ORIGINAL ARTICLE

A CLINICAL STUDY AND MANAGEMENT OF PELVIC VISCERAL INJURIES IN PELVIC TRAUMA

N L Eshwar Prasad [1], D Prashanth [2]

[1]Associate Professor, [2]Senior resident: Department of General Surgery, Osmania Medical College and Hospital, Hyderabad, India

ABSTRACT:
Background: Pelvic injuries are common in civilian and battlefield settings leading to major and prolonged hospitalization. **Aim:** This study includes evaluation of the problem of pelvic visceral injuries in blunt and penetrating pelvic trauma, the commonly injured viscera and their initial and definitive management. **Materials and methods:** Total of 48patients patients who sustained blunt / penetrating pelvic injury, admitted in department of General surgery for a period of 27 months. **Results:** Most common mode of blunt injury is motor vehicle accident/road traffic accident and men within the age group of 20 to 40 yrs are most commonly injured. Pelvic fracture (88.8%) is the most common injury associated with blunt trauma to pelvis than pelvic visceral injuries (37.7%). Posterior urethral rupture (17.5%) is the most common associated pelvic visceral injury in pelvic fracture and rectal injury (2.5%) is the least common. **Conclusions**: Although pelvic fractures may result in prolonged hospitalization and can be a cause of extended disability. It is an infrequent cause of mortality.
Key words: Pelvic injuries, pelvic visceral injuries, Posterior urethral rupture, Rectal injury.

Corresponding author: Dr. N L Eshwar Prasad, Associate Professor, Department of General Surgery, Osmania Medical College and Hospital, Hyderabad.

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INTRODUCTION

Pelvic visceral injuries are relatively rare. Bladder injuries constitute less than 2% of abdominal injuries requiring surgery. Eastern Association for the surgery of Trauma (EAST) identified nearly 228,000 blunt trauma patients. Of these, only 798 had colorectal injury for an incidence of 0.3%,etc. Though rare some of these injuries pose serious problems in the quality of life of the affected individual.[1]

This study includes evaluation of the problem of pelvic visceral injuries in blunt and penetrating pelvic trauma, the commonly injured viscera and their initial and definitive management. Pelvic injuries are common in civilian and battlefield settings leading to major and prolonged hospitalization specially encountered in younger age groups and associated with serious morbidity and mortality hence affecting the socio-economic standards of the individual.

These are few studies available which depict the actual problem, the incidence and the management options in various pelvic visceral injuries and hence a detailed research is required. In this study, all cases admitted with penetrating and blunt pelvic trauma were evaluated, injuries graded according to standard scales and patients managed with the infrastructure available in our hospital. Hence, the incidence, the various pattern or types of pelvic visceral injuries, the association with pelvic fractures, the management methods, the mortality and the overall prognosis is the expected outcome in the study.

MATERIALS AND METHODS

All patients who sustained blunt / penetrating pelvic injury, admitted in Osmania General Hospital in Department of General surgery during a period of 27 months i.e., from June 2012 to September 2014 were included in the study. A total of 48patients

with blunt and penetrating pelvic injury were included in the study.

Inclusion criteria

Patients with blunt and penetrating pelvic injury include urethra, prostate, urinary bladder, vagina, uterus, sigmoid colon, rectum and anal canal.

Exclusion criteria

Patients with perineal lacerations without injury to anal canal or rectum, latrogenic trauma to pelvic viscera, anorectal and perineal tears due to obstetric causes.

Age, sex, date of injury, mode of injury, date of presentation (date of admission), clinical presentation, findings on physical examination, radiological findings, other associated injuries, final diagnosis, treatment, post operative complications, second surgery and post operative complaints, duration of hospital stay.

Patients resuscitated initially, associated head and chest injuries requiring immediate intervention treated. A complete clinical history taken and physical examination was done in all the patients. All the associated injuries were recorded.

X-rays of all suspected bone injuries taken. Foleys catheter tried once in all patients with blood at meatus / haematuria with prior injection of 20cc 2% lignocaine gel per urethra. Ultrasound abdomen and pelvis was done for all patients with pelvic trauma. Retrograde urethrogram (RGU) was done only in cases presenting with blood at urethral meatus and haematuria where per urethral catheter placement was not successful. Follow up RGU done after 2 weeks in cases with partial urethral rupture.

