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CASE REPORT

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Lower limb amputation by emergency medical technicians: a case report from scene

Vahid Ghanbari[1], Abbas Maleki[2], Esmaeil Ghadimi[2], Kiarash Naderi Moghaddam[2], Leili Rostamnia[3] and Ali Ghanbari Rafatie[4,5*]

Abstract

Background Agricultural trauma resulting from machinery poses unique challenges due to severe injuries, delayed access to emergency care in rural areas, and complex extrication procedures. This case study describes the prehospital management and subsequent field amputation of a lower limb performed by Emergency Medical Technicians (EMTs).

Case presentation A 45-year-old male tractor driver sustained extensive lower-limb entrapment in a rotary agricultural device, resulting in severe injuries to the tibia, fibula, and femur. Upon arrival, the EMTs observed bystanders attempting to remove the blades of the machinery. They began caring for the patient according to the XABCDE protocol. The patient experienced severe pain; the EMTs attempted to relieve it, but their efforts were ineffective. Given that extrication of the mangled foot would be time-consuming, the EMTs decided to free the patient by amputating the remaining limb segment. Simultaneously, they requested the helicopter ambulance. However, because of the long time for the helicopter to arrive at the scene, they decided to transport the patient via ground ambulance. They initiated intravenous fluid therapy and notified the receiving hospital of the need for a potential blood transfusion. Upon arrival at the hospital, the patient presented with a decreased level of consciousness.

Conclusions This case revealed several critical challenges for the EMTs: participatory decision-making with the patient's family, inadequate pain management, lack of proper amputation equipment, prolonged helicopter ambulance response, and the mission's subsequent psychological toll. EMTs must be prepared to manage rare, complex cases both clinically and ethico-legally. Therefore, such scenarios should be formally integrated into ongoing training, along with necessary post-mission psychological support.

Keywords Emergency medical technicians, Agricultural trauma, Field amputation, Prehospital pain management, Ethical decision-making

*Correspondence:
Ali Ghanbari Rafatie
alighanbarirafatie@gmail.com
[1]Department of Prehospital Emergency Care, School of Paramedicine, Kermanshah University of Medical Sciences, Kermanshah, Iran
[2]Pre-Hospital Emergency Management Center, Kermanshah University of Medical Sciences, Kermanshah, Iran
[3]Nursing Department, School of Nursing and Midwifery, Kermanshah University of Medical Sciences, Kermanshah, Iran
[4]Student Research Committee, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, Sanandaj, Iran
[5]Kurdistan University of Medical Sciences, Shohadaye Niru-ye Entezami Boulevard, Pasdaran Boulevard, School of Medicine, First Floor, Office of the Research and Technology Committee, Central District, Sanandaj City, Kurdistan Province, Sanandaj County, Iran

Background

Traumatic injuries from agriculture are one of the public health issues all over the world [1]. These injuries are associated with higher morbidity and mortality because of delayed access to medical care [2]. Entrapment in rotating farm machinery creates technical extrication challenges that can delay resuscitation, worsen hemorrhage, and increase ischemic time, raising the risk of irreversible tissue loss and rhabdomyolysis [3]. For prehospital providers, the immediate priorities are rapid control of exsanguinating hemorrhage (e.g., tourniquet application), followed by airway and breathing assessment, circulation management, effective analgesia, and timely coordination of extrication and transport [4].

When entrapment prevents access to life-saving interventions or evacuation, emergency field amputation, while rare, may be the only viable option to save life; such interventions demand clear team leadership, decisive communication, and situational risk–benefit judgment.

This case report describes the prehospital assessment, decision-making, and technical steps taken in the management of a patient with lower-limb entrapment in agricultural machinery, emphasizing practical lessons and protocols relevant to EMTs.

The decision for on-scene amputation, while rare, is a recognized life-saving measure in extreme circumstances, when entrapment prevents life-saving interventions or evacuation [5]. Such a decision is undertaken only when no alternative strategy remains to ensure survival. The implementation of this measure entails complex ethical considerations, including family involvement in decision-making and the procurement of informed consent under crisis conditions. For instance, a case report of an 11-year-old child with multiple traumas from a similar device highlighted the critical need for clear pain control protocols, structured family communication, and access to alternative extrication tools [6].

Given the inherent complexity and distinctive characteristics of these incidents, individual case reports can provide valuable data to optimize prehospital trauma care. The present report aims to describe the prehospital management of a patient with lower-limb entrapment in an.

Case presentation

At approximately 8:00 a.m., during shift handover, the Emergency Communications Center dispatched the EMTs to an accident, announcing codes 10–33 and 10–99. They were immediately mobilized to the scene, located in a village 40 km away from the base. On arrival, the crew encountered a large, agitated crowd and a single patient with catastrophic right lower limb injury after entrapment in a rotary agricultural implement. Upon arrival, the EMTs were confronted with a scene of extreme severity: a large crowd and a patient with a catastrophic lower limb injury.

