ORTHOPAEDIC SURGICAL TREATMENT WAITING TIME FOR ACUTE MUSCULOSKELETAL TRAUMA PATIENTS ATTENDED AT MUHIMBILI ORTHOPAEDIC INSTITUTE, DAR-ES-SALAAM

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ABSTRACT

Background: Waiting time for acute musculoskeletal trauma surgery has been used as a measure of institutional efficiency. Delay in operating on trauma patients leads to increased morbidity, mortality and reports have shown negative impacts and additional costs for the hospitals besides inconvenience to patients and their families.

Objectives: To determine the extent and causes of delay of orthopaedic surgical treatment among acute musculoskeletal trauma patients at Muhimbili Orthopaedic Institute.

Methods: A cross-sectional study on two hundred and eighty patients who met the inclusion criteria. Modified Lankester tool was used to assess the patients from the emergency department and classified into A or B according to the urgency of their surgery. Data was analysed using predictors of surgical delay beyond 24 hours were identified by logistic regression analysis.

Results: The mean age of these trauma patients was 28±15 years of whom a large proportion (79.6%) were male. Lankester group A accounted for 77.5% of the patients recruited. The mean waiting time for orthopaedic surgery for Lankester A and B respectively was 9±5 and 12±6 hours whereby 65.4% of Lankester group A and 9.5% of Lankester B had missed their optimal target time.

Conclusion: Only about a third (34.6%) of emergency patients were operated in less than 6 hours after admission. The most common cause of this delay was lack of theatre slots while the presence of comorbidities predicted delay of more than 24 hours.

Recommendations: There should be more theatres allocated for emergency surgeries and there should be a physician present in the emergency on-call team to manage the co-morbid conditions to reduce their waiting time.

Key words: Treatment delay, Orthopaedic surgery, Emergency surgery, Trauma, Lankester

INTRODUCTION

Waiting time for acute musculoskeletal trauma surgery has been used as a measure of institutional efficiency. High-quality healthcare services have been a major vision among all healthcare systems worldwide and Tanzania in particular (1). There is a challenge in delivering high-quality health care equally and efficiently and one of the areas

affected by these challenges is surgery. Emergency surgery is unplanned and often has to be fitted into a surgery schedule already crowded with elective cases, where Operating Room (OR) space is limited (2).The urgency of surgical intervention depends on the injury sustained. Time to emergency orthopaedic treatment depends on the patient's physiologic and extremity of soft-tissue status (3).

Delay in the surgical treatment of acute musculoskeletal trauma occurs in orthopaedics departments despite improvement in technical and hospital resources (4,5). This delay could be explained partly by the increased number of emergency orthopaedic surgical patients who required emergency surgical treatment (3). Delay in operating trauma patient's leads to increased morbidity, mortality, length of hospital stay and overall cost (3,4). .Studies have shown that when the cause of delay to surgery is identified and appropriate intervention applied leads to improved effectiveness of surgical procedure (6,7).

This study was aimed at identifying waiting time and causes for delay of orthopaedic surgical treatments of acute musculoskeletal trauma patients. When these causes will be addressed, they will not only improve patient outcome but will also reduce costs and eventually leading to patient satisfaction.

