CME LIVE OPEN ACCESS

Journal of
Clinical Anesthesia and Research

Research Article

Polytrauma in Surgical Intensive Care at Kara University Hospital

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Received: 2024 Feb 05 **Accepted:** 2024 Feb 25 **Published:** 2024 Mar 05

Abstract

Title: Polytrauma in surgical intensive care at Kara University Hospital

Context: Since 2011, the increase in road accident injuries with the increase in deaths of young people, a real public health problem, has led to the strengthening of preventive measures including compliance with the Highway Code. Road accidents kill around two people every day outside the hospital in our context.

This study provides information on hospital deaths. From two types of death, the desire will arise to strengthen preventive measures and optimize hospital care to reduce mortality.

The objective: Was to describe the epidemiological and lesion aspects and analyze the evolutionary aspects.

Results: 605 trauma patients (12%) hospitalized over 3 years with 230 multiple trauma patients (38%); 218 patients were studied. The average age was 31.83±16.33 years. The sex ratio was 4.7. 66.1% of patients came from cities; motorcycle taxi drivers and students and pupils represented 25.7% and 17.9% respectively. Polytrauma is caused by road accidents (91.3%). The most frequent injury association was cranioencephalic trauma (83.3%) followed by limb trauma (56.4%). Edema-hemorrhagic contusion was the most common neurological lesion (34.4%). Limb fractures accounted for 45.5%. The evolution was marked by morbidity 56.9% dominated by infections (50%) and mortality 44.5%. Severe coma was the most common factor linked to death (18.3%).

Conclusion: The evolution of treated polytrauma patients was marked by high mortality among young people. The prevention of multiple trauma involves respecting the Highway Code.

Keywords: Polytrauma, Surgical Resuscitation, Chu-Kara, Togo

1. Introduction

1.1. Context

The multiple trauma patient is a serious trauma patient likely to have multiple lesions and/or threatening the vital or functional prognosis. Trauma is responsible for more deaths and disabilities worldwide than malaria, tuberculosis and AIDS combined, including 90% of deaths in low-income countries [1, 2]. Mortality in France in 2019 linked to trauma was 14%. Serious trauma represented the leading cause of mortality in young people and the third leading cause of mortality across all generations, after cancer and cardiovascular diseases [3].

Victorian studies in 2010 estimated the overall mortality rate for serious trauma patients at 6.2% [4]. In Togo, a study carried out in 2016 by Tomta and all [5] at Sylvanus Olympio University Hospital had a case fatality rate of 30%.

At the CHU-Kara, 420 km from Lomé in the north of Togo, no study carried out on polytrauma to take stock of the situation since the arrival of the resuscitation anesthesiologist in November 2019. This study should contribute to prevention and the reduction in mortality of polytrauma patients in intensive care. The main goal was to explain the epidemiological, physical, and rehabilitative aspects of polytrauma patients in surgical intensive care at CHU-Kara.

2. Materials and Methods

This was a retrospective, cross-sectional, and descriptive study of the records of patients hospitalized in surgical intensive care for multiple trauma. The study concerned the files of patients hospitalized from April 1, 2020 to March 31, 2023 (36 months). The execution took place from August 1, 2022 until March 31, 2022.

The parameters studied were collected from medical files, therapeutic records and registers of surgical intensive care patients. The parameters studied were: socio-epidemiological aspects [age, sex, profession, origin, circumstances of occurrence of the polytrauma]; Lesional aspects [vital respiratory, neurological and cardio-circulatory distress] and lesions found on imaging [x-ray of the thorax, pelvis, limbs, abdomen without preparation, cerebral, thoracic and abdominal tomography, Abdominal ultrasound]; associated lesions; progressive aspects [duration of hospitalization, complications, mortality, factors linked to death].

The French version of Epi-Info7.2 software used to process the data manually.

2.1. Ethical Aspects

To carry out the study, an authorization request was sent to the director of CHU-Kara. This had received a favorable opinion from the director and the medical advisory commission playing the role of the ethics commission. The confidentiality of patient records was kept in mind.

