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# A PROSPECTIVE HOSPITAL BASED STUDY OF EPIDEMIOLOGICAL FACTORS IN CASES OF FALL FROM HEIGHT ALONG WITH PATTERN OF INJURIES, MANAGEMENT AND OUTCOME

General Surgery

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## ABSTRACT

**Background:** Fall from height is a common cause of morbidity and mortality in suburban population. These cases are either domestic or workplace injuries with different causative factors.We analyzed different aspects of these falls along with pattern of injuries , management and their outcome.

**Methods:** we conducted prospective epidemiological study to identify various causative , contributory factors and resultant injuries in cases of fall from height.the study group comprised of semiurban population and involved both domestic and workplace injuries presenting in a tertiary care hospital.

**Results:** the study involved 100 cases of fall from height . The age group 21-40 yrs were predominant for abdominal injuries with head or spine injuries with 51 cases out of which 36 were male and 15 were females. 25 cases of fall from height were due to terrace of building.44 cases were home related falls and 56 cases were work related fall. In 52 cases signs of peritonitis were present and in 48 cases absent. according to findings of cect whole abdomen. Liver injury was present in 36 cases and splenic injury was presnt in 28 cases. Combined liver and spleen injury was present in 6 cases. 76 cases were of abdominal injury with head injury , 15 cases were of abdominal injury with spinal injury and 9 cases were of abdominal injury with head and spinal injury.

**Conclusion:** Fall from height is the second most common cause of trauma.Most cases of fall from height are accidental in nature. Male outnumbered females by the ratio of 3:1. 21-40 years age group contributed the highest number with 51 cases . 25 cases of fall from height were due to fall from terrace of building.Among occupation, fall from height most frequently seen among construction workers . Abdomen (Liver Lacerations) injuries are very common followed by head and chest injuries .Liver is the most common solid organ to be damaged, followed by spleen.

## KEYWORDS:

Fall from height , Injuries , Trauma

## INTRODUCTION:

Trauma is the main cause of morbidity and mortality worldwide 1,2and is still the most frequent cause of death in the first four decades of life3 . moreover,it remains a major public health problem among all countries , regardless of the socioeconomic status.4,5Injuries account for about 12% of the disease burden worldwide and have a major impact on the health system .6

The pattern of injuries in cases of falls from heights is dependent on the height, body weight, velocity, nature of surface impacted, orientation of body at the moment of impact and the elasticity and viscosity of tissue of the contact body region, out of which height of fall is the major determining factor.Victims of fall from height presents with various injuries. They can be abdominal injury ,head injury or spinal injuries along with chest injuries or bony injuries.

It may be that abdominal injuries, similar to cervical spine and head injuries, are often fatal in the very early stages (through massive haemorrhage or visceral trauma) and so could be over represented in the fatalities.

This study aims to assess the pattern of trauma in patients with fall from height having abdominal injuries associated with head or spinal injuries along with management options in such patients.we also evaluate the outcome in the form of mortality , morbidity and hospital stay in these patients.

## METHODS:

Inclusion criteria included Either sex Age:- 1-60 years. Abdominal injuries including all visceral organs intraperitoneal as well as retroperitoneal along with head injury , spine injuries or both.Injuries with pattern like abdominal injuries with head injury , abdominal injuries with spine injuries, abdominal injuries with spine injury and head injuries.

Exclusion criteria included Isolated head , abdomen or spine injury , .Infant population below 1 yr of age , Geriatric population above 60 yrs of age due to comorbid conditions. & Immunodeficient patients .

Patient will be assessed in the triage/ casualty and managed according to ATLS regime. A primary survey was conducted and patient managed accordingly following which a secondary survey was done which included whole body examination and assessing GCS score.

Xray cervical spine ap/lateral, xray thoracolumbar spine ap/lateral, x-ray lumbosacral spine ap/lateral were done to rule out any spinal injury. If any positive finding is present along with clinical finding than we will go for MRI whole spine.

USG whole abdomen along with xray abdomen ap erect to assess abdominal injury.

In case of positive findings on ultrasound a CECT w/a will be done in order to grade the injury of solid viscera and to decide management options. Blood investigations, coagulation profile, serum electrolytes viral markers, chest x ray and ECG was also done.

