



Multiple Fractures and Traffic Accidents

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KEYWORDS	ABSTRACT
traffic accidents, multiple fractures, lower extremities	Multiple fractures are one of the consequences of traffic accidents (KLL). The most frequently affected locations are the extremities, especially the lower extremities. The group most commonly involved is motorcyclists, where the incident is more common in developing countries. A 32-year-old man was brought to the emergency room from the local health center after experiencing a traffic accident. The patient had previously received initial treatment through immobilization and situational suturing. The patient is suspected of having fractures in both forearms and right thigh. Then, the patient underwent initial surgery and was referred to undergo further surgery due to limited equipment at the previous hospital. This case discusses the challenges in treating multiple fractures in patients involved in traffic accidents, emphasizing the need for rapid and appropriate initial treatment and adequate follow-up management. Optimal management will also provide a good prognosis. This case shows that traffic accident patients have a high potential for experiencing multiple fractures, which often affect the extremities. This case wants to provide information that early treatment primary and secondary survey include providing fluid therapy and pressure dressings are things that must be done immediately to get a good prognosis and best results.

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INTRODUCTION

One of the points in the Sustainable Development Goals (SDGs) is to reduce morbidity and mortality rates in motor vehicle accidents globally by 50% by 2020 (Alghnam et al., 2022). Data from the World Health Organization, ten known as WHO, found that incidents related to traffic accidents (KLL) were the main contributor to death in people aged 15-29 years. It is estimated that injuries resulting from motor vehicle accidents will be the sixth leading cause of death by 2020 and is expected to increase (Aloudah et al., 2020). Traffic accidents (KLL) are known to be one of the main health problems that substantially burden the health sector globally. It is estimated that almost 2 million more lives were lost due to traffic accidents. In addition to the health burden caused by KLL, there is an economic burden of up to \$518 billion worldwide and \$65 billion in low and middle-income countries (Roshanfekar et al., 2019). Half of the deaths due to traffic accidents in the world are dominated by motorcyclists, followed by pedestrians and bicycle users. Traffic accidents with motorized vehicles are the primary etiology, resulting in death in adolescents and young adults globally (Bezabih et al., 2022). Vehicles such as motorbikes are commonly used to facilitate public transportation, especially for going to work in densely populated areas (Ali et al., 2022).

To prevent fracture risk and clinical management, it is essential to understand the mechanism of multiple fractures in high-energy traumatic fractures such as in traffic accidents. (Feichtinger et al., 2020). Generally, patients suspected of having a fracture will be referred to secondary or tertiary health services for better treatment because most primary health services do not have radiology and

specialist services. Previous research found that almost 80% of patients diagnosed with a fracture in primary care would be treated by installing casts, braces, or slings (Vabo et al., 2022). Around 16% of patients who are injured in traffic accidents will experience disability. Orthopedic injuries are the most common type of injury and are the main factor in permanent disability. Injuries to the musculoskeletal system are the leading cause of disability in KLL patients, especially femur fractures and open fractures of the tibia. Traffic accidents are also the leading cause of most fracture cases in developing countries (Bezabih et al., 2022). Due to the lack of understanding regarding fractures, especially the incidence of multiple fractures in patients who have experienced traffic accidents, the author wants to provide understanding through a case report. This will provide an overview of patients with multiple fractures when initial treatment can be given and help plan appropriate definitive therapy (Pape et al., 2019).

The actions that can be taken are initial treatment including primary survey (airway, breathing, circulation, disability, and exposure) and secondary survey (allergy, medication, past illness, last meal, and event/environment) along with stabilization of the patient's condition after the incident. Stabilization by giving 3 liters of NS fluid alternately with 2 liters of RL fluid intravenously and a pressure bandage to stop the bleeding, before being referred for immediate surgery (Bezabih et al., 2022; Feichtinger et al., 2020; Massaga et al., 2023; Vabo et al., 2022).

This study aims to investigate the relationship between traffic accidents and multiple fracture injuries and their impacts (Rissanen et al., 2017). Traffic accidents are a leading cause of serious injuries, including multiple fractures, which often have long-term consequences on an individual's health and quality of life. This research is important because understanding the factors that influence the incidence of multiple fracture injuries in traffic accidents can help in developing more effective prevention strategies and improving road safety systems. Additionally, understanding the implications of multiple fracture injuries can improve medical treatment and rehabilitation for traffic accident victims. Therefore, it is hoped that this research will provide valuable insights to improve road safety and public health care (Espinoza-Molina et al., 2021).

