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ORIGINAL RESEARCH

Penetrating Pelvic Injury: Cases Analysis

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ABSTRACT

Background: Although, selective nonoperative management of penetrating pelvic injuries is a feasible, safe and effective alternative; lack of advanced imaging studies in developing countries to assess these patients, force us to perform more invasive procedures to treat them.

Study design: Cases analysis performing with patients with penetrating pelvic trauma underwent to laparotomy in General Hospital of Juarez City (Mexico), during January to December 2012.

Results: Among 44 patients with penetrating pelvic injuries and underwent laparotomy were included. There were 27 therapeutic laparotomies, 9 nontherapeutic laparotomies, 8 damage control laparotomies. Small bowel was the most affected organ, follow by both colon and rectum organ. Hypovolemic shock was the major cause of death and surgical site infections were the most common complications.

Conclusion: Despite, that nonoperative management is safe, penetrating wounds with transpelvic trajectory continue having an absolute indication for laparotomy in medical units in developing world.

Keywords: Penetrating wounds, Gunshot wounds, Stab wounds, Laparotomy.

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RESUMEN

Introducción: Aunque el manejo no quirúrgico selectivo en pacientes con trauma pélvico penetrante es factible, seguro y efectivo, la falta de tecnología de imagen avanzada en los hospitales de países en desarrollo, obliga a los médicos a realizar procedimiento más invasivos para tratar a estos pacientes.

Diseño del estudio: Se realizó un análisis de casos en pacientes con trauma pélvico penetrante sometidos a laparotomía exploradora en el Hospital General de Ciudad Juárez (México) durante el periodo de enero a diciembre del 2012.

Resultados: Se incluyeron 44 pacientes con trauma pélvico penetrante. Se realizaron 27 laparotomías terapéuticas, 9 no terapéuticas y 8 cirugías de control de daño. El órgano más afectado fue el intestino delgado seguido del colon y recto. La principal causa de muerte fue el choque hipovolémico, mientras que la complicación más común fue la infección de sitio quirúrgico.

Conclusiones: A pesar que el manejo no quirúrgico selectivo es seguro, aquellos pacientes con trauma penetrante con una trayectoria que atraviesa la pelvis continúan teniendo una indicación absoluta para laparotomía exploradora en hospitales en países en desarrollo.

Palabras claves: Trauma penetrante, Heridas por arma de fuego, Heridas por arma punzocortante, Laparotomía.

INTRODUCTION

Penetrating pelvic injury (PPI) is one of the most difficult to trauma surgeons, patients who have this condition have high-risk of visceral injury (rectum, bladder, distal ureters, internal genitalia, iliac vessels, sacral plexus and autonomic nerves). Although selective nonoperative management of pelvic gunshot injuries is a feasible, safe and effective alternative;[1] lack of advanced imaging studies in developing countries to assess these patients, force us to perform more invasive procedures to treat them. The aim of this study was to assess the results in PPI in a unit without advanced imagenology technology and high incidence of penetrating trauma patients.

METHODS OF RESEARCH

This prospective case-analysis was conducted in the General Hospital of Juarez City (Mexico) over 1 year period January to December 2012. Only patients with penetrating trajectories between the iliac crest and the perineum underwent laparotomy were included in the study. The trajectory was determined by examination of the wound track, surface position of wound, and retained objects on plain pelvic X-rays. Patients with nonoperative management were excluded. The data analyzed were age, gender, type of penetrating trauma, revised trauma score (RTS), hemoglobin on admission, type of laparotomy, visceral injuries, pelvic fractures, complications, length of hospital stay and occurrence of death. The variables were described using measures of central tendency and percentages.

Clinical assessment was done mainly by trauma senior surgeon and secondary by surgery residents (1st to 4th degree). Indications for emergency laparotomy were patients with peritonitis (diffuse tenderness, rebound tenderness, guarding and rigidity) hemodynamic instability, rectal bleeding and urologic injuries. Only X-rays were performed (our hospital lack of image technology, e.g. computed tomography, focused abdominal sonogram in trauma, etc.), and all patients underwent laparotomy for suspect intrapelvic and/or intra-abdominal injury. Initially the management was done by general surgeons, without any orthopedic consultation. At laparotomy, the entire bullet tract has be debrided. All injured viscera are repaired, and the abdominal cavity thoroughly washed out. Once the patient is stabilized, orthopedic consultation was done.

A therapeutic laparotomy was defined when injuries found require intervention (e.g. repair, evacuation, etc.), a

nontherapeutic laparotomy when an injury was found but did not require any intervention, a negative laparotomy when intra-abdominal injuries were not found, an unnecessary laparotomy was defined by both negative and nontherapeutic,[2,3] and a damage control surgery when the procedure was abbreviate limited only to control hemorrhage and intestinal contamination.[4]

RESULTS

During the study period, there were 267 patients with laparotomy for penetrating trauma and only 44 (16.5%) patients with PPI and underwent laparotomy were included. There were 41 (93.2%) patients with gunshot wounds (WS) and three (6.8%) patients with stab wounds (SW). There were 38 (86.4%) men and 6 (13.6%) women, with mean age of 30.7 (±10.47, range 15-57) years. The mean RST was 7,455 and the mean hemoglobin on admission was 12.52 (± 2.5, range 8.1-16.5) g/dl.