All surgical patients requiring surgical intervention will undergo surgery accordingly followed by postoperative care.Need for neurosurgery intervention will be discussed with the neurosurgeon and management set accordingly.

## OBSERVATIONS:

On the basis of criteria described , 100 patients were studied and evaluated and the following observations were made.

The age group 21-40 yrs were predominant for abdominal injuries with head or spine injuries with 51 cases out of which 36 were male and 15 were females.

**TABLE 1:**

| AGE(YRS) | MALE | FEMALE | NO.(%) |
|---|---|---|---|
| 1-10 YRS | 15 | 3 | 18 |
| 11-20 YRS | 6 | 3 | 9 |
| 21 -40 YRS | 36 | 15 | 51 |
| 41-60 YRS | 17 | 5 | 22 |

Table 1 shows distribution of population according to age and sex.

Out of 100 cases of fall from height 25 cases were due to fall from terrace of building , 19 cases were due to fall from stairs , 18 cases were reported due to fall over construction site , 18 cases were fall from ladder , 16 cases were due to fall from balcony and 4 cases were due to fall from drain pipe.

**TABLE 2:**

| PLACES OF FALL | No. |
|---|---|
| TERRACE OF BUILDING | 25 |
| DRAIN PIPE | 4 |
| BALCONY | 16 |
| CONSTRUCTION SITE | 18 |
| STAIRS | 19 |
| LADDER | 18 |
| TOTAL | 100 |

Table 2 shows distribution of population according to places of fall.

Out of 100 cases 44 cases were home related fall and 56 cases were work related fall.

**TABLE 3 :**

| ORIGIN OF FALL | MALES | FEMALES |
|---|---|---|
| HOME RELATED FALL | 29 | 15 |
| WORK RELATED FALL | 45 | 11 |
| TOTAL | 74 | 26 |

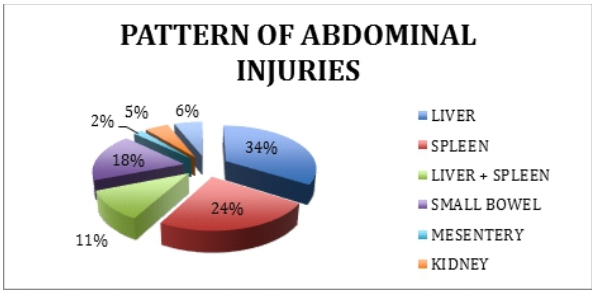
Table 3 shows distribution of population according to origin of fall .

In 34 cases liver was involved followed by spleen in 24 cases. In 11 cases liver injury with splenic injury was found . small bowel injury was found in 18 cases , mesenteric tears was found in 2 cases , bladder injury found in 6 cases and renal injury
in 5 cases.

**TABLE 4:**

| PATTERN OF ABDOMINAL INJURIES | NO. |
|---|---|
| LIVER | 34 |
| SPLEEN | 24 |
| LIVER + SPLEEN | 11 |
| SMALL BOWEL | 18 |
| MESENTERY | 2 |
| KIDNEY | 5 |
| URINARY BLADDER | 6 |

Table 4 shows distribution of study population according to pattern of abdominal injuries.




76 cases were of abdominal injury with head injury , 15 cases were of abdominal injury with spinal injury and 9 cases were of abdominal injury with head and spinal injury.

**TABLE 5 :**

| PATTERN OF INJURIES | NO. |
|---|---|
| ABDOMINAL INJURY WITH HEAD INJURY | 76 |
| ABDOMINAL INJURY WITH SPINAL INJURY | 14 |
| ABDOMINAL INJURY WITH HEAD AND SPINAL INJURY | 10 |

Table 5 shows distribution of study population according to pattern of injuries .

In 11 cases spinal cord damage was the cause of death , in 7 cases combined effect of craniocerebral damage and haemorrhagic shock was the cause. in 5 cases craniocerebral damage was the sole cause and haemorrhagic shock alone in 4 cases was the cause of death.

