

## CASE REPORT

# Jael's syndrome: Hemostatic management of an impacted knife in the facial site—A case report

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**Key Clinical Message**

It is essential to take a specific multidisciplinary approach in penetrating maxillofacial traumas; securing the airway, completing the hemodynamic stabilization, and systemic evaluation and consideration regarding the beneficial therapeutic regime.

**Abstract**

Jael's syndrome is defined as a deliberate injury caused by a knife to the skull and facial area. This article describes the case of a young male patient with a penetrating knife on the left side of the face following an assault. Due to the high probability of injury to the descending palatine artery, it was decided to make a femoral pathway for catheter angiography in the operation room and have a standby vascular surgeon for selective embolization of the external carotid artery in case of severe bleeding. The treatment plan included removing the foreign body, exploring the wound, suturing, tetanus immunization, and prescribing antibiotics. There was no significant complication in the postoperative period. However, in the 6-month follow-up, the patient complained of weakness in the left upper lip and hypoesthesia in the pathway of the left infraorbital nerve. Jael's syndrome can be life-threatening, so there is a need for accurate initial management performed by a multidisciplinary team to raise the survival rate of these patients.

**KEYWORDS**

ambulatory surgery, case report, hemostatic, maxillofacial injuries, penetrating

## 1 | INTRODUCTION

Jael's syndrome was defined as a penetrating knife injury to the skull and facial region. This term is rooted in a biblical story of Sisera's murder by Jael. Jefferson, in 1968, reported this syndrome for the first time as a critical injury in the temporal region of an adolescent boy.<sup>1</sup> Jael's syndrome is a rare event among different populations;

however, foreign bodies (FBs) in the maxillofacial region pose a clinical challenge because of difficult access, proximity to vital structures, and the size of the object. These cases may result from assaults, industrial accidents, penetrating knife injuries, and gunshots.<sup>2</sup>

The FBs may disrupt vessel walls by the development of pseudoaneurysms, even if a major hemorrhage is not present on primary clinical examination. If vessel walls

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are disrupted during FB removal, severe bleeding may occur.<sup>3</sup> The first choice for imaging in penetrating FB injuries is computed tomography (CT), especially when FB is metallic. An angiography is required if the patient presents with severe hemorrhage, an increasing hematoma, or if the FB is near a significant vessel.<sup>4</sup> The management of such cases needs a multidisciplinary approach: first, securing the airway; second, completing the hemodynamic stabilization; and third, ophthalmologic, vascular, and neurologic evaluation.<sup>5</sup> Herein, we present a rare case of penetrating knife injury in the facial area, which is distinctive compared with previous cases because it involves a specific part of the face that has high importance due to its vascularization and the vessels passing from it.

## 2 | CASE HISTORY/ EXAMINATION

A 22-year-old man was transferred with emergency medical services (EMS) to the Imam Hossein Hospital (Iran), presenting with a penetrating knife on the left side of the face following an assault by another man while they were drinking alcohol at his brother's birthday party. No significant event was reported from the incident to admission to the emergency section of the hospital. The Glasgow Comma Scale (GCS) was 15/15 before sedation, and the airway was patent. The medical history of the patient was clear, but he claimed routine usage of marijuana. Because of the patient's agitation, he was sedated in the emergency, and the knife was fixed with a bandage to prevent its sudden removal by the patient (Figure 1A,B).

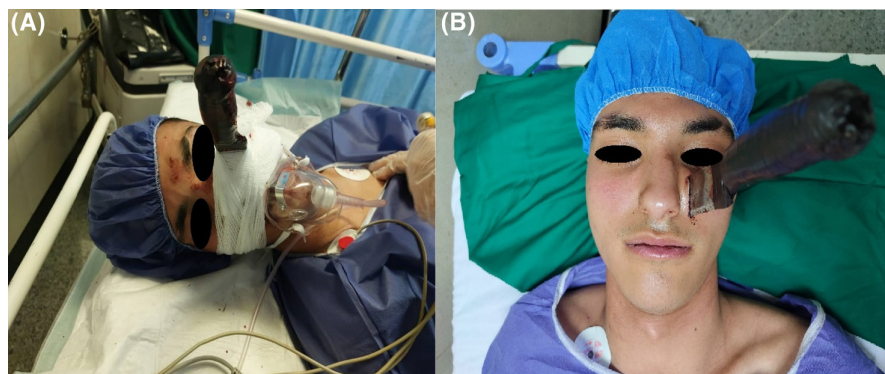
The systemic condition was stable, and there were no signs of dyspnea or changes in the cardiac rhythm and rate. The patient was visited by neurosurgery, general surgery, and ophthalmology services and was discharged due to no significant injuries to the nervous and internal systems or the eyes. There were no signs

