

## Original article

# Indications for Emergency Surgical Management in Trauma and Polytrauma Patients at Tobruk Medical Center: A Retrospective Study.

Rihab Absaat<sup>1\*</sup> , Nourah Alharam<sup>2</sup> , Wisal Hamid<sup>3</sup> , Abdulsalam Mustafa<sup>3</sup> , Mariam Alsaour<sup>3</sup> , Mohamed Shawqi<sup>3</sup> 

<sup>1</sup>Department of General Surgery, Faculty of Medicine, University of Tobruk, Tobruk, Libya

<sup>2</sup>Department of ENT, Faculty of Medicine, University of Tobruk, Tobruk, Libya

<sup>3</sup>Faculty of Medicine, University of Tobruk, Tobruk, Libya

Corresponding Email. [rihab.absaat@tu.edu.ly](mailto:rihab.absaat@tu.edu.ly)

## Abstract

Trauma and polytrauma contribute significantly to morbidity and mortality, particularly among young individuals, representing major global health challenges. A substantial proportion of these patients require emergency surgical intervention to control hemorrhage, manage organ injuries, and achieve physiological stabilization. This study aimed to identify the indications of emergency surgical intervention among trauma and polytrauma patients and evaluate the timing of surgical intervention at Tobruk Medical Center. Data were collected from medical records for 700 patients and included demographic characteristics, indications for surgery, and timing of intervention. Patients were categorized according to whether surgery was performed within 24 hours or more than 24 hours after presentation. A total of 88 patients underwent emergency surgical management, with 94 surgical interventions performed overall, as some patients underwent more than one procedure; of these interventions, 63 were for trauma patients, and 31 were for polytrauma patients. Males constituted 82% of the study population. Hemorrhagic shock was the most common indication for surgery, accounting for 45.45% of cases. Trauma patients represented a higher proportion of procedures performed within 24 hours compared with those performed after 24 hours; however, this difference was not statistically significant ( $p=0.079$ ). In conclusion, Emergency surgical management proved to be a cornerstone in the treatment of both trauma and polytrauma patients. The findings clearly demonstrate the importance of rapid assessment and timely surgical decision-making in trauma and polytrauma patients

**Keywords:** Trauma, Polytrauma, Emergency Surgery, Surgical Intervention, Trauma Management.

## Introduction

Trauma remains one of the leading global causes of morbidity and mortality, particularly among young adults. According to the World Health Organization (WHO), trauma accounts for more than five million deaths annually, surpassing the combined mortality rates of malaria, tuberculosis, and HIV/AIDS [1]. In hospital settings, approximately 30–50% of polytrauma patients require at least one emergency surgical intervention within the first 24 hours of admission, and up to 50–70% undergo surgical procedures during their hospital stay, reflecting the high burden of operable injuries in this population [2].

Trauma is defined as a physical injury or wound caused by external force or violence that leads to tissue damage and physiological disturbance [3]. Polytrauma, defined as injuries affecting at least two body regions with one or more being life-threatening, represents a complex clinical condition requiring rapid and coordinated multidisciplinary management [4]. Initial assessment follows the structured primary survey (ABC), focusing on airway, breathing, and circulation to promptly identify and manage life-threatening conditions [4].

Emergency surgical management plays a pivotal role in improving outcomes among trauma and polytrauma patients. While some injuries can be managed conservatively, others require immediate operative intervention to control hemorrhage, repair vital organ damage, and restore hemodynamic stability [5]. Delays in surgical management are associated with increased mortality, higher transfusion requirements, and an elevated risk of multi-organ failure [6].

This study aims to evaluate the indications of emergency surgical interventions in trauma and polytrauma patients at TMC, focusing on acute, life-threatening conditions requiring immediate operative management.

## Methods

This study was conducted as a retrospective observational study at Tobruk Medical Center (TMC). All patients exposed to trauma and polytrauma admitted to the surgical ICU and surgical departments during the period from January/2025 to 30/October/2025 were included. Data were collected from patients' medical records.

A total of 700 cases were reviewed.

## Inclusion Criteria

Patients of all age groups and both sexes were included in the study.

## Exclusion Criteria

- Patients with incomplete medical records or missing data.
- Patients managed conservatively.

- Patients who underwent orthopedic or ophthalmic surgical intervention.

Data analysis was conducted using SPSS Statistics version 25.0. Categorical variables were presented as frequencies and percentages. Fisher exact test was used to assess associations between categorical variables. A p-value<0.05 was considered statistically significant.

## Results

(Table 1) shows the demographic distribution of the study population (n=700) according to age and gender, and type of trauma. Males accounted for the majority of the study population (82%), of whom (71.43%) were classified as trauma patients and (10.57%) as polytrauma patients. Female patients represented (18%) of the study population, including (14.4%) with trauma and (3.85%) with polytrauma. The mean age of the study population was (40.8 ± 16.5). A statistically significant association was observed between gender and type of trauma between groups (p-value =0.014).