CASE

The male patient experienced KLL on Saturday night in the Kawunganten area and hit a truck. The patient was on his way home from work and wanted to overtake a truck, so he hit the truck from the opposite direction. The patient admitted that he was conscious and asked for help, but after that, the patient was unconscious and was immediately taken to the nearest health center. The patient came with the impression of being seriously ill with BP 100/70 mmHg, pulse frequency 109x/minute, respiratory rate 18x/minute, axillary temperature 36.8 C, Sp.O₂ 92% room air with VAS 9-10. At the community health center, the patient received initial treatment, namely placing splints on the right hand, left hand, and right thigh, and situational stitches were received in the chin area and left knee. Next, the patient was taken to Cilacap Regional Hospital's emergency room for further treatment. At the regional hospital, the patient immediately underwent ORIF Femur surgery. The patient was hospitalized for approximately seven days for stabilization and received three blood transfusions because hemoglobin had dropped (Salpeter et al., 2014). The patient was then referred to Santa Maria Hospital for further treatment. When he arrived, the patient complained of continuous pain in the right thigh; the pain was reduced only when the sole was dorsiflexed (Basini et al., 2024).

Supporting examinations carried out on patients include laboratory and radiological examinations.

a) Laboratory June 3, 2023

Complete Blood	Results	Unit	Reference Value	
Hemoglobin (Hb)	11.5	g/dL	11.5 – 15.1	
Leukocytes	11.81	10 ³ /μL	4.5 – 11.5	High
Erythrocytes	3.81	10 ³ /μL	3.79 – 5.14	Low
Platelets	348	10 ³ /μL	156 – 342	High
Hematocrit	32.3	%	34 – 45.4	Low
MCV	87.4	fL	84 – 98	
MCH	30.2	pg	27.5 – 32.4	
MCHC	35.6	g/dL	31.7 – 34.2	High
Neutrophils %	79.1	%	40 – 75	High
Lymphocytes %	11.5	%	20 – 45	Low
Monocytes %	6.1	%	2 – 5	High
Eosinophils %	1.8	%	1 – 4	
Basophils %	1.5	%	0 – 4	

