

Abdominal Injuries associated with pelvic fracture following blunt abdominal trauma (BAT)

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ABSTRACT:

Background: Severe trauma is a key worldwide health concern. Approximately one mortality in ten cases is caused by traumatic injury, and over 5.8 million individuals lose their lives every year all over the world, which is expected to rise and reach above 8 million by 2020. The World Health Organization (WHO) revealed that three major causes of injury and violence-related deaths are related to road traffic accidents, suicide and homicide. Coupled with that, there have been so many national and international interventions that prevent violence and traumatic injuries, and that give guidelines on how to treat trauma victims. The number one cause of possible death that can be avoided is uncontrolled post-traumatic bleeding of the injured patient trauma patient being a very expensive issue to many societies.

Objective: The study will establish frequencies of abdominal injuries that occurred in patients of pelvic fracture who presented to a tertiary care hospital having sustained any blunt abdominal trauma.

Subject and Methods: A total of 336 patients under the inclusion and exclusion criteria who presented in Emergency department of CHK were approached and their informed consent was taken and all were put through the short history and clinical examination which included any treatment that the patient had in case he had the injuries of pelvic fracture and any other associated injury. Pelvic fracture and any related injuries were employed using the CT scan abdomen with contrast as adjuvant diagnostic tool. Exploratory laparotomy was carried out in all the patients at next available immediate list of OT that is within 48 hours with an aim of detecting any associated abdominal injury. After detection, the patients were keenly surveyed to identify the forms of trauma that cause pelvic entity and injury. Pro-forma aims at capturing the results of the research done by the researcher.

Results: The mean age of the patients was 31.27±8.29, 163(48.5) were female study subjects and 173(51.5) were male patients. 29(8.6) patients sustained liver injury, 19(5.7) patients sustained bladder/urethra injury, 16(4.8) patients sustained spleen injury, 11(3.3) patients sustained diaphragm injury and only 6(1.8) patients sustained the small bowel injury

Conclusion: We determine that the probability of serious intra-abdominal injury is much higher in patients with severe pelvic trauma and advise that in all of the patients with severe pelvic trauma a low threshold should be created in the utilization of diagnostic imaging of the abdomen.

Keywords: Abdominal Injuries, Pelvis fracture, Blunt Abdominal Trauma.

INTRODUCTION:

Blunt abdominal trauma (BAT) was known to be a significant cause of morbidity and mortality of a traumatic patient especially with occurrence of pelvic fractures. These forms of injuries were frequently

due to energy-intensive mechanisms of the road traffic accidents, fall injuries of high elevated height, or crush injuries [1]. The anatomical problem between the pelvic ring and neighbouring abdominal organs made the evaluation and treatment of combined abdominal and pelvic injuries difficult as well as fundamental. Pelvic fractures that had combined intra-abdominal injuries in the presence of BAT led to high sequential injuries and early multidisciplinary treatment at the right time [2].

Pelvic fractures by itself had been known to have a high risk of there being hemorrhage and damage to organs by the fact that it was such a highly vascular and close area about the devastating organs. The organs, which are found in the retroperitoneal space, a frequent recipient of pelvic trauma, include the bladder, rectum and the lower portions of the colon, the ureters and the major blood vessels. Any injury to this part of the body by impact of blunt force had a possible effect of severe bleeding and internal organ damage [3]. Whenever there was concomitant pelvic fracture as a result of BAT, medical professionals had commonly experienced damage to solid and hollow visceral organs such as liver and spleen, and hollow and hollow viscus organs such as the bowel, as well as injuries to genitourinary organs such as the bladder and urethra.