MATERIALS AND METHODS

A cross-sectional study was conducted between July 2018 to February 2019 at the Muhimbili Orthopaedic Institute (MOI) which is the largest orthopaedic and trauma referral center in Tanzania and is based in Dar-es-Salaam adjacent to the Muhimbili National Hospital. There are two designated theatres for emergency trauma surgeries including neuro-trauma. There is an on-call team consisting of four doctors of different cadres including a junior resident, a senior resident, a junior specialist and a consultant/ senior specialist. Most emergency surgeries are performed by residents under guidance from the specialists. Different healthcare financing models are used including cost-sharing, insurance and cases under welfare. Those who need emergency surgery and cannot afford to receive treatment without initial payment. Patients with acute musculoskeletal trauma injury who met inclusion criteria were taken into the study after obtaining informed consent. Type of musculoskeletal injury, coexisting morbidities, time of admission, time of surgery were noted down after careful examination of case sheet and detailed interviews of the treating doctor. Reasons for delay were ascertained, as described by the surgeon and it was corroborated with that given by the nursing staff. The patients were categorized into two categories, Type A or B based on modified Lankaster classification as follows- Type A: Open fractures, dislocations, limb injuries associated with vascular compromise, compartment syndrome, acute osteomyelitis, acute septic arthritis amongst others who should have surgical treatment within 6 hours of admission. Type B: Hip fractures, closed long bone fractures, ankle fractures, limb gangrene, removal of severe implant infection amongst others` also who should be operated upon on the day they presented, or on the day they are declared fit/ ready for surgery. The data collected was analysed using SPSS software version 21. Categorical data like the modified Lankester grouping of patients were compared using the T-test, P-value of <0.05 was regarded as significant. Continuous variables like ages of patients, and duration of the delay (in hours) were expressed as mean ± SD (standard deviation). The primary outcome measured for this study included the duration of delay between the time when a decision to operate was taken and the time the surgery was eventually carried out and the causes of such delays. Secondarily, logistic regression analysis was conducted to identify predictors of surgical delay beyond 24 hours. Results were presented with the aid of tables and diagrams.

RESULTS

Demographics

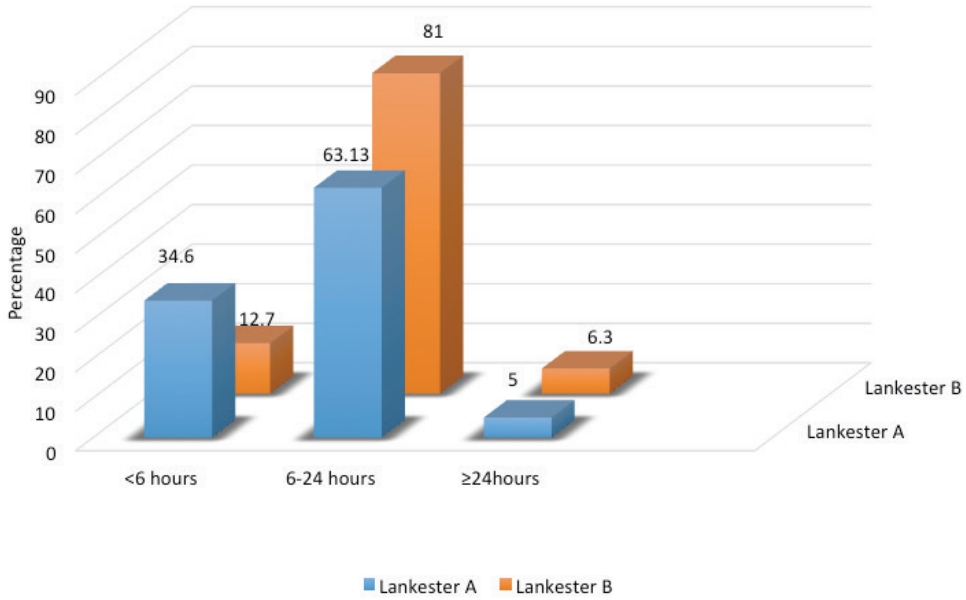
Two hundred and eighty patients with acute musculoskeletal injury were recruited during the study period. There were 223 (79.6%) males and 57 (20.4%) females with a 4:1 ratio. Their mean age was 28±15 years. More than half (61%) of patients were between 16 and 40 years of age. Among the recruited study participants, Lankester group A consisted of the majority (77.5%). Three quarters of the study participants had primary and secondary school education while only 16 (5.7%) had a college/university education. One hundred and sixty three (58.2%) of the study participants were self-employed. The greater number of study participants were admitted during the weekday (64%) and Monday was seen to be the busiest day with 22.3% of admissions.

Time to surgery

Amongst the patients classified in Lankester group A, only 75 (34.6%) participants were operated within 6 hours after admission while five were operated more than 24 hours after admission, with mean time of 9±5 hours. For Lankester group B, the majority of patients 51 (81%) were operated within 6-24 hours with a mean waiting time of 12±6 hours (Figure 1).