3. Results

3.1. Sociodemographic Aspects

Frequency of Multiple Trauma Patients: CHU-Kara received 50544 patients in their surgical intensive care unit during the study period. Six hundred and five (605) patients (12%) were trauma patients with 230 polytrauma patients, representing an overall prevalence of 4.6% and a specific prevalence of 38% of trauma patients. Two hundred and eighteen (218) patients met the inclusion criteria (4.3%). The study lacked twelve (12) patient files.

Age of Patients: The average age of the patients was 31.83 ± 16.33 years with extremes of 1 and 80 years.

Sex of Patients: The male gender predominated (82.6%) and the sex ratio 4.7.

Origin of Patients: Patients from cities 66.1% and 33.9% of rural areas.

Patient Occupancy:

Table 1: Distribution of Patients According to their Occupation

	Workforce	Percentage
Motorcycle taxi driver	56	25,7
Pupil/student	39	17,9
Worker	28	12,8
Civil servant	18	8,3
Car driver	16	7,3
Housewife	14	6,4
Cultivator	11	5
Trader	6	2,8
Not specified	30	13,8
Total	218	100

Circumstances of Occurrence of the Trauma: The patients according to the circumstances of occurrence of polytrauma were: Road accident 199 cases (91, 2%); Tree fall 10 cases (4, 6%); Physical assault 5 cases (2, 3%); Domestic accident3 cases (1,4%); Sports accident 1cas (0,5 %)

3.2. Lesion Aspects

Vital Distress: One hundred fifty-eight patients (72.4%) had neurological distress, 78 patients (35.8%) had respiratory distress, and 42 patients (19.3%) had cardio-circular distress.

Medical Imaging:

Table 2: Distribution of Patients According to Medical Imaging Examinations

	Workforce	Percentage
Craniocerebral computed tomography	104	47,7
Limb radiography	103	47,2
Chest x-ray	29	13,3
Abdominopelvic ultrasound	21	9,6
X-ray of the pelvis	13	6
Spine CT scan	12	5,5
CT scan of the chest	5	2,3
spine x-ray	2	0,9
Abdominal CT scan	1	0,5

NB: Several patients had carried out several examinations at the same time

Associated Lesions:

Table 3: Distribution of Patients According to Associated Lesions

	Workforce	Percentage
Cranioencephalic trauma	183	83,9
Limb trauma	123	56,4
Chest trauma	32	14,7
Abdominal trauma	29	13,3
Maxillofacial	24	11
Spine trauma	21	9,6
Pelvic trauma	14	6,4

Neurological Lesions :

Table 4: Distribution of Patients According to Neurological Lesions

	Workforce	Percentage
Edematous and hemorrhagic contusion	75	34,4
Recess	14	6,4
Subdural hematoma	14	6,4
Fracture and dislocation of the spine	8	3,7
Subarachnoid hemorrhage	7	3,2
Extradural hematoma	6	2,8
Skull fracture	2	0,9

NB. A patient could have several neurological lesions

Chest Injuries: Pleural effusion: 16 cases (7, 3%) understood: Hemothorax: 08; pneumothorax: 05; hemopneumothorax: 03; abundance: average.

Rib fracture 7 cases (3, 2%): Pulmonary contusion 5 cases (2, 3%); Chest wound 2cases (0, 9%).
Not all chest trauma patients had chest x-rays and CT scans. A patient could have multiple respiratory injuries.

Abdominal Injuries: The abdominal injuries included Hemoperitoneum (5%) with 11 cases; splenic contusions (3.7%) with 8 cases; abdominal wound (1.4%) with 3 cases. Liver injury; Hollow organ perforation; Evisceration and Bladder rupture 0,5% each. Ultrasound or CT scans not performed on all patients with abdominal trauma. Multiple abdominal lesions could affect a patient.

Limb and Pelvis Injuries: Limb fractures represented 45.5% and 4.6% for the pelvis.

