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Delay in Surgical Management of Orthopedic Trauma Patients in an Urban Tertiary Care Hospital of India: A Crossectional Study

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Abstract: ***Delay in surgical management of trauma and fracture cases is a problem being faced by all major tertiary care institutes in developing countries. Exponential growth of population against static number of health care institutions and health care personnel has led to a mismatch in the number of takers and givers. A myriad of factors lead to delay in the definitive management of fracture patients. This study was conducted to determine the chief reasons for this delay after careful monitoring of date of admission and date of surgery and interviewing the treating surgeon and the patients. Modified Lankaster classification was used to standardize the advised time for surgery and the results were analyzed statistically.***

Keywords: Delay, Orthopaedic, surgery, Prognosis, Lankaster.

1. Introduction

Patient care in a Government run tertiary care hospital in India is a complex amalgamation of already overloaded Hospital resources and Doctors , patient's relatives who undergo the same amount of mental agony as the patient and the patient himself , keeping himself motivated for long duration of time , till he is operated.

The time delay between admission of a trauma victim and surgical treatment is an important factor governing the morbidity and mortality of a patient, e.g.Hipfractures. It bears direct effect on the functional outcome of surgery as well as the social and physical rehabilitation. Longer periods of stay have an adverse impact on the already overfull and understaffed Government Hospitals. The medical expenditure per patient made by the government is phenomenal and it keeps increasing with every day of admission.

The study was conducted to get a better understanding of the reasons causing delay in the surgical treatment of fractures. Optimum utilization of already scarce resources, proper triage and reduced length of stay could go a long way in decongesting hospitals and providing prompt treatment to patients.

2. Material and Methods

A retrospective study was conducted in the Orthopedic Department of a Tertiary care referral center of Mumbai. All the patients operated between 20th June 2016 and 20th July 2016 were taken into the study after obtaining due informed consent. Date of admission, date of decision of surgery, type of fracture, type of fixation, coexisting morbidities and time in obtaining surgical fitness were noted down after careful examination of case sheet and detailed interviews of the treating doctor and the patient. 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 three categories Type A, B & C on the basis of modified Lankaster classification.

Group A: Open fractures, dislocations, limb injuries associated with vascular compromise, compartment syndrome, acute osteomyelitis, acute septic arthritis, etc., who should have definitive treatment within 6 hours of admission.

Group B: Hip fractures, closed long bone fractures, ankle fractures, limb gangrene, removal of severe implant infection, etc. who should be operated upon on the day they presented, or on the day they are declared fit/ready for surgery.

Group C: tendon injuries, simple hand fractures, cold abscesses, limb deformities requiring surgical correction, malunion or non-union of fractures, chronic osteomyelitis, carpal tunnel syndrome, etc. who should have surgery done within 5 days or more of presentation.

The data obtained was transferred to a computer spreadsheet and analyzed using the Statistical Package for the Social Sciences (SPSS Inc.) version 17.0. 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 days) were expressed as mean ± SD (standard deviation). Primary outcome measures for the study included the duration of delay between the time when a decision to operate was taken and the date the surgery was eventually carried out, the causes of such delays and a comparison with the patients' perspective of the causes of delay.

Secondarily, logistic regression analysis was conducted to identify predictors of surgical delay beyond 3 days. Results are presented with the aid of tables and diagrams.

Table 1 The three categories of trauma admissions

Group A
Open fractures
Any dislocation
Any fracture – dislocation
Compartment syndrome
Supracondylar fractures with neurovascular compromise
Femoral neck fracture (child)
Subcapital femoral neck fractures in adults under 60 years
Re-implantation
Mangled hand
Severe infection
Osteitis/septic arthritis
Cauda equina compression
Contaminated traumatic wounds
Group B
Most fractured neck of femurs
Wrist fractures
Ankle fractures when ready
Closed long bone injuries
Simple clean wounds
Spinal tumours with neurology
Spinal fractures with neurology
Other injuries not included in groups A or C
Group C
Re-manipulation of a fracture
Locked knees
Sciatica
Spinal tumour/fracture without neurology
Peri-prosthetic fracture
Ruptured Achilles tendon/quadriceps tendon
Hand injuries – simple fractures, simple tendon injuries, simple nerve injuries

To measure the prevalence of comorbidities and other contraindications for surgery, ASA grading was considered.

ASA grading:-

1) Patient is a completely healthy fit patient.
2) Patient has mild systemic disease.
3) Patient has severe systemic disease that is not incapacitating.
4) Patient has incapacitating disease that is a constant threat to life.
5) A moribund patient who is not expected to live 24 hour with or without surgery.
6) Emergency surgery, E is placed after the Roman numeral.

An attempt was made to categorize the myriad reasons for delay in surgery.