**TABLE 6:**

| CAUSE OF DEATH | NO. |
|---|---|
| CRANIOCEREBRAL DAMAGE | 5 |
| HAEMORRHAGIC SHOCK | 4 |
| COMBINED EFFECT OF BOTH | 7 |
| SPINAL CORD DAMAGE | 11 |
| TOTAL | 27 |

Table 6 shows distribution of Cause of death

**DISCUSSION:**

National Crime Records Bureau, Ministry of Home Affairs, Government of India in a published report in 2010 has mentioned that fall from height contributed 2.6% of all fatalities due to natural and unnatural causes7. Fall from height is a common cause of polytrauma in urban population8,9. But in suburban population, the factors responsible for such fall and resultant injuries are different. Most of such falls are easily preventable with simple measures.Injury due to fall from height remain a significant cause of morbidity and mortality in our day to day life.

In a study by Junaid A. Bhatti et al presented for the first time the full age and gender spectrum of fall-related injuries in a large sample of patients presenting to EDs in Pakistan. Most of those affected from fall-related injuries were relatively young, and children accounted for a significant proportion of such injuries. Children and females were mostly injured at home, whereas males aged 16–45 years were injured on road sites. Most of the children were injured while playing, whereas young and older adults were injured during work activities10. In our study , the minimum age was of 1 years and highest number i.e. 51 cases were in 20-40 age group, 22 cases in 40-60 age group. The age incidence of our study match with the above study.

In a study by Vineet Jain et al conducted at a tertiary care medical college located in a suburban area catering to both urban and rural population.In this study 64.4% of all cases were adult males and 35.6 % were females.In our study 74(74%) victims were male and 26(26%) were females11.

The sex incidence of our study correlate with the other studies.the incidence of fall from height in females is less in our region may be due to the fact that males are considered breadwinners and suffer work related falls .The origin of fall is an important factor in fall from height. In a study by Bronwen McNoe et al concluded that The specific origin of the fall was the precise location where the worker was standing or sitting at the time of the fall. In their study the most common sites were roofs (15%), ladders (13%), boats (12%) and scaffolding (9%) . in our study the most common sites were the terrace of the building (25%) , stairs(19%) , ladder (18%) , construction site (18%) , balcony (16%) and drain pipe(4%)12.

The incidence of origin of fall in our study correlates with other study. In our study, maximum number of cases belonged to workplace injuries (n = 56, 56%), which is contrary to similar study by Gulati et al13 where 90% cases were domestic injuries and Kent and Pearce14 who reported 57.4% cases of domestic fall.

In another study by Dubey Chandrashekhar et al they conducted ultrasound in 90 cases and found splenic injury in 8 cases , hepatic injury in 7 cases , renal injury in 3 cases , haemoperitonuem in 6 cases , intraperitoneal fluid in 25 cases and normal study in 6 cases14.In our study the FAST SCAN predicted in 100 cases 60 cases had haemoperitoneum and 24 cases free fluid in pelvis and 16 cases with normal findings. In our study the sensitivity was 84 % and specificity was 100 % .

In a study conducted by J.V.Kiran Kumar et al liver was the organ which was most commonly involved (4 out of 11 cases). In one case, although the overlying ribs were fractured, laceration of the liver was present on its undersurface. Spleen showed multiple lacerations in 3 cases but fracture of the overlying ribs was not seen in these cases. These findings were indicative that damage to these internal organs was due to deceleration. Hence spleen was the most common organ involved by deceleration. This is a finding in similarity with the study conducted by Steedman DJ et al , in which splenic injury was found to be the commonest cause of haemoperitoneum. Kidneys were not found to be injured in any of the cases in there study15. In our study liver was the most common organ injured followed by spleen. Splenic injury was found mostly due to desceleration. The combined effect of livef and spleen injury was found in 11 cases. Small bowel injury was found to be in 18 cases , mesenteric tear was present in 2 cases , renal injury was found in 5 cases and uriary bladder injury in 6 cases.The incidence of pattern of abdominal injuries are in correlation with the studies.

In a study by J.V.Kiran Kumar et al they described the cause of death in relation to primary impact. In their study 66.6% cases suffered cranio-cerebral damage followed by haemorrhagic shock in 20%. Only in two cases were there association of the two and in two cases there was spinal cord damage16. In our study cause of death in maximum umber of cases was spinal cord damage 11 cases (40.7%) , combined effect of cranio cerebral damage and haemorrhagic shock in 7 cases(25.9%) , cranio cerebral damage in 5 cases(18.52%) and haemorrhagic shock in 4 cases(14.81%). The incidence of cause of death correlate with the above study.