3.3. Treatment

Medical Treatment:

Table 5: Distribution of Patients According to Medical Treatment

	Workforce	Percentage
Conditioning	218	100
Vascular filling	218	100
Analgesic	218	100
Mechanical ventilation	104	47,7
Transfusion	54	24,8
Vasoactive amines	20	9,2
Neurosedation	159	72,9
Osmotherapy	149	68,3

Surgical Treatment :

Table 6: Distribution of Patients According to Surgical Treatment

	Workforce	Percentage
Trimming and suturing wounds	55	25.2
Traumatology (osteosynthesis)	31	14.2
Thoracic drainage	13	6
Laparotomy *	9	4.1
Neurosurgery (evacuation of hematoma)	6	2.8
Urology (bladder repair)	1	0.5
Thoracotomy **	1	0.5
Osmotherapy	149	68,3

*: splenectomy (5), splenoraphy (2), suture excision of the small intestine with washing and drainage (1); **: there was no operating report.

3.4. Evolutionary Aspects

Length of Hospitalization: The average length of hospitalization was 8.6 ± 7.6 days with extremes of 1 and 45 days.

Complications: Complications were 56.9%, dominated by infections in 50% (109 patients), and followed by renal failure in 6% (13 patients) and pressure sores in 0.9% (2 patients).

Ninety-seven (97) patients (44.5%) died, and 121 patients (55.5%) were transferred to the neurosurgery, traumatology, general surgery, pediatric surgery, and urology departments for further care.

Risk Factors Linked to Death: Le coma sévère représentait 18,3% avec 40 cas ; la détresse respiratoire représentait 12,8 % avec 28 cas ; l'état de choc représentait 9,2 % avec 20 cas ; l'infection 2,3% avec 5 cas, non spécifiés dans 1,9%avec 4 cas.

4. Discussion

4.1. Methodology and Difficulties

Twelve (12) incomplete files were not included in the study. This observation is inherent to retrospective studies where the files are incomplete and/or untraceable and there was no archiving of the files apart from the supervisor who was busy with patient care. The sole MAR was a hot commodity for filling out medical files and updating them. This raises the problem of maintaining medical records in health structures. Computerization of medical records in the different departments of CHU-Kara would prevent the loss of medical records.

4.2. Socio-Epidemiological Aspects

Frequency of Multiple Trauma Patients: The number of multiple trauma patients listed was 230 among 5054 patients hospitalized during the same study period. The overall frequency of polytrauma patients in surgical intensive care was 4.6%. Link this low frequency in our context to the versatility of the pathologies treated in surgical intensive care and especially the postoperative recovery, which took place in this department. This result is similar to that of Bonkoungou and all in 2018 at the CHU Yalgado Ouédraogo in Ouagadougou in Burkina-Faso, which was 4.1% of admissions. It was lower than those of Camara Y in Guinea in 2020, Olry K in France in 2014 and Obame and all in Gabon in 2019 had respectively 31%, 38% and 7% [6-9].

Polytrauma patients (38%) significantly affected intensive care in our context. Strengthening preventive measures would reduce this frequency.

Patients' Age: The low average age reflects the population of developing countries. This more active youth remains more exposed to traffic accidents due to their road incivility in our context. This result is comparable to those of several authors with a predominance of young adults. For Tomta and all in Togo in 2016, Obame and all, Tchaou and all in Benin in 2012 and Camara Y in Guinea in 2020 with respectively an average age of 37.5±17 years, 29.8±9.2 years, 28.5±12.1 years and 25.8±5 years and a more active youth [5, 7, 9, 10].

For Chrysou and all in Switzerland in 2017 and Oniskoff G in France in 2018, the average age was 48.5 years and 47.5±19.7 years respectively. These average ages were higher than in our context and reflect the characteristics of industrialized countries with the aging of the population according to Eberhard and all [11-13].

In reality, all ages affected. The social and economic impact of young people stems from the loss of able-bodied arms.