of active bleeding in the face or the palatopharyngeal region. Intraoral examination revealed no laceration or dental fractures, but a bulge was palpable in the left tuberosity area in the palate, which was seen as the apex of the knife. The results of emergency laboratory tests were as follows: hemoglobin = 15.1 g/dL, hematocrit = 44.4%, and platelet =  $218 \times 10^3/\mu\text{L}$ . A facial CT scan with three-dimensional (3D) reconstruction was performed to evaluate the extent of the knife injury and the adjacent tissues involved. The facial CT scan revealed the passage of the blade with metallic density from the anterior and medial wall of the left maxillary sinus, extending to the medial of the medial pterygoid process and nasopharyngeal area, and, finally, terminating at the anterior arch of the atlas vertebra (Figure 2A–C). It was also revealed that the patient may have pulled the knife a little before arriving at the hospital (Figure 2A). No serious structural displacement or organ destruction was observed in the facial CT scan other than the anterior and medial wall of the left maxillary sinus perforation.

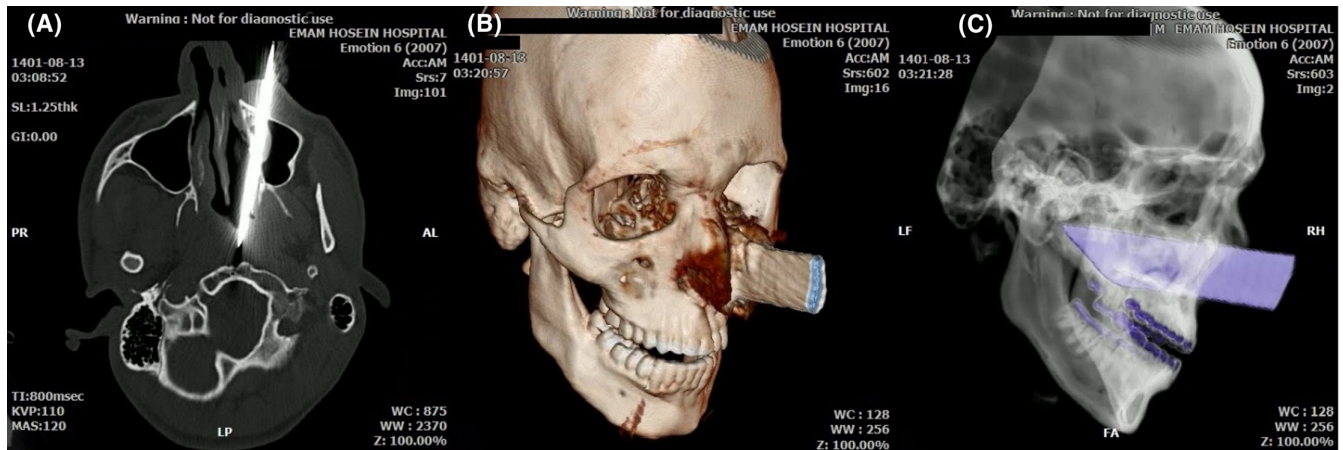
## 3 | TREATMENT

He was given antitetanus prophylaxis and admitted to the oral and maxillofacial surgery ward approximately 40 min after the trauma; 600 mg clindamycin was used intravenously as a prophylactic antibiotic, phenyl ephrine 0.25% was used as the anticongestive, and antihistamine tablets were given as antiallergic medication. A CT angiography (CTA) was performed for better investigation of the knife blade passage and its damage to local arteries (Figure 3A–C).