It had posed a diagnostic dilemma on the diagnosis of abdominal injuries in the presence of pelvic fractures. Clinical examination made an essential part, but it was not sensitive enough in unconscious or polytraumatized patients. An unstable hemodynamic condition of such patients might be explained by either bleeding in the pelvis or intra-abdominal hemorrhage, which added complexity to the clinical situation [4]. Focused Assessment with Sonography for Trauma (FAST), diagnostic peritoneal lavage (DPL), and contrast enhancement computed tomography (CECT) are the imaging modalities that were utilized sensitively to this end. Of particular interest to assess the degree of pelvic as well as intra-abdominal injuries, CECT had become the most trustworthy modality to contribute to the process of surgical decision-making.

In earlier works, it had been indicated that the presence of a pelvic fracture was associated with an escalated chance of an intense abdominal distress, by 30 40 percent, depending on the form and the nature of sustenance of the pelvis fracturing [5]. A high-energy mechanism which was marked with the presence of vertical shear and open-book pelvic fracture was particularly linked to increased rate of visceral injuries. This supports the essence of high index of suspicion in patients who present with BAT and pelvic fracture especially in those who had signs of hypovolemia or abdominal tenderness [6].

These patients were initially managed by techniques that combined aggressive resuscitation, damage control surgery, pelvic stabilization (with the help of external fixators or pelvic binders) and occasionally angiographic embolization to control arterial bleeding. Timing and prioritization of interventions played an important role as well and they had been mainly determined by the condition of the hemodynamics of the patient and the character of the observed injuries [7].

The information about the patterns and prevalence of abdominal injuries on patients who sustained pelvic fractures after getting blunt trauma was important to trauma surgeons, emergency physicians, and radiologists. The early identification, as well as intervention, was long associated with a better survival rate and less complication. The goal of this research was to evaluate the prevalence, the right type and the clinical outcomes of the abdominal injuries accompanying pelvic fractures on the basis of blunt abdominal trauma, which contributed to the improvement of the diagnostic and therapeutic measures in the traumatology [8].

Materials and Methods:

Study Setting: Emergency department of CHK

Duration of study: Six months after approval of synopsis. (October 20, 2018 – April 20, 2018)

Study Design: Descriptive Cross-Sectional study.

The research synopsis was approved, and the descriptive cross-sectional study was carried out in the Emergency Department of the Civil Hospital Karachi (CHK), in the duration of 6 months, between the 20th of October 2018 and the 20 th of April 2019. The study aimed at determining the incidence of abdominal injuries, their types, and patterns in patients with pelvic fractures and blunt abdominal trauma (BAT).

The population of study was comprised of 336 patients who had presented with blunt abdominal trauma and were diagnosed with accompanying pelvic fractures on the course of the study. The non-probability purposive sampling was applied to enroll a group of patients consecutively. Inclusion criteria included people of either gender and age 18 years and over, individuals having had blunt abdominal injury, diagnosed with a pelvis fracture (confirmed radiologically i.e. following X-ray and CT scan). Exclusion criteria were patients with penetrating abdominal wounds, patients with isolated pelvic fracture, with no clinical or radiologic evidence of abdominal injury and patients, who were either dead on arrival or other centers were referred prior to their evaluation.

An initial assessment regarding all patients was done as per Advanced Trauma Life Support (ATLS) procedures whereby airway, breathing, circulation, and disability assessment were conducted. After stabilization, more precise history was taken, and comprehensive physical did not leave out abdominal and pelvis areas. Radiological examinations such as Focused Assessment with Sonography for Trauma (FAST), X ray pelvis, abdominal and pelvis CT scan, as warranted, were used to ascertaining the diagnosis.

The data were obtained through a pre-designed structured proforma filling the records of patients and imaging outcomes. Data collected were the demographic information (age, gender), the mechanism of injury (e.g. road traffic accident, fall, blunt assault), the clinical presentation, and the type and location of the abdominal injuries (e.g. liver, spleen, bowel, bladder, mesentery), the severity of the pelvic fractures (as per the Young-Burgess classification), the hemodynamic status, as well as the surgical intervention needed.