b) Radiology May 27, 2023

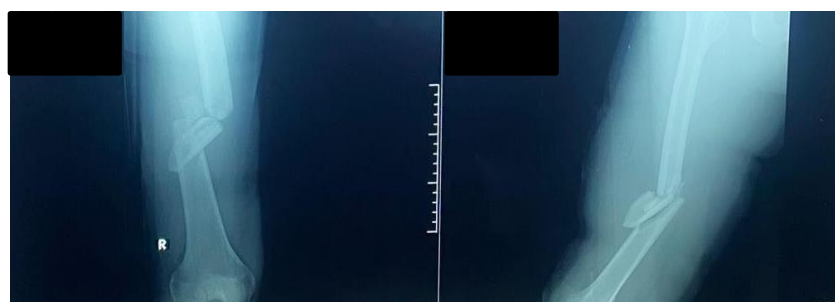
Dextra Antebrachii X-ray



**Figure 1. Impression of a fracture in the distal 1/3 of the Radius Dextra bone
Sinistra Antebrachii X-ray**



**Figure 2. Fracture impression in the distal 1/3 of the Radius Sinistra bone
Dextra Femur X-ray**



**Figure 3. Impression of a comminuted fracture in the middle
1/3 of the dextral femur**

Pelvic X-ray

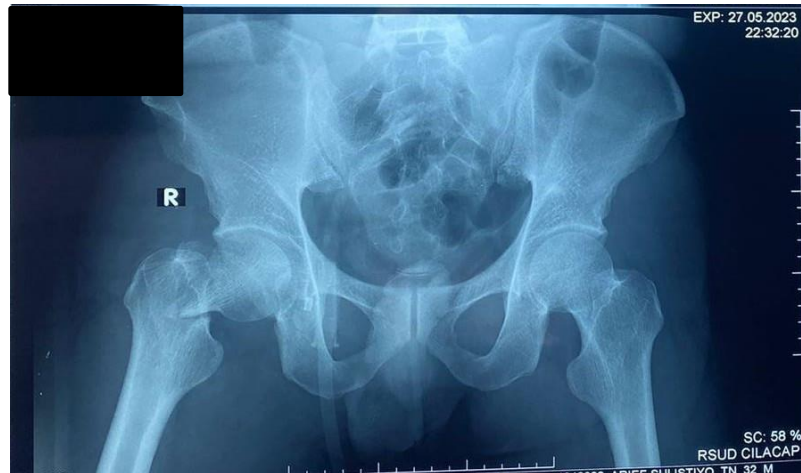


Figure 4. Fracture impression in the proximal 1/3 of the right femur

c) Radiology May 28, 2023

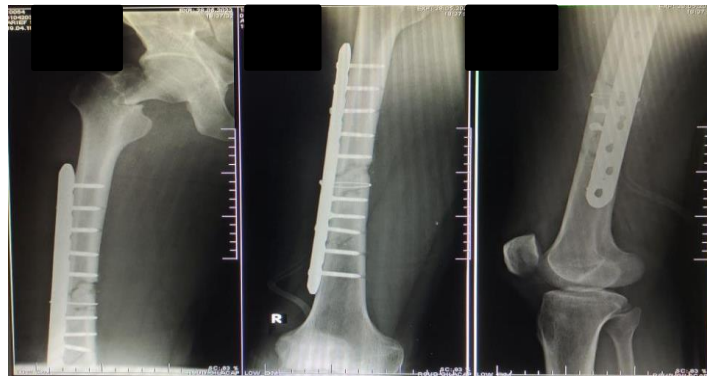


Figure 5. Post Dextra Femur ORIF Operation

Furthermore, after the patient arrived at the referral hospital, further surgery was immediately carried out on the left and right radius bones and the femur bone using a c-arm.

d) Radiology Examination June 4, 2023



Figure 6. Post Dextra Radius ORIF Operation



Figure 7. Post Sinistra Radius ORIF Operation



Figure 8. Post operation ORIF Collum Femur Dextra using c-Arm

From the results of the anamnesis, it was found that the patient came with complaints of pain in the patient's right thigh. The patient was post-KLL one week ago and had undergone ORIF femur surgery at RSUD previously. The patient was sent to a referral hospital for ORIF surgery on the left and right radius and surgery on the femoral neck using a C-arm (Sharad, 2018). On physical examination, general status includes respiratory rate, pulse frequency, blood pressure, and internal body temperature, which are normal. Status localization was obtained on the femoris region, which has a surgical scar with limited passive active ROM. Edema and limited ROM were found on the right and left wrists. In supporting examinations, laboratory results were found to be within tolerance limits. The inspection radiologist obtained results from an X-ray of the pelvis AP, which showed a fracture of the right femur 1/3 proximal. X-ray antebrachial dextran obtained fracture radius 1/3 distal extra, and left antebrachial X-ray shows a Smith fracture.

Based on the results of anamnesis, inspection physique, And inspection Supporting support, it can be concluded that the patient experienced multiple fractures with closed fractures on the proximal 1/3 and mid 1/3 of the right femur + closed fractures on the distal 1/3 of the right radius + closed fractures on the distal 1/3 of the left radius.

RESULTS AND DISCUSSION

In this case report, there is a 32-year-old man who suffered multiple fractures as a result of a traffic accident. Research conducted by previous researchers also obtained similar results regarding the predominance of male patients in multiple fracture cases caused by traffic accidents, with a percentage of around 79-96% (Bittar et al., 2020). In another study, it was found that the age range of the research subjects was two to 90 years (average 31.6), most of whom were in the middle age group

(21-30 years) at 36.5%, followed by the 10-20 year group (20.3%) (Aloudah et al., 2020). Subsequent researchers also found that the average age of patients with multiple fractures was 32.8 years, and the majority were men (83.3%) (Alghnam et al., 2022). Studies conducted by other researchers found that traffic accident patients who experienced multiple fractures were predominantly male (Aloudah et al., 2020). Research conducted in Ethiopia also found that the majority of KLL patients with multiple fractures were men, with a percentage of 71.7%. These results are also in line with other countries such as Taiwan (59.4%), India (83%), Uganda (83%), and Tanzania (72.7%) (Bezabih et al., 2022).

Table 1 Comparison of the number of patients with multiple fractures in patients with high-traumatic fractures based on gender (Feichtinger et al., 2020)

	Number of patients with high-traumatic fractures			Number of patients with high-traumatic multiple fractures			Percentage of patients with high-traumatic multiple fractures		
	Male	Female	Total	Male	Female	Total	Male (%)	Female (%)	Total (%)
(0-15)	41,649	24,988	66,637	723	309	1032	1.7	1.2	1.5
(16-30)	47,058	17,444	64,502	2697	638	3335	5.7	3.7	5.2
(31-53)	60,040	28,566	88,606	5474	1286	6760	9.1	4.5	7.6
(54-70)	18,409	17,020	35,429	2126	1061	3187	11.5	6.2	9.0
(> 70)	4819	7399	12,218	638	747	1385	13.2	10.1	11.3
Total	171,975	95,417	267,392	11,658	4041	15,699	6.8	4.2	5.9