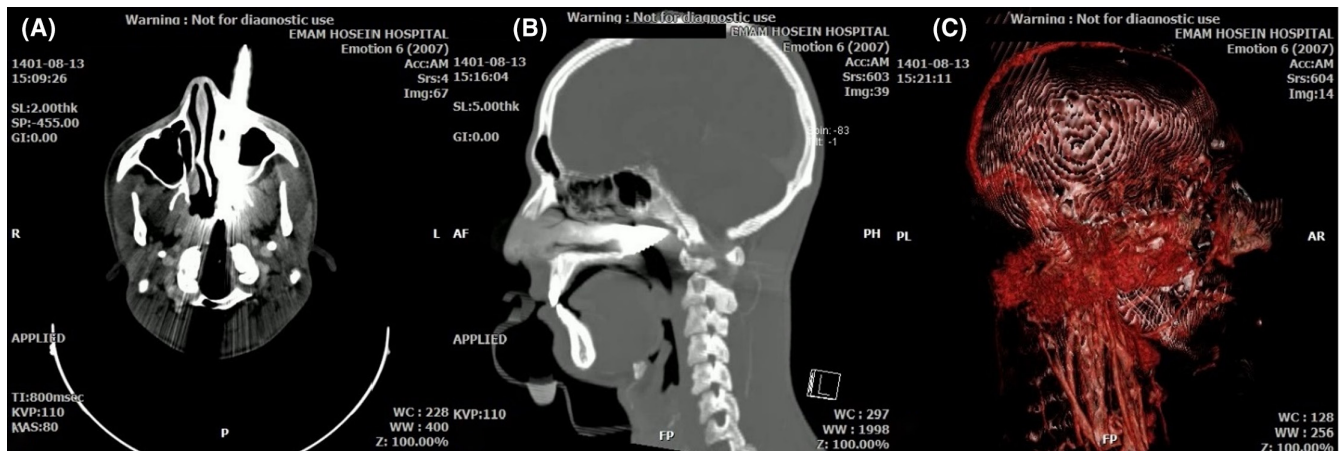
Due to the high probability of injury to the descending palatine artery, and upon consultation with the interventional radiologist and vascular surgeon, it was decided to make a femoral pathway for catheter angiography in the operation room and have a standby vascular surgeon for selective embolization of the external carotid



**FIGURE 1** Preoperative clinical photograph of the patient with an impacted knife in the maxillofacial area; (A) The initial condition of the patient with the fixed knife at the emergency center (B) Frontal view just before surgery.



**FIGURE 2** Facial computed tomography (CT) scan of the patient revealing the passage of the blade from the anterior and medial wall of the left maxillary sinus, extending to the medial of the medial pterygoid process and nasopharyngeal area, and, finally, terminating at the anterior arch of the atlas vertebra; (A) Axial cut, (B) Three-dimensional (3D) reconstruction of the facial computed tomography (CT) scan, (C) Another type of 3D reconstruction of the facial CT scan with metallic emphasis.



**FIGURE 3** Computer tomography-angiography (CTA) of the patient from the facial region revealing the proximity of the knife to the nasopharyngeal area containing vital structures such as the descending palatine artery; (A) axial cut, (B) sagittal cut, (C) three-dimensional (3D) reconstruction.

artery in case of severe bleeding. Besides the 4-unit iso-group, iso-Rh pack cells were reserved. After these precautionary efforts, the operation was performed on the second day of admission under general anesthesia. In the first step, after induction of general anesthesia by oral intubation, local anesthesia (lidocaine 2%) with 1:100,000 epinephrine was injected into the left buccal area. In the second step, the knife was pulled out in the entrance pathway with a gentle force to avoid trauma to adjacent structures during withdrawal. The penetrating part of the knife blade was approximately 9 cm (Figure 4). In the third step, as no significant bleeding occurred, an in-depth exploration of the wound after FB removal was performed with abundant irrigation, and the gel foam was inserted in the site. In the final step,

the incision line was sutured with Vicryl 4-0 and nylon 6.0 in two layers.

#### 4 | OUTCOME AND FOLLOW-UP

Postoperative recovery was successful with the prescription of intravenous clindamycin 600 mg every 8 h, intravenous acetaminophen 1 g every 8 h, intravenous dexamethasone 8 mg every 8 h (which was tapered in 3 days and then discontinued), an antihistamine tablet every 8 h by oral route, intranasal sodium chloride 0.65% every 8 h, intranasal phenyl ephrine 0.25 every 8 h for 3 days, and topical tetracycline 1% every 8 h on the suturing site. The mentioned medications were

continued until discharge, which was 1 week after the surgery (Figure 5A). In the 6-month follow-up session (Figure 5B), the patient complained of weakness of the left upper lip and hypoesthesia in the pathway of the left infraorbital nerve, which was marked with mapping. We recommended physical training with expression

muscles in front of a mirror and self-massage of the site to accelerate nerve recovery.

