

A Retrospective Study of Missed Fractures and Injuries in Orthopedics

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ABSTRACT

Introduction: Common orthopedics injuries may result in long-term disability when they are treated lately. Simple fractures may require surgeries when they are missed and neglected. Most musculoskeletal injuries are seen in emergencies, some injuries may be missed when life-threatening conditions require attention, especially in poly-trauma patients. Certain injuries are difficult to recognize and some fractures may not visible in initial x-rays. A high index of suspicion is required to diagnose such cases.

Methods: We conduct a retrospective study in which missed fractures, dislocations, and injuries were diagnosed and noted by consultant Orthopaedic surgeons from 2013 to 2022.

Results: There were 76 missed diagnosed cases noted from 2013 to 2022. The patient's ages range from 2 years to 63 years. Altogether 42(55.3%) were missed fractures, 23 (30.3%) were missed dislocations, and 11(14.5%) were tendon and ligament injuries cases. The common reason for the error was related to radiological error found in 62 (81.6%) cases. Misreading of X-rays was seen in 22 (28.9%) cases, poor quality x-rays in 17 (22.4%) cases, improper x-rays in 10 (13.2%) cases, and failure to order for x-rays in 16 (21.1%) cases.

Conclusions: Good history and clinical examinations are essential. Proper x-rays should be taken and poor-quality x-rays should not be accepted but repeated. Most injuries missed on radiographs are not difficult to diagnose. Re-evaluation of patients should be done in an emergency, and with poly-trauma patients.

Keywords: *Fractures; Retrospective Studies; X-Rays*

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INTRODUCTION

Diagnostic errors are important in all branches of medicine. In orthopaedics and emergency department, significant diagnostic errors occur that may vary from simple fractures to potentially life-threatening injuries.[1] Most musculoskeletal injuries are first seen by emergency doctors, residents, and paramedics, some injuries may be missed when life-threatening conditions require attention, especially in poly-trauma patients. Certain injuries are difficult to recognize and some fractures may not be visible in initial x-rays. A high index of suspicion is required to diagnose such cases.[2,3]

Orthopaedic injuries may result in long-term disability when they are treated late. Simple fractures may require surgeries when they are missed and neglected. A delay in diagnosis may lead to poor outcomes in long-term results. Patients may have persistent pain, they may suffer until the diagnosis is made. Patients may have distress, cost of treatment will increase for patients and hospitals. It may cause complaints, bad publicity, and medico-legal issues.[4]

Here we study the incidence and clinical significance of missed injuries. The contributing factors and strategies are necessary to minimize such errors that help to improve the quality of trauma care.

METHODS

This was a retrospective study conducted in the Department of Orthopedics, Manipal Teaching Hospital, Pokhara, Nepal from January 2013 to January 2022. Here we described the diagnostic errors clinically and radiologically.

Inclusion criteria

- Any injuries not diagnosed in the emergency department at the first clinical and radiological examination by orthopaedic surgeons.
- Any injuries not diagnosed during the

first day of observation in the orthopaedic department by orthopaedic surgeons.

- The patient presents in the orthopaedic outpatient department with symptoms due to injuries which were not diagnosed and seen in other centres by orthopaedic surgeons.

Exclusion criteria

- Injuries were missed by medical officers before the patient left the emergency department.
- Cases in which diagnosis was correct but management was inappropriate.
- False-positive cases

The data of patients who had missed injuries were collected from wards, emergency, and OPD. Clinical and radiological details and the diagnosis made at the time will be recorded from initial admission. We analyze the collected record, patient details, and clinical findings including age, gender, and residential status. Based on these data, we will evaluate the missed cases in orthopaedics. The data collected will be entered into a database created using Microsoft Excel and analysis will be done by SPSS version 16.0.

RESULTS

A total of 76 patients who met the inclusion criteria were included in the study. The demographic profiles are shown in Table 1.

Table 1: Demographic variables

Variables	Results
Age of patients	27.37 ± 16.23 (2 - 63yrs)
Gender	
Male	53 (69.7%)
Female	23 (30.3%)

In our study 11 (14.5) patients had tendon or ligament injury which was missed as proper history was not taken and in some cases, clinicians failed to do the needful examination.

Forty-seven (85.5) patients had fractures or dislocations which was missed as the proper radiological evaluation was not done. Table 2 shows the missed cases.