Fig. 1 The patient's condition following on-scene amputation, showing the extent of injury

The patient was a 45-year-old male tractor driver who had suffered the injury while working in an agricultural field (Fig. 1). He had dismounted from the tractor to inspect a rotary device attached to it, during which a portion of his pant leg became entangled. Because the machine was operating, his right leg was pulled into the device up to the inguinal region. A witnessed the incident and notified the Emergency Communications Center at 8:00 a.m. The patient was in severe pain, and the bystanders were agitated and distressed. The machinery had drawn the patient's leg up to the inguinal area, with the tibia and fibula extensively crushed and the femur protruding from the hip joint.

Following the XABCDE protocol, the EMTs first applied direct pressure and a tourniquet at the patient's hip to control hemorrhage. Airways and breathing were subsequently assessed and found to be uncompromised. His vital signs at the scene were: Hear Rate > 100 bpm,

Blood Pressure = 100/70 mmHg, and Respiratory Rate = 19 breaths/min. Two large-bore intravenous lines (18-gauge IV cannulas) were established. One bystander had fainted from the distress of witnessing the event. The patient's pain was severe, with even minimal movement eliciting intense vocalizations.

The senior technician requested a helicopter ambulance from the emergency communications center. However, there was no defined landing zone near the accident location. Simultaneously, the EMTs considered possible options for extricating the patient's trapped lower limb. Bystanders had attempted to disassemble the machinery, but the process was slow and complex. The patient's heart rate increased to more than 110 and he became more irritable due to severe pain. The EMTs considered other options, such as oxy-fuel cutting, to amputate the entrapped limb. Ultimately, the EMTs decided to amputate the remaining part of the limb and extricate the patient.

They first explained the situation to the patient's brother and son. Initially, the son opposed the decision. The patient exhibited extreme pain and pale and cold skin, and bystanders were visibly distressed. The EMTs tried to explain the risks and benefits of their decision to convince the patient's son. The patient's level of consciousness decreased to a Glasgow Coma Scale score of 10–11, and their pulse rate was very week. The patient exhibited severe pain, indicated by their psychological reactions. The EMTs administered intravenous diclofenac sodium and acetaminophen for pain relief, but these were ineffective. Fluid resuscitation was continued with 1.5 L of normal saline at scene.

Ultimately, the patient's brother and son provided their agreement with the EMTs' decision to amputate. There was no suitable cutting instrument in the ambulance. The patient's brother offered a personal knife for use. The team proceeded with the amputation using this knife, placed the patient on a long backboard, and transferred him into the ambulance, along with the amputated tissue. One of the EMTs tried to coordinated helicopter ambulance. Ultimately, a helicopter was approved, but the landing site was approximately 20 min from the scene. One EMT was driving, and two were at the patient's bedside in the patient compartment of the ambulance. Given an estimated 15–20-minute wait for the helicopter and the escalating scene safety risks, the decision was made to transport the patient by ground ambulance. During transport, bleeding was controlled with a tourniquet and direct pressure, and fluid resuscitation was continued with 1.5 L of normal saline. An attempt was made to manage the patient's pain with one gram of acetaminophen.

After approximately 45 min of transport, the patient was delivered to a level-one trauma center. During transport, the radial pulse became very weak, and the patient was unresponsive to verbal stimuli. The patient's heart rate was 135, and his blood pressure was less than 80 mmHg at the time of arrival to the emergency department. Upon arrival, a physician and nursing team, alerted by the dispatch center, were prepared for the patient's reception. Following initial stabilization with two units of packed red blood cells, the patient was sent to operating room for emergency surgery for management of crush injuries to the foot and leg. An amputation from the femur was ultimately performed. The patient was discharged from the center approximately one month later and subsequently admitted to a private hospital.

Discussion

This report explores the challenges encountered by EMTs in managing a patient with a mangled limb resulting from agricultural trauma. Several key challenges were identified during scene management, the transportation of the patient to a trauma center, and their psychological support after this mission.

Following primary interventions (hemorrhage control with a tourniquet and intravenous fluid therapy), the EMTs were confronted with the critical decision of how to extricate the entrapped limb. EMTs decided to amputate the crushed limb according to the rule of "saving life over preserving the limb." This principle is recommended when confronting a mangled limb in which three of the four major systems (bone, vascular, nerve, and muscle/soft tissue) are severely injured, and their recovery seems impossible, or when the limb hinders life-saving interventions [7].

Implementation of such a decision needs consent of his family. Effective communication is a core competency for EMTs. Franz et al. and Davoudi et al. emphasize that interpersonal skills are as critical as clinical skills for emergency care personnel [5]. Proficient communication can help mitigate stress for the EMTs, the patient, and bystanders. In this case, the EMTs shared their reasoning with the family, allowing them time to consider the decision, to which they ultimately consented.