1) Patient factors
- Coexisting Morbidities
- Delay in giving consent
- Absence of relatives
- Lack of funds

2) Hospital Factors
- Lack of OT slots
- Lack of Nurses
- Lack of other OT staff like servants and wardboys
- Lack of specific diagnostic modality like 2D echo machine

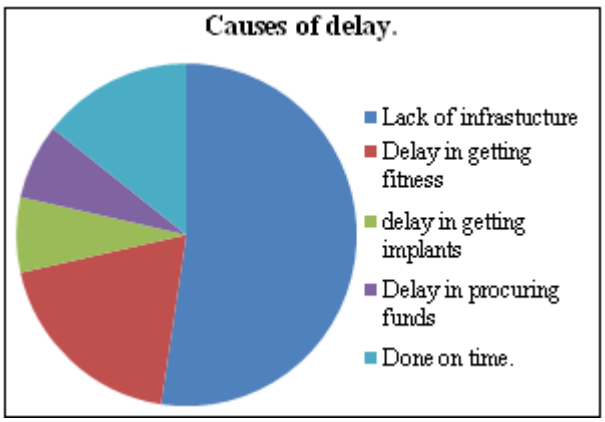
3) Surgeon Factors
- Delay in taking decision.
- Improper initial management leading to delay in final surgery.
- Delay in procurement of proper implants for the surgery.

3. Results

All the data collected over this period of time was tabulated and analyzed statistically . Normal demographical data was included in the study to increase the scope of the study and to get a fair idea of the scenario.

There were 42 cases which were included in the study after taking due consent. All of them were trauma cases. Average age of the patients was 42 years. There were 9 Female patients and 33 of them were males.Out of 42 , 29 were classified into Lankaster type B and 13 were classified into Lankaster type A. 8 patients directly came in OPD and were admitted from the same portal whereas rest of the 34 patients were admitted from the Emergency Room. The average time period between the day of admission and date of surgery was 15.73 days with minimum being 0 day, i.e. patient was operated on the same day as compared to maximum of 55 days, in which patient could not be operated as the patient had multiple major co-morbidities. If we consider average number of days taken in each category of Lankaster classification average number of days taken for surgery in type A was 13.61 days whereas average in Type B was 16.68 days . This clearly suggests that except few cases which were taken up immediately or on the same day , rest of the cases took a long time to come to OT table , most of the times we treating the complication of the fracture rather than the fracture itself.

Coming to the causes of the delay, most of the times there were multiple reasons for delay in operating the patients, but after careful interview of the treating doctors as well as the patients, major causes were ascertained. Out of 42 patients 22 (48%) were delayed just because of lack of proper infrastructure, including lack of OT slots, lack of ward boys or sisters and lack of linen and gowns. 8 cases were delayed because of delay in getting fitness for surgery. Delay in getting proper implants and delay in getting funds ready lead to delay in 3 cases each whereas 6 cases were seen to be operated on time



Descriptives								
delay								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	22	14.55	5.755	1.227	11.99	17.10	3	25
2	8	26.13	14.367	5.080	14.11	38.14	8	55
3	3	20.33	12.503	7.219	-10.73	51.39	6	29
4	3	21.67	13.317	7.688	-11.41	54.75	7	33
5	6	1.00	.632	.258	.34	1.66	0	2
Total	42	15.74	11.236	1.734	12.24	19.24	0	55

Multiple Comparisons						
delay Tukey HSD						
(I) delay_coded	(J) delay_coded	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-11.580*	3.598	.021	-21.89	-1.27
	3	-5.788	5.363	.816	-21.16	9.59
	4	-7.121	5.363	.676	-22.50	8.25
	5	13.545*	4.013	.014	2.04	25.05
2	1	11.580*	3.598	.021	1.27	21.89
	3	5.792	5.900	.862	-11.12	22.70
	4	4.458	5.900	.941	-12.45	21.37
	5	25.125*	4.706	.000	11.63	38.62
3	1	5.788	5.363	.816	-9.59	21.16
	2	-5.792	5.900	.862	-22.70	11.12
	4	-1.333	7.115	1.000	-21.73	19.06
	5	19.333*	6.162	.026	1.67	37.00
4	1	7.121	5.363	.676	-8.25	22.50
	2	-4.458	5.900	.941	-21.37	12.45
	3	1.333	7.115	1.000	-19.06	21.73
	5	20.667*	6.162	.015	3.00	38.33
5	1	-13.545*	4.013	.014	-25.05	-2.04
	2	-25.125*	4.706	.000	-38.62	-11.63
	3	-19.333*	6.162	.026	-37.00	-1.67
	4	-20.667*	6.162	.015	-38.33	-3.00
*. The mean difference is significant at the 0.05 level.						

