoms are exclusively local [4]. The main cutaneous clinical manifestations are erythema, edema, cellulitis, urticarial plaques, ulcers and rarely skin necrosis [9]. Several factors affect the severity of the symptoms: scorpion species, toxin type and amount, age, physical and medical condition of the victim [7]. In our case, the patient suffered from an unregulated Diabetes mellitus, which definitely affected the healing process of the initial skin lesion and made him prone to invasive infection resulting in skin, soft tissue and splenius capitis muscle partial necrosis.

The size of the defect after surgical debridement took up the greatest part of posterior neck surface. A skin graft can be used to close a wound on the posterior aspect of the neck. However, such a graft cannot stretch and if it contracts it will limit neck movement. Thus, the anatomical area of the lesion necessitated coverage with a flap, which is durable, retains the functional adnexal glands and hair

growth, and provides stable wound closure.

The patient was not a good candidate for free flap reconstruction, due to poor regulation of his glycemic status and his general medical condition. Furthermore hospital services were heavily disrupted due to Covid-19 pandemic, with limited availability of theatre time and ICU beds.

Many local flaps have been used for posterior neck coverage, including keystone, V–Y advancement flap, bilobed or cervico-humeral fasciocutaneous flaps, latissimus dorsi, and pectoralis major muscle or musculocutaneous flaps. In this case we chose the vertical lower island musculocutaneous trapezius flap because of its bulk, reliability, proximity, and limited donor site morbidity, since the donor site is closed primarily and the function of upper portion of trapezius muscle is preserved.

According to Mathes and Nahai classification, the trapezius muscle flap has a type II vascular distribution, consisting of major (transverse cervical artery) and additional minor (occipital artery and posterior intercostal artery) vascular pedicles [10]. The vertical trapezius musculocutaneous flap is based on branches of the major artery and can be reliably extended to 12 × 42 cm [11]. The pedicle of this flap has an adequate length, allowing a wide arc of rotation, with sufficient distance from the zone of injury [11]. These characteristics allow minimal donor site morbidity and flap safety [11,12].

In this region, a trapezius myocutaneous flap based on either the superficial branch of the transverse cervical artery or the dorsal scapular artery would be the first-line option for reconstruction, since it provides robust soft tissue coverage with good color and texture match in a 1-stage reconstruction, with short surgical duration, low complication rate, and excellent functional results.

Conclusion

This case report is the first reporting Plastic Surgery reconstructive techniques for the management of a massive neck defect after an *Euscorpis sicanus* scorpion sting. Obviously, major complications of such stings need to be managed drastically for the optimum patient's outcome.

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Patient's consent

Written consent was taken from the patient for publication.

CRedit authorship contribution statement

All authors managed the literature searches and contributed to the writing of the manuscript. All authors read and approved the final manuscript.

Uncited reference

[12]

Declaration of competing interest

None.

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