Table 2: Missed Cases

Missed Cases Category	Numbers
Fractures	42 (55.2)
Dislocations	23 (30.3)
Tendons and Ligaments	11 (14.5)

Among the 76 cases, 37 (48.7) cases were initially seen in our hospital by ourselves while 39 (51.3) cases were seen by other consultants from other institutes. In all 76 cases, the final diagnosis was made when we reevaluated the patients. Proper history, clinical examination, and radiological evaluation helped to reach the diagnosis. In 11 cases, 5 cases required MRI for diagnosis; in 6 cases, CT scans were done for diagnosis. Among the 76 cases, 34 (44.7) cases were initially seen in the emergency while 42 (55.3) cases were seen in the outpatient department. In 12 cases there were multiple injuries, the diagnosis was missed as the patient's life-threatening condition was managed.

Table 3: Causes for Missed Diagnosis

Causes	Numbers
Failure to take history	9 (11.8)
Failure to do a thorough clinical examination	5 (6.6)
Radiological error	62 (81.6)

Table 4: Causes of Radiological Error

Radiologic Causes	Numbers
Poor quality films	17 (22.4)
Misreading of x rays	22 (28.9)
Improper views	10 (13.1)
Failure to take x rays	16 (21.1)
Other forms of investigation require	11(14.5)

Table 5: Comparison of missed injuries among polytrauma patients, patients from emergency, and their first visit

	Missed injuries	p-value
Nonpolytrauma patients	64	0.567
Polytrauma patients	12	
Patients from Emergency	34	0.007
Patients from the outpatient department	42	
Patients are initially seen in our hospital	37	0.055
Patients are initially seen in other hospitals	39	

Comparing the missed injuries cases with polytrauma and non-polytrauma patients, there were no significant differences ($p > 0.05$). Similarly, there were no significant differences between the cases that were missed initially in our centre or other centres ($p > 0.05$). There was a significant difference between the case seen first in the emergency and outpatient department ($p < 0.05$).

DISCUSSION

Missed fractures, dislocations, and injuries are the problem encountered by every orthopaedic surgeon. The incidence of missed injuries ranges from 0.6% to 2%.[1,5,6] It is not possible to find out every diagnostic error and so our study is inevitably incomplete. No study can accurately detect all missed diagnosed cases. Here we study the cases which were not diagnosed previously in the first visit but were later diagnosed. Here we studied 76 cases that were diagnosed later on subsequent visits to the hospital.

The main cause of the diagnostic error was a radiological error which was 81 % in our study. This is similar to the study of Guly H R, and Wardrope et al.[1,7,8] Among the radiological error, misreading of x-rays (29%) are the common cause of missed diagnosis seen in our study which is similar to the study of

Houshian et al who show 15-34% of misinterpreted x-rays. [3,9,10]

In 17 (22.4) cases fracture and dislocation was missed due to poor-quality x-rays. Most of these x-rays were done in primary centres in the periphery where X-ray quality was poor. Proper views were not done due to a lack of trained radiologists.[11]

Delay in diagnosing fractures is expensive for both patients and the communities. Patients may lose confidence in the hospital when the diagnosis is missed.[12] An adequate history and physical examination including proper radiological examination of the injured region will help to reduce the problem. In our study proper history and examination help to diagnose 18% of cases, which is similar to the study of Berman et al.[13]

While dealing with poly-trauma patients, minor injuries may be missed primarily when life-threatening conditions require attention. [5] Reexamination of all multiply injured patients requires carefully in subsequent days is required. Twelve patients sustain multiple injuries and their diagnoses were missed in our study. They were diagnosed later with re-evaluations.

It is difficult to diagnose injuries in children and in unconscious patients who cannot cooperate during examinations. A high index of suspicion is necessary to identify these patients. If clinical suspicions persist despite appropriately normal radiographs these patients should be carefully re-assess and investigated further CT/MRI require for further diagnosis. 34 (44.7) cases were initially seen in emergency and whose diagnoses were missed in our study. In the emergency setting, diagnostic errors can be reduced by increasing knowledge. The system's key elements are communication of the patients, clinical history a correct selection of initial and subsequent x-rays.[14] Radiology plays a pivotal role in the diagnos-

tic assessment of polytrauma patients. The key element to reducing errors in an emergency setting are knowledge, experience, and correct image protocol.[15] With advances in imaging tools and various investigating facilities, the incidence of missed diagnosis is not declined.[11,16] To avoid missing positive findings radiologist or the clinician must obtain necessary information from patients. Even double reporting and good communication between clinicians and radiologists are required.[11,17] Learning from errors needs a serious review of our practice and the employment of changes to increase performance levels. Errors lead to diagnostic problems and reveal medicolegal consequences.[18]

CONCLUSION

Good history and clinical examinations are essential. Proper x-rays should be taken and poor-quality x-rays should not be accepted but repeated. Most injuries missed on radiographs are not difficult to diagnose. Patients should be re-evaluated if we are dealing with them in an emergency or while treating multiply injured patients. Regular educational program morbidity meetings and root cause analysis helps to reduce missed cases.

CONFLICT OF INTEREST

None

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None

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