4. Discussion

With a population density equivalent to India's, there is always a burden on all Government owned service providers. Hospitals are no different. Apart from dealing the regular inflow of patients in the Out Patient Department, admitted patients have to be taken care of as well. Under all this pressure, maintaining a strict time limit for surgeries and delivering quality care as prescribed by International bodies and institutions take a hit. No hospital so far has been able to fully resolve the issue of operative delays. This is due to the fact that the demand for operating services usually outstrips the available facilities. Limiting the waiting list for surgeries is one of the most challenging problems for Hospital administrators.. There are standards against which current practices should be appraised. Standards like these are difficult to maintain in working environment like that in India. Even though this is one of the most relevant problems being faced by the Government institutions of the country, very few studies have been conducted to clearly earmark the problem areas and gauge the deficiency exactly.

There is significant delay before operative orthopaedic treatments in our Hospital. During the course of the study it was noticed that most of the delays were directly related to the lack or relative lack of infrastructure.There was also lack proper information and explanation given to the patient by the authorities. Even when it was conveyed to them, the delay to be expected was not informed. This led to a lot of unrest and lack of confidence among patients and their relatives. There is also the possibility that even in cases where such explanations were provided; they may not have been understood by the patients and their relations. It is paramount that the surgical patient be taken into confidence and up – to date information be provided to him, included the type of surgery, timing and delay if any. Apart from this all the regular pre-operative check list is maintained including an informed consent explaining the diagnosis , details of surgery and likely complications. These discussions are documented in the patients' notes for medicolegal reasons.

The fact that the urgency (modified Lankester) grouping was a significant predictor of delay before operative treatment with the most emergent cases being less likely to be delayed might be some credit to the selection process by the managing teams. This is because the potential dangers of a delay in group A patients are usually grave compared to those associated with group C patients.

Lack of theatre slot was the commonest reason for delaying operative treatment of our patients. This was particularly common in the group B (urgent) patients. It could be that our centre gives priority to the emergencies (group A) at the

expense of urgent cases while very few elective cases (group C) get operated upon at all. Our study reveals both clinical and organizational reasons for delay in the operative treatment of patients. Theatre inefficiency has been shown to be a major factor in the delay encountered in treating surgical patients especially in the developing countries. [12] In such circumstances, the solution lies in the improvement of efficiency of the operating theatre, alternatively, theatre time needs to be increased in order to accommodate all trauma and elective admissions in reasonable time. This buttresses the wisdom in the proposal by Villa and coworkers that the allocation of beds and operating theatre hours should be based on patient flow characteristics of the various units and specialties in the hospital. [13] A follow-up study is needed to further elucidate the factors responsible for non-availability of theatre slots in our centre. That notwithstanding the contributory factors for the theatre non- availability will probably include wastage of operating time from cancellation of cases, delays encountered in transferring patients from the wards to the theatre, shortage of instrument sets occasioning the need to re-sterilize after every one or two operations, amongst others. Other important causes of treatment delays in our hospital are nonavailability of blood for surgeries as well as industrial actions by the various groups of hospital staff. It would be expected that these factors are likely to be encountered in similar practice settings in other parts of the developing world.

The factors that significantly determine delay to operative treatment included the urgency of the patient's condition based on the modified Lankester grouping. The need for a careful review of our operation booking policy cannot be over-emphasized. The delay occasioned by poor ASA status has been described although it is not statistically significant in this study. [14]Attempts are often made to optimise relatively poor operative risk patients before surgery and this may contribute to the delay. Orosz *et al.*, in their review of hip surgeries, also identified the need to optimize patients, the admission of patients on certain days of the week, as well as lack of theatre slots; as factors that may significantly contribute to delay before surgery. [8]

In interpreting the results of our findings, the following limitations were encountered. The modified Lankester classification of patients was done retrospectively, this could have denied the investigators in this study some details of the individual cases which might affect the accuracy of our classification. It is debatable that the mix of elective procedures classified as group C by Lankester *et al*., have to be done within 5 days of presentation. Secondly, because hospital records are based on day/month/year dating, delay to surgery could only be measured in days as against hours; this reduces the precision of the estimates. The ASA classification, like most clinical classification systems, is known to have the disadvantage of being observer-dependent. Having been derived from clinical notes, the ASA classes of our patients is another potential source of inaccuracy.

5. Conclusions

Patient characteristics associated with a delay included admission during the weekend and modified Lankester groups B and C. This audit shows that our current practice in terms of promptness to surgical care and communication falls short of the ideal. There is a need for better communication between surgeons and patients/relatives about delays in surgical treatment. Theatre facilities should be expanded and efficiency of service delivery improved. Attention to these relatively avoidable gaps will make our practice more patient-centred as well as improve patient satisfaction, safety and outcome. The extent to which delay affects functional recovery and the outcome of treatment requires further studies.

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