








Case Report

Difficult airway management and cardiac arrest in an obese patient with maxillofacial fractures: a case report

Amir Rahmanian Sharifabad¹  , Sayyed Reza Ahmadi Koupaei² , Mahmood Hosseinzadeh Maleki³ ,
Elhamsadat Mousavi⁴ 

¹Assistant Professor of Emergency Medicine, Faculty of Medicine, North khorasan University of Medical Sciences, Bojnurd, Iran

² Assistant Professor of Emergency Medicine, Department of Emergency Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

³ Associate Professor of Cardiovascular Surgery, Department of Cardiac Surgery, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

⁴ Faculty of Medicine, North khorasan University of Medical Sciences, Bojnurd, Iran

Corresponding Author:

Tel: +989155576619

Email: rahmanian_amir@yahoo.com

Abstract

We present a case report of a challenging airway management and subsequent cardiac arrest in an obese patient with complex maxillofacial fractures. The patient, a young unknown man involved in a motorcycle accident, was brought to the emergency department with a low level of consciousness. Cervical immobilization was initiated, and the patient was triaged as a level 1 according to the Emergency Severity Index. Despite the use of a cervical collar, airway compromise and severe maxillofacial bleeding necessitated immediate intervention. This case report highlights the challenges encountered during intubation, the development of tension pneumothorax, and the successful management of cardiac arrest in this complex trauma patient.

Key words: Pneumothorax, Advanced Trauma Life Support Care, Thoracostomy

Citation: Rahmanian Sharifabad A, Ahmadi Koupaei S.R, Hosseinzadeh Maleki M, Mousavi E. Difficult airway management and cardiac arrest in an obese patient with maxillofacial fractures: a case report. J Surg Trauma.2023;11(4):159-162.

Received: June 25, 2023

Revised: October 30, 2023

Accepted: March 3, 2024

Introduction

Managing the airway in trauma patients with complex maxillofacial fractures and obesity is a challenging and high-stakes task (1). These patients often have limited neck mobility, a short thyromental distance, and increased soft tissue thickness, which complicates airway management (2,3). Complications, such as hypoxia and hypercarbia, can be life-threatening if intubation is prolonged or requires multiple attempts (4). In such cases, it's crucial to recognize and promptly manage complications like tension pneumothorax, which can further jeopardize the patient's well-being (5). The successful resolution of cardiac arrest in the presented case underscores the importance of a well-coordinated healthcare team, rapid assessment, and effective communication among team members (1).

In summary, managing the airway in trauma patients with complex maxillofacial fractures and obesity demands the utmost skill and readiness from healthcare providers, emphasizing the need for continuous skill development and adherence to the latest guidelines for optimal patient outcomes.

Case

A young obese man involved in a motorcycle accident was brought to the emergency department by emergency medical services.

The patient presented with a low level of consciousness and was immediately triaged as a level 1 according to the Emergency Severity Index. Cervical immobilization was initiated using a cervical collar fixed by emergency medical technicians. Upon assessment, the patient exhibited severe maxillofacial bleeding, necessitating immediate airway intervention. Airway management was initiated following Advanced Trauma Life Support guidelines (6). Given the patient's unresponsiveness, maxillofacial fractures, and bleeding, rapid sequence intubation (RSI) was performed using a video laryngoscope (7).

Intubation was challenging due to the patient's obesity, complex maxillofacial fractures, and limited visualization. However,

successful intubation was achieved with an in-line and immobilized cervical spine. Following intubation, the placement of the endotracheal tube was confirmed using capnography and bilateral lung auscultation. The patient was connected to a mechanical ventilator in Synchronized Intermittent Mandatory Ventilation (SIMV) mode with Volume-Controlled Ventilation (VCV) settings based on ideal body weight (8). Initial vital signs were stable, with a heart rate of 80 beats per minute and blood pressure of 135/75 mmHg.

However, shortly after the initiation of mechanical ventilation, the ventilator was alarmed for high airway pressure. Simultaneously, the patient's heart rate increased to 160 beats per minute, and the central pulse was not palpable. These findings were indicative of a potential tension pneumothorax resulting from positive pressure ventilation. Immediate actions were taken to address the situation. Chest compressions were initiated according to the American Heart Association (AHA) guidelines for cardiopulmonary resuscitation (CPR) (9). The patient was disconnected from the ventilator, and bag-valve-mask ventilation using a two-person technique was performed to ensure adequate ventilation and oxygenation. Manual ventilation was carefully administered considering the observed high airway resistance.

Additionally, a bilateral needle thoracostomy was performed in the fifth intercostal spaces between the mid and anterior axillary lines, resulting in the audible release of air bilaterally (10). After two minutes of chest compression, spontaneous circulation (ROSC) was returned. Hemodynamic stability was restored, and the patient's vital signs showed improvement. The subsequent management involved stabilization, further investigation of the underlying injuries, and multidisciplinary involvement to optimize the patient's outcome.