## CONCLUSION:

The results from this study are important for the physician responsible for the initial treatment of these cases, both at the scene and in the hospital. The recognition of specific features in victims of falls from height can assist in screening these patients, as well as in transfer, indication of diagnostic tests and monitoring. It is important to understand that trauma victims with life threatening injuries often have no major clinical signs and may go unnoticed at an initial examination. We must always consider the “dynamic” feature in the evolution of traumatic injuries as well as their multiplicity and association. Initially stable patients and considered “low risk” can evolve in a short time to the imminent risk of death. The time lost in this “delayed diagnosis” has a significant impact on prognosis and may be responsible for severe complications and even death of the patient. Thus, methods for rapid and effective recognition of trauma victims with potentially severe injuries, even before the first clinical manifestations, become of utmost importance. Understanding the severity of the trauma mechanism involved in falls from height is extremely important. There is real potential for severe and lethal lesions, as demonstrated in this study. Even in patients with few symptoms, this mechanism of trauma draws attention to the need for rapid clinical evaluation and prompt performance of diagnostic tests. This would certainly reduce the time to diagnosis and treatment, providing the best results and prognosis.

## BIBLIOGRAPHY:


1. . . Berger LR, Mohan D. Injury control: a global view. Oxford University Press; 1996.
2. . . Potenza BM, Hoyt DB, Coimbra R, Fortlage D, Holbrook T, Hollingsworth-Fridlund P. The epidemiology of serious and fatal injury in San Diego County over an 11-year period. Journal of Trauma and Acute Care Surgery. 2004 Jan 1;56(1):68-75.
3. . . Baker SP, O'Neil B, Ginsburg MJ, Li G. 2nd ed. The Injury Fact Book . New York: Oxford University Press; 1992.
4. . . Taçyıldız SG. Predicting factors for mortality in the penetrating abdominal trauma. Acta Chir Belg. 2004;104:429-34.
5. . . Kochanek KD, Xu J, Murphy SL, Miniño AM, Kung HC. National vital statistics reports. National Vital Statistics Reports. 2011 Mar 16;59(4):1.
6. . . World Health Organization. Injuries, Violence Prevention Dept. The injury chart book: A graphical overview of the global burden of injuries. World Health Organization; 2002.
7. . . . Accidental deaths and suicide in India. National Crime record Bureau, Ministry of Home Affairs. 2010.
8. . . Yagmur Y, Güloğlu C, Aldemir M, Orak M. Falls from flat-roofed houses: a surgical experience of 1643 patients. Injury. 2004 Apr 30;35(4):425-8.
9. . . . Kohli A, Banerjee KK. Pattern of injuries in fatal falls from buildings. Medicine, science and the law. 2006 Oct 1;46(4):335-41.
10. . . Bhatti JA, Farooq U, Majeed M, Khan JS, Razzak JA, Khan MM. Fall-related injuries in a low-income setting: results from a pilot injury surveillance system in Rawalpindi, Pakistan. Journal of epidemiology and global health. 2015 Sep 30;5(3):283-90.
11. . . Jain V , Jain S , Dhaon BK . A Multi Factorial Analysis of the epidemiology of Injuries from Falls from Heights . 2014 Dec 23:4(4):283-87.
12. . McNoe B, Langley J, Driscoll T, Feyer AM. Work-related slip, trip and fall injuries in New Zealand. Injury Prevention Research Unit; 2005 Apr.
13. . Gulati D, Aggarwal AN, Kumar S, Agarwal A. Skeletal injuries following unintentional fall from height. Ulus Travma Acil Cerrahi Derg. 2012 Mar 1;18(2):141-6.
14. . . Kent A, Pearce A. Review of morbidity and mortality associated with falls from heights among patients presenting to a major trauma centre. Emergency Medicine Australasia. 2006 Feb 1;18(1):23-30.
15. . Steedman DJ. Severity of free-fall injury. Injury. 1989 Sep 30;20(5):259-61.
16. . Kumar JK, Srivastava AK. Pattern of Injuries in fall from Height. J Indian Acad Forensic Med. Jan-March. 2013;35(1):0971-3.