Sex of Patients: The male population was 82.6% with a sex ratio of 4.7. Link this male predominance to the greater mobility of men, motorcycle taxi drivers and other risky activities. This male predominance was found by several authors such as Obame and all, Monkessa and all in Congo Brazzaville in 2022 with a sex ratio of 4.9 and 4.8 respectively [9, 14].

Our results were higher than that of Chrysou in Switzerland in 2017 with a sex ratio of 2.79. In this case, women were involved in all areas of activity, leisure and sport in industri-

alized countries, according to Eberhard and all and the male predominance tends to disappear. Young people should be more aware to be cautious in traffic and their activities [11, 13].

Origin and Occupation of Polytrauma Patients: The majority of patients (66.1%) came from urban areas. Link this rate to the greater density in urban areas with the increase in human-to-human mobility, the increase in the number of vehicles and non-compliance with the Highway Code, leading to more accede Motorcycle taxi drivers, pupils and students were more represented by 25.7% and 17.9% respectively (table 1). These professions were at greater risk of road accidents. Motorcyclists are most likely to cause road accidents because they do not follow the Highway Code, particularly in urban areas.

Polytrauma Occurrence: The main circumstance of occurrence of polytrauma was road accidents (91.3%) and tree falls (4.6%) in 3.1.6. This factor causing polytrauma would be linked to the increase in the number automobile, road traffic, poor condition in certain places on the roads, poor condition of machinery, and non-compliance with the Highway Code. WHO 2018 recognizes that users are encouraged by impunity when they commit offenses on the road. The results of Bonkoungou and all 77.6% and Monkessa and all 84.7% are comparable [6, 14, 15]. This frequency is lower than that of Oniskoff G 48%. Road accidents are the main cause, particularly in developing countries [12].

4.3. Lesional Aspects

Vital Distresses: The main concern for 72.24% of people was neurological distress, followed by respiratory distress with 35.8%, and cardiocirculatory distress with 19.3%. The association of neurological distress with cranioencephalic trauma (CTE) was strong among polytrauma patients in our context. Depression of respiratory centers led to respiratory distress in individuals with TCE, thoracic lesions, upper airway obstructions, and cardiovascular lesions. Blood loss or cardiac damage can cause cardiovascular distress. Vital distress was similar to that of Obama and all with neurological distress at 62.2%, followed by cardiocirculatory distress at 41.1% and respiratory distress at 31.5%; Bonkoungou and all with neurological distress at 72.1%, followed by respiratory distress at 50.8% and cardiocirculatory distress at 13.1%. This predominance of neurological distress linked to the high representation of TCE in polytrauma patients. Oniskoff G noted with neurological distress in 35% of polytrauma patients with a Glasgow score less than or equal to eight [6, 9, 12].

Vital distress was the factor responsible for the majority of mortality among polytrauma patients. Assessing respiratory and cardiocirculatory distress requires adjustments to both pre-hospital and hospital care, but our context lacks pre-hospital care.

Radiographic Examinations: CT was performed in 56.8% of head trauma patients and 47.2% of limb radiography cases. Cranioencephalic CT and limb radiography were the most commonly performed radiological examinations (table 2). The rate of completion of these examinations was high in our context despite the unavailability of the scanner in the northern region of Togo until 2021. The high rate of completion of limb radiography explained by its availability.

This result is higher than that of Tchaou and all [10] with a CT completion rate of 7.1% and standard radiography of 85.7%. The low completion rate of CT linked to its high cost. CT was essential for the injury assessment of the polytrauma patient. Public centers made available to reduce the cost of its production significantly [10].

Associated Lesions: TCE had the greatest number of injuries, followed by limb trauma with 56.4%. Trauma to the thorax, abdomen, maxillofacial sphere, spine and pelvis represented 14.7%, 13.3%, 11%, 9.6% and 6.4% respectively (table 3). Connect the prevalence of TCE to the vulnerability of the head and limbs to damaging agents. Lack of awareness of the benefits of wearing a helmet common in our context and would have contributed to the severity of TCEs. Thorax and abdomen trauma triggered by direct impacts and/or deceleration movements (table 3).