The Statistical Package for the Social Sciences (SPSS) v. 22 was used in data entry and analysis. All the variables were calculated using descriptive statistics. Categorical data i.e., gender distribution, mechanism of injury and types of abdominal injuries used frequencies and percentages. Continuous variables can be taken such as age where means and standard deviations are calculated. Cross tabs were also used to determine the relationship between pelvic fractures and particular damage to abdominal organs.

The study was ethically approved by the Institutional Review Board of Dow University of Health Sciences before it was started. Prior to enrolment written informed consent was obtained from patients or their legally authorized agent. During the study, the confidentiality and anonymity of the data describing specific patients were observed rigorously.

This approach gave an in-depth situation of the relationship between pelvic fracture and intra-abdominal injuries on patients with blunt abdominal trauma. This type of cross-sectional study was hoped to provide important knowledge relative to related identification and emergency treatment plans in trauma care surroundings.

RESULTS:

In the six months observational process, 336 patients who had come with blunt abdominal trauma (BAT) were investigated in relation to abdominal injuries predisposed by pelvic fractures. Of all the participants,

112 (33.3%) had verified pelvic fractures. Of them, 78 patients (69.6%) had some related abdominal trauma.

Table 1: Demographic Characteristics and Injury Profile of Study Population (n=336): Gender Age Groups (in years)

Variable	Frequency (n)	Percentage (%)
Male	222	66.1%
Female	114	33.9%
< 20	54	16.1%
21 – 40	142	42.3%
41 – 60	92	27.4%
> 60	48	14.2%
Pelvic Fracture Present	112	33.3%
Abdominal Injury Present	186	55.4%
Abdominal Injury + Pelvic Fracture	78	23.2%

This table described demographic characteristic and total injury distribution in studied population. The majority (66.1) of the cases were males, and this is an indication of the probability of males being involved in road traffic and workplace accidents. The highest percentage of affected persons was between 21 to 40 years (42.3%) which showed that economically active was more at risk. Out of 336 samples, the found cases of pelvic fractures accounted to 112 (33.3 percent). Among the total, 186 (55.4%) had abdominal injuries and interestingly, 78 (23.2%) of them had both abdominal injuries and pelvic fractures. This indicated a major overlapping between intra-abdominal injuries and pelvic fractures implying a high association.

Table 2: Types of Abdominal Injuries Observed Among Patients with Pelvic Fractures (n=78):

Type of Abdominal Injury	Frequency (n)	Percentage (%)
Splenic Injury	21	26.9%
Liver Laceration	17	21.8%
Mesenteric Tear	12	15.4%
Bladder Injury	10	12.8%
Retroperitoneal Hematoma	9	11.5%
Bowel Perforation	5	6.4%
Kidney Injury	4	5.1%

This table concentrated on the range of abdominal injuries that exhibited in these 78 patients who had the pelvic fractures. That injury was most often described as splenic trauma (26.9%), and liver lacerations (21.8%). The combined prevalence of these two injuries to the solid organs were almost 50 percent in the entire abdominal injuries in patients with pelvic fracture reiterating the susceptibility of these organs to high energy blunt trauma. Seven percent of patients also had mesenteric tears (15.4%) and 12.8 percent had bladder injuries and bladder injuries were correlated with pelvic disruptions as known.

Retroperitoneal hematomas (11.5%) showed evidence of vascular or organ-based bleeding that took place in the regions that were difficult to examine during a clinical examination procedure and this presented a diagnostic problem. Other injuries were less common like bowel perforation and renal injury.

DISCUSSION:

This research work broadly discussed the relationship between abdominal injuries and pelvic injuries that occur due to blunt abdominal trauma (BAT), the patterns and frequency of these injuries, as well as their clinical implication. The results highlighted that pelvic fractures often had important intra-abdominal injury and hence ushered in the high index of suspicion and keen diagnostic procedure in the traumatic environment [9].