Figure 1

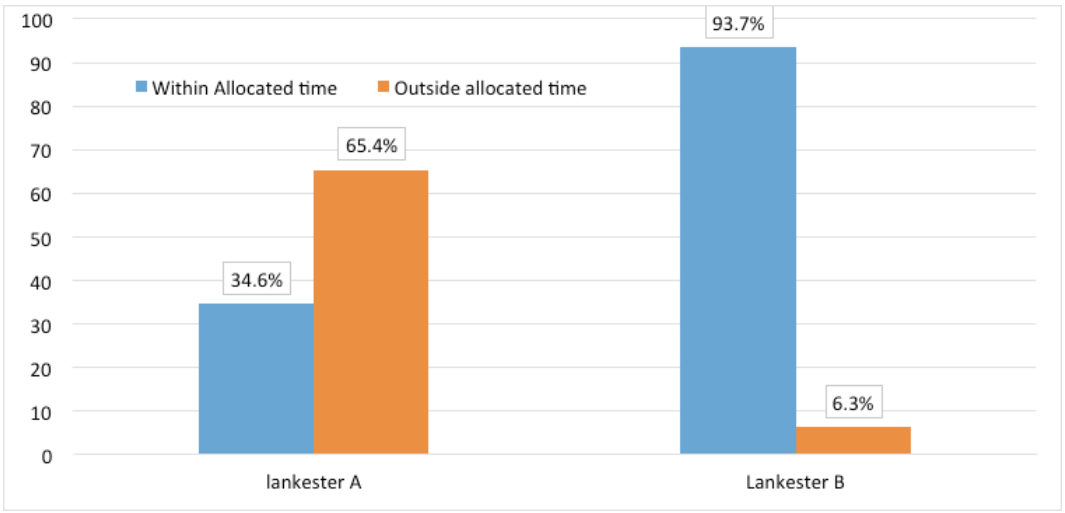
Waiting time for orthopaedic surgical treatment in Lankester group A and B patients



About two thirds (65.4%) of patients classified as Lankester group A had delays in their ideal time for surgery while majority (93.7%) of those who were classified as Lankester group B had their surgeries within the ideal time (Figure 2).