Tchaou's lesion association is similar to 85.7% of TCE and 88.1% of limb trauma. Obame and all had 68.2% TCE, 52.6% limb trauma, 39% abdominal trauma, 33% thorax trauma and 11% pelvic trauma; Monkessa and all had 75.7% of TCE, 47.45% of thorax trauma and lower limb trauma accounted for 25.7%. On the other hand, for Orly K, the three most frequently found injuries were chest trauma 56.8%; members 55.7% then TCE 50.2% [8-10, 14].

Multiple trauma patients in sub-Saharan Africa experienced equal effects on their skulls, limbs, thorax, and abdomen.

Neurological Lesions: Table 4 Shows that hemorrhagic and edematous brain contusion is the most common neurological condition with 34.4 percent of cases.

Ekouele Mbaki and all in Congo Brazzaville in 2018 and Hissene and all in Niger in 2022 had respectively 46.7% and 44.06% brain contusion. Konate and all in Ivory Coast in 2020 had 46.49% of intra-parenchymal lesions and 20.30% of extra-parenchymal lesions. Tsiaremby and all in Madagascar in 2023 had 32% cerebral contusion, 11% cerebral edema and 39% extradural hematoma [16-19].

Vertebral fractures and dislocations were 3.7% (Table 4). Toure and all in Benin in 2022 had 28.1% simple fracture, 26.3% simple dislocation and 22.8% fractures and dislocations. These rates high compared to our context and depended on the high proportion of spinal trauma patients in his study [20].

The lethality of brain and spinal injuries necessitates the prioritization of preventive measures.

Chest Injuries: In 3.2.5, Pleural effusions caused 7.3% of all thoracic injuries, while Rib fractures caused 3.2%. Illiassou

and all in Mali in 2022, 92.3% had pleural effusion, pulmonary contusion and costal injury in 93.3% respectively; 31%; and 23% of cases. Obame and all in 2023 reported pulmonary contusion (26%), hemothorax (20%), pneumothorax (14.5%) and rib fractures (21.8%). These chest lesions associated respiratory and/or cardiocirculatory distress. Mouzou and all in Togo in 2022 reported 35.8% pulmonary contusion, 24.1% hemothorax, 13.4% rib fracture and 11.2% pneumothorax. For Féray S in Tenon in France, among chest trauma patients, 93% had a costal flap, 85% had a pleural effusion and 67% had a pulmonary contusion. The higher rates observed in their studies may be due to the large number of chest traumas [21-24].

Abdominal Injuries: Hemorrhage was the main culprit in 5% of abdominal contusion cases, while only 3.7% had splenic injury (In 3.2.6). This low proportion of abdominal injuries were linked to a small number of abdominal traumas in our context. On the other hand, Rakotomena and all in Madagascar in 2018, had 92.5% hemoperitoneum, 52.24% splenic injury and 37.31% liver injury due to abdominal trauma. According to Kambire et al, Burkina Faso experienced 48.2% and 37% ruptures of the spleen and jejunum in 2018 [25, 26].

Limb and Pelvis Injuries: Limb fractures were the main injury in 45.5% of cases. They would result from a violent shock to the limbs. Pelvic fractures were the main injury in pelvic trauma patients with 4.6% of cases.
This result was close to that of Kambale Ketha and all in Democratic Congo in 2019 with 5.29% of cases. According to Incagnoli and all reports, pelvic fractures made up 5% of all trauma fractures in France [27, 28].

4.4. Treatment

Medical Treatment: The control of upper airway freedom was systematic. Intubation and mechanical ventilation carried out in 47.7% of cases. Respiratory and neurological distress, sources of hypoxia or cerebral anoxia were indications for mechanical ventilation (see table 5).

This result is comparable to that of Monkessa and all 40% of cases [14].