**Table 1. Demographic distribution of study population, n=700.**

| Variable        | Trauma (n, %) | Polytrauma (n, %) | Total (n, %) | p-value |
|-----------------|---------------|-------------------|--------------|---------|
| Age (Mean ± SD) | 38.6 ± 15.2   | 42.9 ± 17.4       | 40.8 ± 16.5  | <0.001  |
| Male            | 500(71.43%)   | 74(10.57%)        | 574 (82%)    | 0.014   |
| Female          | 99(14.4%)     | 27 (3.85%)        | 126(18%)     | 0.010   |

Regarding the timing of surgical interventions (Table 2), a total of 94 surgical interventions were performed in 88 patients, as some patients underwent more than one surgical intervention. Of these interventions, 78 (83.0%) were performed within 24 hours, including 49 (62.8%) for trauma patients and 29 (37.2%) for polytrauma patients. The remaining 16 interventions (17%) were performed after 24 hours, comprising 14(87.5%) for trauma patients and 2 (12.5%) for polytrauma patients. Overall, trauma interventions accounted for the majority of surgical procedures performed within the first 24 hours, while polytrauma interventions represented a smaller proportion of early surgical interventions. The difference between trauma and polytrauma interventions according to the timing of surgery was not statistically significant (p-value=0.079).

**Table 2. Distribution of surgical interventions according to timing of surgery among trauma and polytrauma patients.**

| Variables       | Trauma (n, %) | Polytrauma (n, %) | Total (n, %) | p-value |
|-----------------|---------------|-------------------|--------------|---------|
| Within 24 hours | 49(62.8%)     | 29 (37.2%)        | 78(83.0%)    | 0.079   |
| >24 hours       | 14 (87.5%)    | 2 (12.5%)         | 16 (17%)     |         |
| Total           | 63(67.0%)     | 31(33.0%)         | 94(100%)     |         |

(Table 3) Describes the indications of emergency surgical interventions among operated patients (n=88). Hemorrhagic shock was the most common indication, accounting for 45.45% (n=40), including 18.18% (n=16) for trauma patients and 27.27% (n=24) for polytrauma patients. The second most common indication was thoracic emergencies (36.36%, n=32), comprising (12.5%, n=11) for trauma patients and (23.86%, n=21) for polytrauma patients.

**Table 3. Indications of Emergency Surgery Among Operated Trauma and Polytrauma Patients. (n=88).**

| Variable                | Trauma (n, %) | Polytrauma (n, %) | Total (n, %) |
|-------------------------|---------------|-------------------|--------------|
| Hemorrhagic shock       | 16 (18.18%)   | 24(27.27%)        | 40 (45.45%)  |
| Airway compromise       | 6 (6.8%)      | 14 (15.9%)        | 20 (22.7%)   |
| Thoracic emergency      | 11 (12.5%)    | 21(23.86%)        | 32 (36.36%)  |
| Abdominal emergency     | 9 (10.23%)    | 15 (17.04%)       | 24 (27.27%)  |
| Intracranial hemorrhage | 9 (10.23%)    | 11 (12.5%)        | 20(22.7%)    |