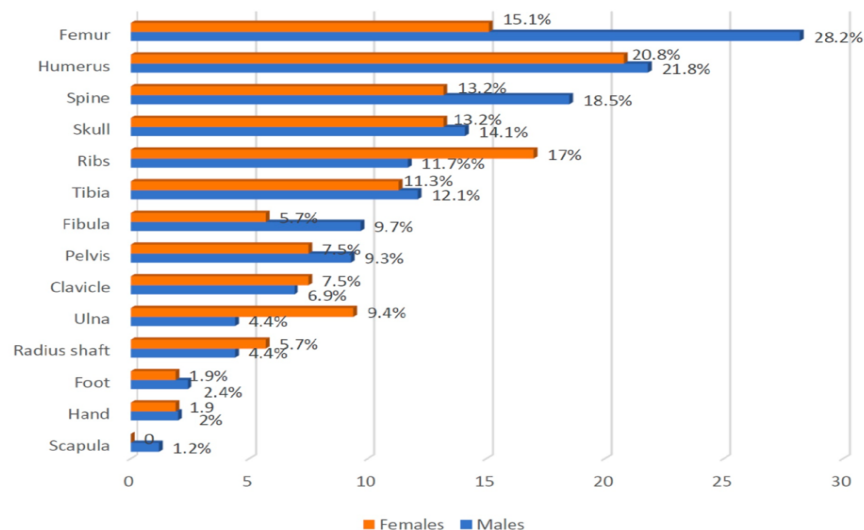


Figure 9 Comparison of fracture locations in men and women (Aloudah et al., 2020).

Based on the results of his research, the most commonly affected bone group in men is the femur (28.2%), followed by the humerus (21.8%), while the least frequently affected is the scapula (1.2%). This research also shows that the humerus is the part of the bone most commonly fractured in women (Aloudah et al., 2020).

The patient looked seriously ill with blood pressure 100/70 mmHg, pulse rate 109x/minute, respiratory rate 18x/minute, axillary temperature 36.8 C, Sp.O2 92% room air with VAS 9-10. The patient's clinical condition tends to be better than the case in a subsequent research study reporting a KLL patient with multiple fractures who had a worse clinical condition than the patient in this case report (Massage et al., 2023). The patient arrived pale and in hypovolemic shock with BP 80/40 mmHg, no palpable pulse, and a respiratory rate of 18x/minute (Massage et al., 2023). The patient in this case is similar to the case found in previous research, where a 27-year-old patient experienced multiple fractures due to KLL while riding a motorbike and was hit by a van (De Vita, 2021). The patient came with severe illness and was found to have tachycardia (107x/minute) and an increase in

respiratory rate up to 26x/minute (De Vita, 2021). This is slightly different from the characteristics of KLL patients with fractures found in subsequent studies, where most patients who came had general conditions that tended to be stable (Bezabih et al., 2022).

This patient had multiple fractures in the distal 1/3 of the right and left radius; in addition, there were also comminuted fractures in the mid 1/3 of the right femur and a fracture in the proximal 1/3 of the right femur. The location most frequently injured in KLL is the lower extremities. Where the most common types of injuries were fractures (71.7 %), soft tissue injuries (12.8%), and dislocations (8.6%). The most common type of fracture is compound fracture (52.4%) (Bezabih et al., 2022).

Table 2 Frequency distribution of orthopedic injuries related to traffic accidents (Bezabih et al., 2022).

1.Region of the Body that was Injured	Frequency	Percent
Upper limb	56	16.7
Lower limb	161	47.9
Pelvic area	25	7.4
Chest area	10	3.0
Head injury	26	7.7
Multiple injuries	58	17.3
2.Type of vehicle that causes the injury		
A Passenger car	122	36.3
Motorcycle	92	27.4
Bicycle	28	8.3
Bus	18	5.4
Pickup trucks	24	7.1
Others	52	15.5
3.Type of fracture		
Simple	111	47.6
Compound	122	52.4

In another study, it was found that the majority of patients suffered bilateral or multiple bone fractures (35.2%) (Aloudah et al., 2020). Researchers further observed that fractures at the neck of the femur and tibia were more common in patients aged 30 to <60 years (Aloudah et al., 2020). This is similar to other research, which found that traffic accidents resulted in the highest number of injuries, including fractures of the lower extremities (44.7%) (Martins et al., 2021). A common mechanism occurs when a collision occurs with another motorized vehicle. This mechanism also commonly occurs in KLL events in China, India, and Nigeria (Martins et al., 2021). Subsequent research found that the dominant location of multiple fractures occurred in the extremities, which caused quite a large number of disabilities. In his study, it was also found that injuries that occurred in the extremities, neck, head, and thorax were more likely to require long-term rehabilitation. Patients who undergo surgery due to this injury have 60% greater potential than those who do not (Alghnam et al., 2022). Patients who experience a combination of fractures involving the proximal humerus and proximal femur show a 1-year mortality risk of 47.1% (Feichtinger et al., 2020).