The respirator would be essential equipment for the treatment of polytrauma patients.

All patients had benefited from conditioning and vascular filling to restore and maintain effective blood volume. Transfusion carried out in 24.8% of cases and the use of vasoactive amines in 9.2% of cases. Link this low rate of blood transfusion to the low demand for transfusion of multiple trauma patients in our context.

All patients had benefited from analgesic treatment, the use of osmotherapy was necessary in 68.3% of cases and neurosedation in 72.9% of cases.

This result is comparable to that of Obame and all's [72% osmotherapy and 61% neurosedation results] [9].

Surgical Treatment: The most performed surgical treatments were wound debridement and suturing, 14.2% traumatological interventions, and 6% chest drainage. Laparotomy performed in 4.1% of cases and neurosurgical interventions in 2.8% of cases (see table 6). In our context, surgery played a significant role in restoring vital functions and managing multiple trauma patients.

4.5. Evolutionary Aspects

Complications: There were 56.9% complications, including 50% infectious complications, 6% renal failure, and 0.9% pressure sores. Infections linked to invasive procedures, wounds and insufficient asepsis in care. Renal failure probably linked to shock states in our context. Pressure sores believed to be linked to insufficient preventive measures.

Preventing infections requires strict hygiene and aseptic measures to emphasize in intensive care.

Mortality: The number dead was 44.5%. The high mortality rate of polytrauma patients in our context is a result of several factors. Among these, the non-existence of pre-hospital care, medical transport, and insufficient qualified personnel. An insufficient technical platform in the surgical emergency department and in surgical intensive care are other significant factors. The low socioeconomic level, the lack of health coverage for all, and the severity and complexity of the injuries could explain this very high mortality rate.

This rate was comparable to those of Bonkoungou and all, Monkessa and all, and Camara Y [7] with respectively 45.9%, 50% and 56.67% deaths. It is higher than that of Tomta and all in the same country in 2016 with 30% [5, 6, 14].

On the other hand, El Mestouri and all in the Netherlands in 2017 and Chrysou and all in Switzerland in 2017 had low mortality rates of 19.1% and 5.5%, respectively. They show that industrialized countries have a well-organized chain of care for polytrauma patients, with emphasis on pre-hospital care and hospital care [11, 29].

The high mortality rate of patients makes polytrauma a significant public health issue.

Factors Linked to Deaths: In 3.4.3 it shows that severe coma was the primary cause of death in 18.3% of cases, followed by respiratory distress in 12.8% of cases, shock in 9.2% of cases, and infections in 1.9% of cases. This result was lower than that of Monkessa and all in Congo Brazzaville in 2021 with neurological distress as the first factor of death by 61.8% [30].

The most prevalent causes of death for multiple trauma patients in sub-Saharan Africa were severe post-traumatic coma, resulting in cerebral anoxia, respiratory depression, and acute circulatory failure.

Hospitalization Duration: The average duration of hospitalization for surgical intensive care for polytrauma patients was 8.5 to 7.8 days, with extremes of 1 and 45 days.

This relatively long duration linked to the severity of the multiple trauma patients. The latter required a minimum of intensive care time and those depending on the evolution. It was a source of nosocomial infectious complications and bedsores.

This result was comparable to those of Monkessa and all and Camara Y having respectively an average duration of hospitalization of 8.7±10 days and 8.2±5 days with the same reason and severity of injuries of the polytraumatized person [7, 14].

Orly K found an average duration of 10.4±12.2 days. The longer the hospital stay, the higher the rate of recovery, but it also increases the risk of complications [8].

5. Conclusion

At Kara University Hospital, there was a 38% rate of polytrauma in surgical intensive care. Young adults and men more affected. Road accidents were the main mechanism of occurrence of polytrauma. Motorcycle taxi drivers, pupils/students and urban areas more affected by trauma. The main lesions were vital distress, TCE, limbs, thorax, abdomen, spine and several associations. Complications caused the majority of evolution, with a mortality rate of 44.5%.

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