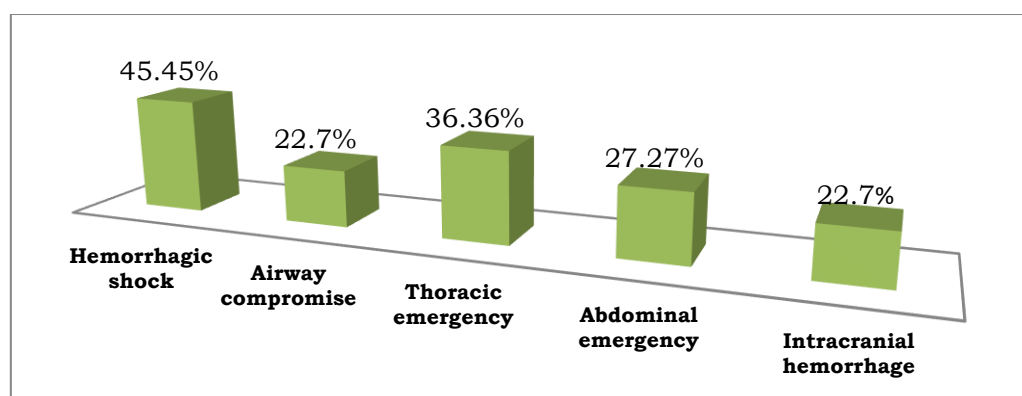


**Figure 1. Indications of Emergency Surgery among Operated Patients.**

A total of 88 patients underwent surgical interventions, with 94 procedures performed, as some patients underwent more than one procedure. Regarding the types of emergency surgical procedures performed, laparotomy was the most frequently performed procedure, accounting for (29.79%, n=28), followed by thoracostomy and craniotomy, which accounted for (22.34%, n=21) and (21.28%, n=20), respectively. Other surgical procedures included two nasal bone reductions, one mandibular fracture fixation, one surgical intervention for scrotal injury, one vascular intervention for femoral vein injury, and one additional procedure for repair of soft palate injury. The distribution of surgical procedures differed between trauma and polytrauma patients, with laparotomy being more frequently performed among trauma patients (Table 4).

**Table 4. Types of Emergency Surgical Procedures Performed in Trauma and Polytrauma Patients**

| Type of Surgery           | Trauma (n, %) | Polytrauma (n, %) | Total (n, %) |
|---------------------------|---------------|-------------------|--------------|
| Laparotomy                | 20 (36.39%)   | 8(20.51%)         | 28 (29.79%)  |
| Craniotomy                | 9(16.36%)     | 11(28.20%)        | 20 (21.28%)  |
| Thoracostomy              | 9 (16.36%)    | 12 (30.77%)       | 21(22.34%)   |
| Thoracotomy               | 12 (21.82%)   | 7 (17.95%)        | 19 (20.21%)  |
| Other surgical procedures | 5 (9.09%)     | 1 (2.56%)         | 6 (6.38%)    |
| Total                     | 55 (58.51%)   | 39 (41.49%)       | 94 (100%)    |

## Discussion

The present study provides an overview of the indications of emergency surgical intervention among trauma and polytrauma patients at Tobruk Medical Center. Regarding the demographic characteristics of the study population, the mean age (Mean  $\pm$  SD) was  $40.8 \pm 16.5$ . The findings demonstrate a predominance of male patients in both trauma and polytrauma (71.43%, n=500) and (10.57%, n=74), respectively. These findings are generally consistent with the systematic review conducted by Boughton et. al., which analyzed trauma registry data from 14 low- and middle-income countries, including more than 103,000 trauma patients. Their study reported that males represented a median of 75% of trauma patients [7]. The higher proportions of male patients observed in the current study may reflect greater exposure to road traffic accidents, occupational hazards, and other high-risk activities. Hemorrhagic shock was identified as the leading indication for emergency surgery, accounting for (45.45%, n=40). Among these cases, both trauma and polytrauma patients were represented and accounted for (18.18%, n=16) and (27.27%, n=24), respectively. These findings are comparable with the prospective study conducted in the United Kingdom and Ireland, which assessed 363 trauma patients from 34 hospitals; the study reported that 51% of emergency operations were performed for hemorrhage control [8].

Thoracic injuries constituted the next most common indication for surgical intervention (36.36%, n=32), with cases occurring in both trauma (12.5%, n=11) and polytrauma patients (23.86%, n=21), followed by abdominal emergencies (27.27%, n=24), with (10.23%, n=9) and (17.04%, n=15) for trauma and polytrauma patients. In addition, (83.0%, n=78) of emergency operations were performed within the first 24 hours; (62.8%, n=49) were among trauma patients, while polytrauma accounted for (37.2%, n=29). In terms of surgical procedures, laparotomy was the most frequently performed procedure (29.79%, n=28), followed by thoracostomy, which accounted for (22.34%, n=21) of patients who underwent emergency surgical intervention; these findings align with a study conducted by Kulshrestha et al., which confirms that while abdominal trauma frequently demands aggressive operative management like laparotomy, the tube thoracostomy remains the single most common invasive procedural intervention required for chest trauma management (80–84%) [9]. The predominance of hemorrhagic shock and the high proportion of early surgical intervention observed in our study are therefore consistent with current trauma practice, where rapid hemorrhage control and timely surgery remain the cornerstone of successful trauma management.

## Conclusion

Emergency surgical management proved to be a cornerstone in the treatment of both trauma and polytrauma patients, with hemorrhagic shock being the most common indication. The study population was predominantly male. Laparotomy was the most frequently performed surgical procedure, reflecting the significant burden of abdominal trauma requiring operative management. The findings clearly demonstrate the importance of early recognition, rapid assessment, and timely access to appropriate surgical care. Strengthening trauma systems, operative capacity, and multidisciplinary trauma management are essential to improve the care of trauma and polytrauma patients at Tobruk Medical Center.

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**Ethical approval** was obtained from the Research Ethics Committee (REC), Faculty of Medicine, Tobruk University, under approval number NBC:009.H.25.45 (16/10/2025).

### Conflicts of Interest

The authors declare no conflicts of interest.

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