At the community health center, the patient received their first treatment by getting splints on his right, left hand, and right thigh and receiving situational stitches on his chin and left knee. In research conducted by subsequent researchers, generally, patients who experience a fracture and are taken to primary care will be given conservative treatment in the form of reduction using a cast or braces to immobilize the fractured part (Vabo et al., 2022). In a case report conducted by researchers, patients with multiple fractures were given initial treatment in the form of compression with bandaging and splinting techniques in the area suspected of having a fracture (Massage et al., 2023). Giving 3 liters of NS fluid alternately with 2 liters of RL fluid intravenously using an 18 F cannula. Urinary catheterization was also carried out using a 16 G Foley Catheter, and the result was 1000 ml

of urine with a transparent color in the urine bag. (Massaga et al., 2023) . Previous researchers in their research also found that around 45.5% of KLL patients with multiple fractures who came to the hospital emergency room had received initial treatment in the form of fluid resuscitation and immobilization of the suspected fracture. (Bezabih et al., 2022) .

At the regional hospital, the patient underwent ORIF femur surgery immediately. The patient was hospitalized in the Regional Hospital for seven days and received three blood transfusions because HB had dropped (Amin et al., 2019). Then, the patient began stabilizing and was immediately referred to a hospital for further surgery. Researchers, in their study report, stated that the patient underwent surgery to treat the multiple fractures that had occurred. The patient was treated in the ICU because his initial condition was terrible. Approximately seven days later, the patient was transferred from the ICU to a regular ward (Massage et al., 2023). In multiple fracture conditions involving the extremities, fractures in the lower extremities are the most common, especially in the femur. For femur fractures, most patients undergo fixation surgery using an open reduction technique, better known as open reduction internal fixation (ORIF) or closed reduction or closed reduction internal fixation (CRIF) (Tenenbaum et al., 2019).

In case studies carried out by other researchers, within 4 hours, the patient had to have completed initial treatment and necessary laboratory examinations to prevent life-threatening complications from occurring (De Vita, 2021). Then, the patient is transferred to the operating room for debridement and further procedures on the patient. Surgery should be performed first on bones that have more severe fractures. Accurate reduction and adequate fixation are necessary to restore the articular and mechanical function of the bone structure to achieve optimal function (De Vita, 2021). Early fixation of fractures can reduce harmful stimuli from the fracture site. It is recommended to positively affect the patient's metabolism, muscle tone, body temperature, and brain function. An unstable fracture condition can cause a decrease in the patient's general condition due to more extensive soft tissue damage and an increased risk of fat embolism, as well as resulting in less efficient nursing care. This can cause respiratory insufficiency and pulmonary complications and increase the length of hospital stay (Zhang et al., 2018).

Researchers found that patients with fractures of the lower extremities were the group most vulnerable to experiencing functional limitations within one year after leaving hospital care (Tenenbaum et al., 2019). Research conducted by Vu et al. found that in patients with multiple fractures, It is very likely that you will experience several psychological disorders such as post-traumatic stress disorder (PTSD), depression, and driving phobia. Apart from that, it was also found that there was an incidence of secondary infection of around 46.6 % in multiple fracture patients due to KLL. The average length of stay in hospital lasts around 14 days, but in some cases, it can last up to 87 days (Bittar et al., 2020).

CONCLUSION

Traffic accidents are events that can result in multiple fractures, which generally affect the extremities, especially the lower extremities. The prevalence of this incident is generally in young men and tends to be high in developing countries. Apart from causing health problems, multiple fractures in traffic accidents also cause other problems, such as economic, social, and psychological problems for patients. Early treatment in primary care helps reduce subsequent injuries that may occur. Definitive treatment must be carried out as early as possible so that morbidity and mortality rates can be reduced to as little as possible. Proper and quick treatment can restore or improve the function of the fractured bone. Management for this case requires multi-dimensional and coordinated treatment to provide the best results. This case can occur frequently, so initial evacuation must be

handled as soon as possible, a primary survey and secondary survey must be handled. Including give 3 liters of NS fluid alternately with 2 liters of RL fluid intravenously and also a pressure bandage to stop bleeding, then a through examination of the patient is carried out. If the patient stable, they can get appropriate and adequate follow-up examinations for get appropriate management.

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