Pain management was another important aspect of this patient's care. This situation placed considerable strain on both the patient and the EMTs, a challenge compounded by the limitations of existing protocols. According to Iran's prehospital emergency guidelines, only Diclofenac sodium and acetaminophen are available intravenous drugs for pain control [8]. Pain management is one of the prehospital emergency care services in other countries. Smyth et al. (2025) studied acutely injured patients aged 16 and older and found that even with injectable medications like morphine or ketamine, more than half still reported moderate to severe pain upon arriving at the hospital [9]. Hassankhani et al. highlighted the

urgent need for effective pain management protocols and advanced prehospital training to address this issue [8]. This case clearly illustrates the critical need to revise prehospital analgesia protocols and policies.

Another challenge in caring for this patient was the lack of standard tools for amputating the entrapped limb. While amputation was justified by the principle of beneficence, performing it with an inappropriate tool risks violating the principle of non-maleficence, as it can cause further tissue damage and patient harm. Access to appropriate tools can enable safer implementation of such emergency procedures [10]. Gedei et al. emphasize that appropriate tools for field amputation must be readily available, as using inappropriate equipment can delay rescue and cause further harm by crushing bone and soft tissue. According to the findings of this study, tools such as the reciprocating saw, which offer faster and cleaner amputations, should be available on scene as first-choice devices [11]. Therefore, preparedness for rare but critical events, including equipping ambulances based on local occupational hazards, is essential [12].

Furthermore, the EMTs decided to transport the patient by ground ambulance rather than waiting for an air ambulance. According to the protocol, this case should be transferred to the hospital via helicopter ambulance [13]. In such a situation, the decision to wait for air medical transport should be made based on the scene situation, the patient's situation, and the possible waiting time for the response time of the air medical ambulance. EMTs must be able to choose the best way of transportation based on the potential benefits and risks associated with their different options [14]. Sutham et al. emphasize that clarifying and making air ambulance dispatch protocols more dynamic by simultaneously considering medical factors, weather conditions (cloud cover, wind speed, and air pollution), and operational factors can shorten decision-making and improve air emergency response times [15]. Therefore, we suggest developing a clear, dynamic protocol for air ambulance dispatch to expedite decision-making and reduce response times in such scenarios.

Another notable aspect of this case was the psychological stress imposed on the EMTs. Studies have shown that emergency personnel exposed to traumatic and painful scenes often develop acute anxiety symptoms [16, 17]. Therefore, after such missions, EMTs should participate in a debriefing session held by their organization. Boland et al. (2019) note that burnout has been linked to absenteeism and intention to leave the profession among EMS providers, citing previous research [18]. The authors suggest that social support outside the workplace may be a critical resource for managing occupational stress, and that workplace-based supports such as critical incident stress debriefings may also play a role in mitigating psychological distress. They emphasize that organizations should implement interventions that promote optimal coping strategies and foster strong social connections to support provider well-being [19].

Conclusions

This case demonstrates that EMTs should be prepared not only for common emergencies but also for rare yet critical cases. Therefore, the management of mangled limbs should be formally integrated into EMTs' ongoing training and education. Successfully managing such cases requires more than clinical skill; it also demands critical thinking and decision-making under pressure, including delivering bad news, addressing ethical dilemmas, engaging patients and families, and selecting appropriate transport strategies, often with limited resources or non-standard equipment. In addition, this case highlights the need to [1] update prehospital pain management protocols and drug formularies [2], establish clear decision-making processes for air ambulance dispatch in remote areas, and [3] ensure the availability of appropriate equipment for field amputations.

Abbreviations

EMT	Emergency medical technician
IV	Intra venous
XABCDE	Exsanguinating hemorrhage, Airway, Breathing, Circulation, Disability, Exposure/Environment
10-33-(Police/EMS Code)	Often means "Emergency, all units stand by" or a critical situation. In this context, it signals a high-priority emergency
10-99-(Police/EMS Code)	Often means "Wanted/stolen" or "Critical incident." Here, it likely indicates a "mass casualty" or "critical emergency" to convey the severity of the accident

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Author contributions

V.G. (Vahid Ghanbari) transcribed the interviews and drafted the manuscript. L.R. (Leili Rostamnia) conceived the study idea. A.M. (Abbas Maleki), E.G. (Esmaeil Ghadimi), and K.N.M. (Kiarash Naderi Moghaddam) participated in conducting the interviews. A.Gh.R. (Ali Ghanbari Rafatie) participated in the interviews, contributed to writing the manuscript, and reviewed and approved the final manuscript. All the authors read and approved the final manuscript.

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Data availability

Not applicable. This study did not generate any datasets and was based solely on interviews with emergency medical technicians. The audio recordings of the interviews are kept confidential by the researchers to protect privacy, but the interview transcripts can be made available upon request for valid reasons.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and the case report was prepared following the CARE guidelines. The study was approved by the Ethics Committee of KUMS (IR.KUMS.REC.1405.004).

Consent for publication

Consent for the publication of the patient's images was obtained, and informed consent for participation in the study was also obtained from the emergency medical technicians.

Competing interests

The authors declare no competing interests.

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