Figure 2

Proportion of allocation time in Groups A and B

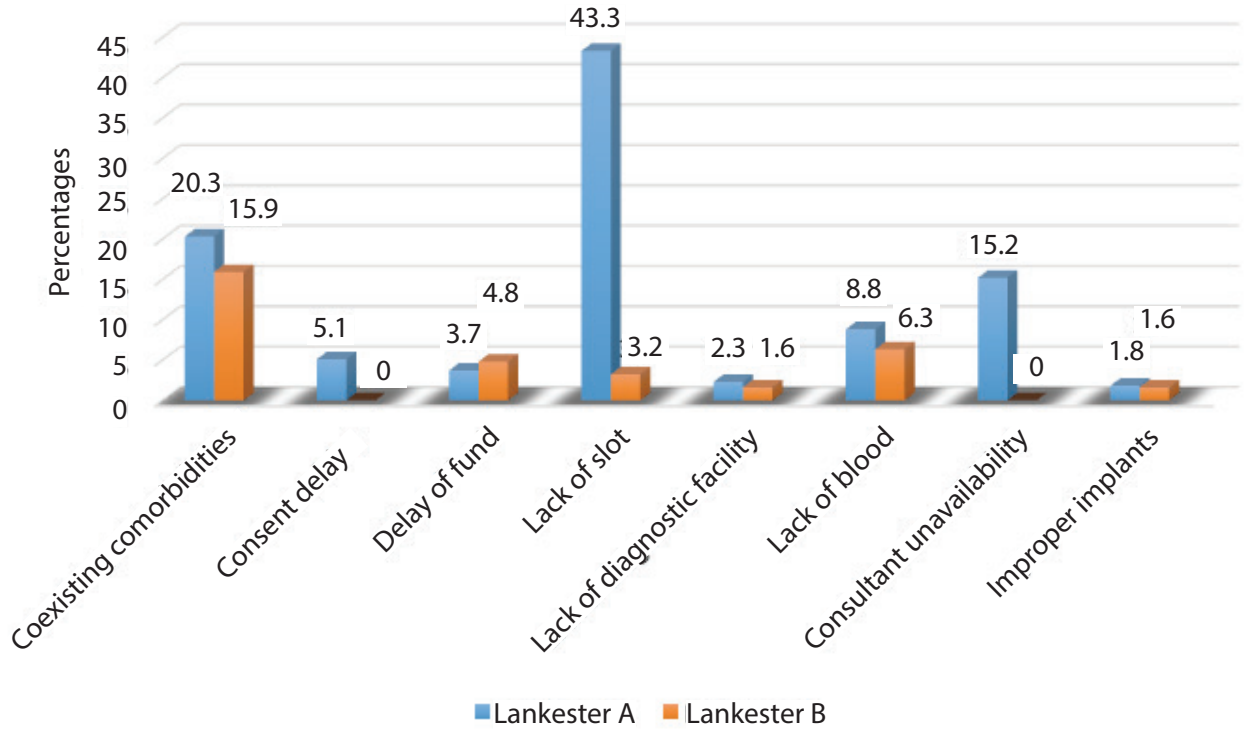


Reasons for delay

Lack of theatre slot contributed significantly (43.3%) to the delay among the patients in Lankester group A, followed by coexisting comorbidities in about a fifth (20.3%) of the patients. Unavailability of consultants was another cause (15.3%) in the delay in addition to unavailability of proper implants (1.8%). The most common cause of delays in patients of Lankester group B was coexisting comorbidities (15.9%) (Figure 3).

Figure 3

Reasons for delay of orthopaedic surgical treatment



Delays among patients with co-morbid conditions was seen to be more in weekends (58.6%) as opposed to weekdays. Twenty point three percent, however logistic regression analysis was conducted among these factors and significant difference ($p<0.05$) was only found among patients with coexisting comorbidity with p of 0.018 (Table 1).

Table 1

Reasons for delay of orthopaedic surgical management in Lankester group A

No	Reasons for delay	Response	Orthopaedic surgical treatments		P-value
			Not delayed (<6 hours)	Delayed (≥6 hours)	
1	Coexisting morbidities	Yes	8 (11.1%)	36 (20.3%)	0.018
		No	64 (88.9%)	109 (75.2%)	
2	Day of admission	Weekday	51 (70.8%)	85 (58.6%)	4.296
		Saturday	15 (20.8%)	34 (23.4%)	
		Sunday	6 (8.3%)	26 (17.9%)	
3	Delay in giving consents	Yes	1 (2.8%)	9 (6.2%)	1.176
		No	70 (97.2%)	137 (93.8%)	
4	Inability to pay	Yes	2(4.2%)	2 (3%)	0.07
	(Lack of funds)	No	69 (95.8%)	142 (97%)	
5	Lack of blood	Yes	4(5.6%)	18 (12.4%)	2.484
		No	68 (94.4%)	127 (87.6%)	

Patients who had existing comorbidities and admitted on Sunday were more likely to have delayed surgeries than those admitted on any other day, however, this was not statistically significant (Table 2).

Table 2

Reasons for delay of orthopaedic surgical management in Lankester Group B

No	Reasons for delay	Response	Orthopaedic surgical treatments		P-value
			(< 24 hours)	(≥24 hours)	
1	Coexisting comorbidities	Yes	8 (14.0%)	2 (33.3%)	1.514
		No	49 (86%)	4 (66.7%)	
2	Day of admission	Weekday	40 (70.2%)	2 (33.3%)	7.046
		Saturday	11 (19.3%)	1 (16.7%)	
		Sunday	6 (10.5%)	3 (50 %)	
3	Inability to pay	Yes	1 (1.8%)	2 (33.4%)	11.937
	(Lack of funds)	No	56 (98.2%)	4 (66.7%)	
4	Lack of blood	Yes	3 (6.3%)	1 (16.7%)	1.187
		No	54 (94.7%)	5 (83.3%)	

DISCUSSION

In this study, 223 (79.6%) of the patients studied were male and 57 (20.4%) were female with a ratio of 4:1 and the majority of the patients (61.4%) were of the age group 16-40 years with a mean age of 28±15 years. The study by Lankester *et al*. (9) in 2000 and that of Ifesanya *et al* (8) in 2013 had similar findings. Young male predominance can be explained by the fact that this group is largely involved in high risk and demanding activities such as machine operators, motorcycles riding and car driving, mining, and construction works and therefore putting them at risk of physical injuries.