There were 27 (61.4%) therapeutic laparotomies, there were 9 (20.4%) nontherapeutic laparotomies, there were eight (18.2%) damage control laparotomies and, there were not negative laparotomies. The visceral injuries found during laparotomies are listed in Table 1. Excluding pelvic fractures, a mean of 2.3 visceral injuries per patient was observed; including pelvic fractures the mean was 2.6 injuries per patient. Of 18 complications were recorded and are listed in Table 2. The mean hospital stay was 9.9 (± 10.54, range 1-76) days. There were nine deaths (mortality 20%): six (66.7%) by hypovolemic shock, two (22.2%) by sepsis, and one (11.1%) by multiorgan failure not secondary to sepsis.

Table 1: Injuries detected in 44 patients with pelvic penetrating wounds undergoing laparotomy

Injured viscera	*Number of injuries*	*Percentage*
Colorectal	38	36.9
Ascending	4	10.5
Transverse	6	15.8
Descending	1	2.6
Rectosigmoid	27	71.1
Small bowel	47	45.6
Bladder	6	5.8
Iliac vessels	11	10.6
Arteries	3	27.3
Veins	8	72.7
Ureter	1	0.9
Pelvis fractures	12	27.3
Number of injured organs per patient (excluding fractures)	2.3	

Table 2: Complications detected in 44 patients with pelvic penetrating trauma undergoing laparotomy

Complication	*Number of patients*	*Percentage*
Enteral fistula	2	11.1
Surgical site infection	11	61.1
Superficial	2	18.2
Deep	7	63.6
Organ or space	2	18.2
Thrombosis	1	5.5
Rectovesical fistula	2	11.1
Sepsis	2	11.1
Total	18	100

DISCUSSION

The incidence of laparotomies by PPI was 16.5%, there were not an statistic in this setting. However, PPI has a considerable percentage in penetrating injuries in our city. The incidence of patients with PPI by GW was higher than SW (93.2 *vs* 6.8%), and reflects of a public health problem of violence in Juarez (Mexico). This place is one of the most important places for mexican narcotraffic bands and use of fire weapons is more common in this setting. Between 2008 and 2010, Juarez was the most violent city in Mexico, and deaths by fire weapons were more common.[5]

The mean age (30.7 years old) and ratio male:female patients in this study were similar to other mexican studies,[2,6,7] and show that active economic population is more affected in our country. The mean revised trauma score in our study was 7,455, inferior to other study with nonoperative management—in the same setting—that show 7,842 in the same variable;[1] but, the mean hemoglobin on admission was similar in comparative with same study (12.52 g/dl vs 12.4 g/dl). Although RTS was lower in our group, differences between groups operative *vs* nonoperative management, there were no difference between hemoglobin mean and that is discussed because the initial levels of hemoglobin did not show relation with severity of injury.

In our study, mean of visceral injury per patient was 2.3 *vs* 5.6 in other report by Navsaria et al in patients underwent to laparotomy by penetrating pelvic injury.[1] This was possible because the personal that is related to drug war and its paramilitary personal had training in management of fire arms and the objectives to kill someone are thorax and head mainly.[8]

The risk of visceral injury from abdominal ballistic trauma occurs in up to 90% of cases.[9] Patients with PPI frequently have combined severe injuries to pelvic soft tissue, bony pelvis, genital-urinary tract, rectum, vascular structures and intra-abdominal organs, large bowel was the

organ most affected in this short study (47 injuries) and colorectal viscera was the second most affected (38 injuries). It is important to note that transverse colon was affected also and may be because part of this organ fall in pelvic contents especially if this organ is very lax.

Although arterial and venous injuries occur with equal frequency in penetrating abdominal trauma,[10] we had major incidence in venous injuries than arterial injuries (72.7 *vs* 27.3%) PPI. Although 12 patients have pelvic fractures there were not instable pelvic fracture, and orthopedic intervention was indicated only for all bullets lodged near or into a joint (within 4 days of injury),[11] none in this study.

Major complication in this study was intestinal fistula, but more frequent was surgical site infection and this was expected because the majority of operations were regarded as contaminated. Deaths related to PPI deaths frequently occur as a result of associated injuries and complications rather than pelvic injury itself.[12,13] Deaths in this study occur mainly by hypovolemic shock, secondary by sepsis, and one patient by multiorgan failure due to metabolic decontrol. Of two patients that fall in sepsis, both died due this condition. Others report that primary causes of dead in PPI have included posterior pelvic venous hemorrhage, pelvic arterial hemorrhage, extrapelvic trauma, multisystemic organ failure, adult respiratory distress syndrome, and a myriad of other conditions.[14] Despite that nonoperative management is safe, gunshot wounds with transpelvic trajectory have an absolute indication for laparotomy (therapeutic laparotomy rate 85%)[14] in medical units in developing world.

There are several limitations of this study: small population, single institution, only descriptive study: are factors which undoubtedly cause bias views.

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