## 5 | DISCUSSION

Knife penetrating injuries in the maxillofacial area can terminate the patient's life as they can cause severe bleeding by harming the chief blood vessels.<sup>6</sup> When the wound is communicated with the oronasal cavity, hemorrhage can obstruct the airways.<sup>7</sup> Our case was a novel one among penetrating knife injuries in the facial area due to the high probability of injury to the descending palatine artery and massive hemorrhage during the surgery; therefore, a vascular surgeon should be present as the supervisor during the surgery to manage emergencies and provide a femoral pathway for catheter angiography for selective embolization of the external carotid artery in case of severe bleeding. Note that unlike similar case reports,<sup>8,9</sup> in our case, the penetration was not in the orbital area, and the FB was not penetrated through the cranial fossa. Hence, there was no brain damage in our case.

Many routes have been introduced for detecting and localizing FBs. Plain two-dimensional (2D) radiographs, CT scans, magnetic resonance imaging (MRI), and ultrasound can be used, depending on the FB site and composition. CT has been mentioned as the best technique for detecting metallic FBs.<sup>10</sup> CTA is a well-accepted modality that has superseded conventional approaches. The advantages of CTA include short examination time, the ability to visualize injuries to hard and soft tissues and other vital structures without invasiveness and, particularly, the very high resolution of the image.<sup>11</sup> In addition to locating blood vessels, angiography blocks them by selective embolization in cases of severe bleeding in inaccessible sites. Angiography is a useful tool in facial trauma



FIGURE 4 Penetrating part of the knife blade.



FIGURE 5 (A) Clinical photograph of the patient 7 days after operation; (B) Clinical photograph of the patient in the follow-up session 6 months later.

diagnosis, and a vital indication for its use is establishing the proximity of FBs to the arterial blood supply of the maxillofacial area. Selective emergency angiography should be used in patients suffering from penetrating FBs in the facial region.<sup>12</sup> In acute vascular trauma, angiography is a valuable method for planning surgical strategy, for example, for making excellent exposure and access to the involved arteries to control proximal and distal to the site of the injury precisely and as fast as possible.<sup>13</sup> The management approach for this kind of injury should be multidisciplinary and step-by-step. The first step involves providing patency of the airways, hemodynamic stabilization, and vascular, neurologic, and ophthalmologic evaluation,<sup>14</sup> which were done step-by-step in our case. It is recommended that the medical management of cases with penetrating knife injuries should be in the following order: access, FB removal, wound exploration, adequate irrigation, and suturing. Besides, tetanic immunization and prescribing antibiotics should be noted. The ideal technique for removing a penetrated knife is cautious extraction by the primary entrance under general anesthesia.<sup>5</sup> These steps were taken in our case to manage the patient properly, which is consistent with other case reports in this field.<sup>5,15</sup>

Two-thirds of cases with Jael's syndrome are on the left side of the face, which might be related to the fact that most of the population is right-handed. Therefore, it is logical that most attackers are right-handed, which is why it is easier for them to attack the left side of the face,<sup>1,16</sup> which was consistent with our case. Moreover, reviewing the previous articles<sup>14,17,18</sup> revealed that the characteristics of the studied Jael's syndrome patients were as follows: males, 15–35 years old, consuming alcohol at the time of injury, drug abusers, and having a low socioeconomic profile. The incidents usually took place on a weekend, from 9 p.m. until 2 a.m., and were caused by fights at home, which were fully compatible with our case.

Penetrating trauma to the face also injures deeper anatomical structures, which causes postoperative complications such as facial nerve disorders,<sup>19</sup> sialoceles and parotid fistulae,<sup>20</sup> and palsy of sensory nerves.<sup>21</sup> In our case, the proximity of the infraorbital nerve to the site of penetration resulted in hypoesthesia in the left ala of the nose, the left side of the upper lip, and the infraorbital region. Furthermore, due to weakness of the left upper lip, the buccal branch of the facial nerve on the left side of the face may be irritated.

Using CTA for precise investigation of the route of the penetrating knife in the face, the follow-up of the patient, and postoperative complications was among the strengths of this case report. The patient said, “I am very thankful to

God for saving my life despite the horrible accident. I also appreciate the medical team for their delicate surgery. The only irritating thing now is the numbness of my upper lip and nose.”

## 6 | CONCLUSION

Our Jael's syndrome case, with the high probability of injury to a significant artery in the facial area, indicated the necessity of taking specific steps and interprofessional consultation to reach favorable outcomes. This report also highlighted the significance of postoperative follow-up to deal with complications.

### AUTHOR CONTRIBUTIONS

**Mostafa Alam:** Conceptualization; methodology; project administration; supervision. **Mohsen Golkar:** Data curation; validation; visualization. **Ashkan Badkoobeh:** Visualization; writing – review and editing. **Milad Baseri:** Writing – original draft.

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### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

Further data are available from the corresponding author on reasonable request.

### CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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