Among the patients studied, 90.7% were residents of Dar es Salaam and Pwani Region which is close to MOI while the remaining 9.3% came from other regions, this can be explained by the fact that MOI is a tertiary treatments institution while from other regions patients may seek care to nearby centers before reaching MOI, similar results are also seen in another study by Long *et al*. (13) in North West Cameroon.

Among two hundred and eighty study participants, 77.5% were patients who required emergency surgery (Lankester group A) while those who required urgent surgery were 22.5% (Lankester group B). This is different from other studies done by Jagias *et al*. (10) and Ifesanya *et al*. (8) which showed Lankester B to have the higher proportion. These differences can be explained by the fact that MOI is a main tertiary institution in Tanzania.

The average waiting time of an acute musculoskeletal patient from admission to orthopaedic surgical management for patients who required emergency surgery (Lankester A) was 9±5 hours while for patients who required an urgent operation (Lankester B) were 12±6 hours. The waiting time is different (lower) compared to the study done by Ifesanya *et al*. (8) in 2013 and Jagiasi *et al*. in 2017. This difference may be due to that the fact that the compared studies were conducted retrospectively and because hospital records are based on day/month/year dating, delay to surgery could only be measured days as against hours and this reduces the precision of their estimate. The efficiency of the on-call emergency trauma team at MOI and increased in the number of the operating rooms for an emergency case can also explain the lower waiting time in this study.

Among two hundred and seventeen patients who required emergency surgery (Lankester A), only 34.6% were operated in their ideal target time (less than 6 hours). The majority of patients (63.1%) waited for 6 to 24 hours for their surgery. In Lankester Group B, among the sixty-three patients, 90.5% were operated within their ideal time (within 24 hours). Dominique *et al*. (12) had similar results. Lankester *et al*. (9) however had similar results in group B but different results in emergency

patients (group A). This difference in the extents of delay in Lankester group A can be explained by a large proportion (77.5%) of emergency patients admitted.

There are multifactorial causes of delay in orthopaedic surgery for acute musculoskeletal trauma patients. In the Lankester group A, lack of theatre slots (43.3%) was the most common reason for the delay, followed by the unavailability of a consultant/experienced orthopaedic surgeon (15.2%). Among the patients in Lankester Group A, 36 (20.3%) patients were delayed due to existing co-morbidities, whilst 12.4% were due to unavailability of blood products and a further 3.7% due to lack of funds. Patients admitted during weekday had a slightly high chance of encountering delays compared to those admitted during weekends.

In Lankester group B patients, the lack of theatre slots accounted for 3.2% of the delays while lack of diagnostic modality facilities like CT contributed to 1.6% of the delays. Several other studies had similar observations (8,9,12,15,17). Lack of blood products were the reason for the delay in 6.3% (4) of the patients, whereas inability to pay for surgery in 3 (4.8%) patients and unavailability of the proper implant in 1(1.6%) patient). Similar findings also have shown from different studies (8-10).

Secondarily logistic regression analysis was conducted to identify predictors of surgical delay for Lankester group A and B and factors analysed include the day of admission, pre-existing comorbidity, lack of blood, delay in giving consent and inability to pay. Among the factors analysed the only significant difference of ($p<0.05$) was found for patients with coexisting comorbidity in Lankester group A with a p-value of 0.018. This differs from the study done by Ifesanya *et al*. (8) in 2010 which shows patients admitted on weekend are more likely to delay. This may be due to the difference in the efficiency of the on-call emergency trauma team on weekdays and weekend and the volume of emergency patients admitted.

CONCLUSIONS

The study revealed the following findings;

i. The mean waiting time for patients who required emergency surgery was 9±5 hours while for patients who required an urgent surgery was 12±6 hours.
ii. Sixty five point four percent of emergency patients (Lankester A) were delayed while for patients requiring urgent surgeries (Lankester B) only 9.3% had delayed surgeries.
iii. The commonest cause of delays for surgery was lack of theatre slots.
iv. The presence of comorbidity predicted delays of more than 24 hours in emergency patients.

RECOMMENDATIONS

i. To allocate more theatre slots for emergency patients to reduce their waiting time.
ii. Orthopaedic and trauma centers should use orthopaedic surgical treatment waiting time as the indicator for quality delivery services.
iii. The physician should be part of the emergency on-call team to facilitate early management of the patient's comorbidities.

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