Post suprapubiccystostomy, retrograde urethrogram, Micturition cystourethrogram (MCUG) was done after 3 months in patients with posterior urethral injury who followed upto decide on further management. CT Cystogram was done in stable patients with gross haematuria. CT scan of brain, abdomen was done in few selected cases with head injury and blunt injury abdomen.

Digital rectal examination was done in all cases of pelvic trauma. Sigmoidoscopy was not done in any patient presenting with bleeding per rectum. The injuries were classified according to Organ Injury by American Association for the surgery of Trauma (AAST) and Abbreviated injury scale (AIS).The AIS is an anatomical scoring system and provides a reasonably accurate ranking of the severity of injury. The Organ injury scales were developed by the organ injury scaling committee of the AAST.

Second surgery or the definitive procedure in patients with faecal diversion was done after a minimum interval of 3 months and for patients with urinary diversion after a minimum interval of 5months and followed up. All the values were expressed as mean or percentage.

RESULTS

This clinical study includes a total of 48 patients with blunt and penetrating pelvic trauma, treated.

Table-1: Age distribution of patients with pelvic trauma

Age Group	Number Of Cases	Percentage
<20Yrs	5	10.5%
20-40 Yrs	31	64.5%
>40Yrs	12	25%
Gender		
Male	36	75%
Female	12	25%

The mean age of patients was 33yrs with a minimum age of 8yrs and a maximum age of 80yrs.Of the 48 patients,12 were female (25%) and 36 were male(75%).There were 2 deaths, both being male.

Table 2: Types of injuries in study

Type of injury	
Penetrating injury	3
Blunt injury to pelvis	45
Penetrating rectal injury	2
Injury to anal canal	1
Pelvic fractures	40
Urinary bladder laceration	4
Vaginal injury	1
Rectal injury	2
Anal canal injury	4

Table-3: Association of pelvic (pubic rami) fracture and posterior urethral injury.

Pattern of pubic rami fractures associated with posterior urethral(partial/complete)injuries	Partial urethral rupture cases	Complete urethral rupture cases	Total
Bilateral superior and inferior pubic rami fracture	1	2	3
Bilateral superior rami fracture	0	1	1
Ipsilateral superior and inferior rami fracture	1	2	3
Total	2	5	7

Table-4: Types of bladder injury and association with pelvic fracture.

Patients (4cases)	Type of Fracture (2cases)	Extra Peritoneal Bladder Rupture (2cases)	Intra Peritoneal Bladder Rupture (2cases)	Diagnostic CT Cystogram (3cases)	Death (1case)
A	Right SPR + Right Both Bones Of Leg	Present(Inferolateral Wall Rupture)	-	Done	-
B	Bilateral SPR+IPR	Present(Bladder Neck Rupture)	-	Done	Death
C	-	-	Present(At The Dome Of - Bladder)	-	-
D	-	-	Present(At The Dome Of Bladder)	Done	-

Most common injuries in patients with blunt trauma to the pelvis are pelvic fractures than visceral fractures.37.7% cases had pelvic visceral injuries(16 out of 45 cases of blunt pelvic injury).

In this study, urethral injury was seen in 17.5% of pelvic fractures, vaginal injuries in 11% of pelvic fractures, bladder injuries in 5%,anal canal injuries in 5%,and rectal injuries in 2.5% of pelvic fractures.

Bilateral superior and inferior pubic rami fracture was seen in 3 cases i.e 1 case of partial urethral rupture and 2 cases of complete posterior urethral rupture. Bilateral superior pubic rami fracture seen in 1 case of complete posterior urethral rupture.

One patient expired on 7th post operative day due to ARDS. Follow up cystogram was done in 3cases, Suprapubic and perurethral catheters were removed in all these cases showing a normal voiding trial and normal cystogram at 2 to 3 weeks. There were no post operative complications of the procedure done for any of the above patients.