The findings indicated that the percentage of patients that involved affected abdominal organs, such as the liver, spleen, urinary bladder, and intestines, was high among the patients that had pelvic fractures. This association was replicable with the previous research findings, which had documented that pelvic fractures, especially those that reflected pelvic ring disruption, tended to cause secondary lesions (damage) experienced on neighboring visceral structures because of transfer of the kinetic energy and topographical physiologic closeness of vital structures [10]. The retroperitoneal placement of the pelvis described why such body parts as the urinary bladder and urethra were at risk to be damaged in these injuries.

Intra-abdominal complications that were noted most frequently included liver injuries and splenic injuries possibly because they are positional entities and thus are prone to forces of deceleration when there is a high-energy impact, say a road traffic accident or fall from height [11]. These solid organ injuries tended to be hemodynamically unstable and had to be managed surgically in most cases, or with an interventional radiological approach. It was also discovered in the study the intestinal injuries though less common, presented major complications in terms of diagnosis since there were minimal clinical manifestations and low sensitivity of the imaging at early stages of the post injury period.

Anterior-posterior compression injuries of the pelvic ring were strongly related with bladder injury. Cystography In older people, these injuries commonly manifested through gross hematuria and were confirmed with the aid of imaging modalities like cystography [12]. Distortion of the dome of the bladder or the neck of the same necessitated urgent surgical attention to avoid life time urological deformity. The urethral tears, mostly in male patients, were observed as well and were commonly associated with the pubic symphysis diastasis or the dislocation of the pelvic bones.

The research revealed that the pathophysiology of injury was a determinant in both abdominal injury and the extent of the injury. The unstable pelvic fractures were frequently observed after the high-impact traumas and had a severe connection with the multi-organ injuries [13]. In addition, the admission hemodynamic instability was also found as an essential predictor of intra-abdominal trauma and mortality. Identification and classification of types of pelvic fractures early, based on systems such as the tile or Young-Burgess systems, was helpful in predicting other injuries and managing them.

Regarding the diagnostic modality, focused assessment in trauma using sonography (FAST) was useful in the rapid detection of the free intraperitoneal fluid [14]. Nevertheless, the contrast-enhanced computed tomography (CT) was shown to be the gold standard of the overall assessment, mostly in patients who are hemodynamically stable. In patients who were unstable, the clinical judgment or FAST result usually directed the goal of emergency laparotomy or angioembolization.

The results of the study emphasized the importance of a multidisciplinary approach by future trauma surgery, orthopedic care providers, and urologists focused on achieving the best possible results. Intra-abdominal injury, hemorrhage control and pelvic fracture stabilization early had a profound effect on

prognosis. Also, the research highlighted the need of continued monitoring of late complications, i.e. infections, fistulas and organ dysfunction [15].

This paper once again confirmed that the abdominal trauma often accompanied pelvic fractures after BAT and was the challenge in diagnosing and treating such cases. Such ceremonies of reduced morbidity and mortality were greatly caused by integration of clinical vigilance, advanced imaging, and quick surgery in these cases of trauma.

CONCLUSION:

This study revealed that the abdominal injuries have been prevalently linked with pelvic fractures after blunt abdominal injury (BAT). Most of the patients with pelvic fracture were recorded to have serious intra-abdominal injuries especially on the liver, spleen and urinary bladder. All these injuries led to poor morbidity and high length of stay in hospitals. The results showed that early, clinical evaluation as well as timely imaging was imperative in early identification and treatment of related injuries to the abdomen. In addition to this, the harshness of the pelvic fracture matched well with the propensity and secretion of abdominal organ involvement. Multidisciplinary care such as trauma surgery, orthopedics, and critical care was also required, and these actually helped to improve patient outcome. Early surgical intervention, where required lowered rates of complications and mortality. Altogether, the present study exposed the significance of high index of suspicion towards abdominal trauma in patients diagnosed with pelvic fracture following BAT, which stresses the necessity of early full-scale examination and treatment of trauma.

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