Discussion

This case report highlights the challenges encountered during difficult airway management

in an obese patient with complex maxillofacial fractures. The combination of limited neck mobility, short thyromental distance, and obesity can significantly impact the success of intubation (7).

The development of tension pneumothorax, potentially resulting from positive pressure ventilation, further complicated the patient's condition and led to cardiac arrest. Tension pneumothorax occurs when air accumulates under pressure in the pleural space, causing compression of vital structures and compromising cardiac output.

In this case, positive pressure ventilation likely contributed to the progression from simple pneumothorax to tension pneumothorax, leading to cardiac collapse. Needle thoracostomy was performed as an immediate life-saving intervention to relieve the tension and restore circulation (9,11). The prompt recognition of the deteriorating clinical situation, including high airway pressure, increased heart rate, and absent central pulse, allowed for swift initiation of appropriate interventions. Effective CPR, needle thoracostomy, and timely restoration of circulation were vital in achieving ROSC.

Conclusion

Managing difficult airways in trauma patients demands a systematic and collaborative approach, as evident in this case report involving an obese patient with complex maxillofacial fractures. The challenges encountered serve as a stark reminder of the intricacies inherent in airway management. The development of tension pneumothorax and subsequent cardiac arrest underscores the critical importance of swift recognition and immediate interventions. Timely initiation of chest compressions, needle thoracostomy, and appropriate ventilation techniques played a pivotal role in securing a positive patient outcome.

This case report illustrates the interplay of factors in airway management and trauma care, emphasizing the need for continuous education, adherence to established guidelines, and a proactive and

coordinated healthcare environment. By upholding these principles, we can better navigate the complexities of managing difficult airways in trauma patients and enhance overall patient outcomes.

Acknowledgments

We would like to express our sincere appreciation to the dedicated nurses of Bojnurd Imam Ali Hospital Emergency Department for their invaluable assistance and exceptional patient care throughout the management of this complex trauma case. Their expertise, teamwork, and commitment to providing quality healthcare contributed significantly to the successful outcome of this patient. We extend our heartfelt gratitude to each member of the nursing team for their unwavering dedication and professionalism. This article with code IR.NKUMS.REC.1402.193 has been approved by the ethics committee of Bojnord University of Medical Sciences.

Conflict of Interest

The authors of this case report declare that there are no conflicts of interest to disclose. No financial or personal relationships with individuals or organizations could have influenced the reporting, analysis, or interpretation of the clinical findings presented in this case. All medical decisions and actions taken in the patient's care were based on clinical indications and best practices without any external influences. This case report is intended solely to contribute to medical knowledge and does not serve any commercial, financial, or professional interests.

References

1. Sakles JC, Laurin EG, Rantapaa AA, Panacek EA. Airway management in the emergency department: a one-year study of 610 tracheal intubations. *Ann Emerg Med.* 1998;31(3):325-332.
2. Frerk C, Mitchell VS, McNarry AF, et al. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. *Br J Anaesth.* 2015;115(6):827-848.
3. Smith JE, Reid AP. Maxillofacial trauma. *Br J*

Anaesth. 1999;82(2):258-261.

4. Peterson GN, Domino KB, Caplan RA, Posner KL, Lee LA, Cheney FW. Management of the difficult airway: a closed claims analysis. *Anesthesiology*. 2005;103(1):33-39.

5. Ball CG, Hameed SM, Evans D, Kortbeek JB, Kirkpatrick AW, Canadian Trauma Trials Collaborative. Tension pneumothorax complicating airway management in the prehospital setting. *Prehosp Emerg Care*. 2008;12(2):239-244.

6. American College of Surgeons. Advanced Trauma Life Support (ATLS) Student Course Manual. 10th ed. Chicago, IL: American College of Surgeons; 2018.

7. Cook TM, Woodall N, Harper J, et al. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult

Airway Society. Part 2: intensive care and emergency departments. *Br J Anaesth*. 2011;106(5):632-642.

8. Ferguson ND, Fan E, Camporota L, et al. The Berlin definition of ARDS: an expanded rationale, justification, and supplementary material. *Intensive Care Med*. 2012;38(10):1573-1582.

9. Neumar RW, Shuster M, Callaway CW, et al. Part 1: executive summary: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*. 2015;132(18 Suppl 2):315-367.

10. Smith JE, Bleetman A. Needle thoracocentesis in tension pneumothorax: insufficient cannula length and potential failure. *Injury*. 2004;35(1):79-80.

11. Saghafinia M, Motamed H, Esfandiari E, et al. Incidence of tension pneumothorax after emergency intubation: a multicenter study. *Eur J Emerg Med*. 2019;26(2):140-145.