DISCUSSION

Blunt injury to the pelvis is more common than penetrating injury in this study as only 3 out of 48 cases sustained penetrating injury and the rest i.e 45 cases sustained blunt trauma. Most of the injuries were sustained in a motor vehicle accident / road traffic accident 38 out of 48cases (79.16%) Pelvic fracture was the most common injury associated with blunt trauma to pelvis seen in 40 out of 45 cases(88.8%) where as pelvic visceral were seen in 16 cases out of 45cases(37.7%)

In this study, urethral injury was seen in 17.5% of pelvic fractures, vaginal injuries in 11% (1 out of 9 female cases) of pelvic fractures, bladder injuries in 5%,anal canal injuries5%,and rectal injuries in 2.5% of pelvic fractures. This suggests that posterior urethral ruptures are the most common associated pelvic visceral injuries in pelvic fracture and rectal injuries are the least common(sigmoid, prostate, uterine injuries were not found in the study, hence not considered).19 patients sustained various pelvic visceral injuries of which only 3 were due to penetrating injury and the rest due to blunt injury .Among pelvic visceral injuries, posterior urethral injuries(15.55% of blunt trauma cases) were the most common, followed by urinary bladder(8.8% including 2 penetrating injuries) vagina(8.3%).

Males(72.09%) were more commonly injured than females(27.08%)(64.5%) cases belonged to the age

group of 20-40yrs.This may be attributed to the most common mode of injury i.e motor vehicle accidents which are commonly seen in men than in women. Youngest patient recorded in the study was 8yrs old female and the eldest was 80 yrs male. Associated head (3 cases-6.65), chest (2 cases-4.4% and facial(2 cases-4.4%) injuries were not common with pelvic injuries.

There were 7 out of 45 patients (15.55%) with blunt trauma who sustained posterior urethral injury. All the patients with urethral injury were male (7 cases), female urethral injuries were not found in the study. There were no penetrating injuries causing urethral trauma. Mode of injury was mostly due to a road traffic accident/motor vehicle accident, 5 out of 7 cases(71.4%).In a study by Koraitim et al[2] ,motor-vehicle accidents (68%-84%) are the cause for the pelvic fractures that lead to urethral disruption. Other modes of injury were also seen i.e motor vehicle- pedestrian injury(1 case) and fall from a moving train (1 case).Most common associated injury in these cases was a pelvic fracture and more specifically pubic rami fracture was seen in all cases(100%) where as in a study by Tauber M et al,[3]the posterior urethral injuries in males are often associated with pelvic fractures(255).Pelvic ring fractures or pubic rami fractures cause shearing force on the bladder neck sphincter complex and the posterior urethra near the urogenital membrane, significantly attached to the pubic bones hence causing tears or lacerations commonly in this area. Sometimes fractured bony spicules can directly injure the urethra/bladder.

In this study posterior urethral injury was seen in 23.3% male patients with pelvic fracture and female urethral injuries were not found whereas urethral injury has been reported to occur in approximately 10% of males and up to 6% of females sustaining pelvic fractures in studies by Koraitim et al,[2] the female urethral is short and relatively mobile due to lack of significant attachments to pubic bone. Injury to the female urethral is very rare. It usually occurs as a partial tear of the anterior wall and is rarely a complete disruption of the proximal or distal urethra and mostly associated with vaginal tears.

The association with number/pattern of pubic rami fracture and type of urethral rupture could not be studied due to shortage of cases in this study but it can be commented that there is strong association of pubic rami fracture with urethral injuries based on those study. In various studies by Brandes and Borelli[4],Koraitim, et.al [2]"Straddle fractures" involving all four pubic rami and fractures with vertical and rotational instability are associated with the highest risk of urological injury.

There were no bladder injuries associated with any of the urethral injuries in this study.Other associated injuries like anorectal laceration (1 case), perineal laceration (1-case), blunt abdominal injury with haemoperitoneum (1 case). Most common presentation was blood at urethral meatus (100%) followed by suprapubic pain and distension, inability to void seen in 5 cases with complete posterior urethral rupture.According to Lim PHC,Chung HC[5]blood at the meatus is a cardinal sign of posterior urethral injury,and seen in 37% to 93% of cases.

Bladder injuries are rare and are seen in 0.2% of all patients with trauma and 2% of all patients requiring surgery for abdominal visceral injuries. Bladder injuries were more common in adult study.Bladder neck injuries are common in children mostly boys as the supporting structures of the posterior urethra and bladder neck i.e the prostate and puboprostatic ligaments are immature as studied by Mc A leer IM, Kaplan GW, Scherz HC[6] . Bladder injuries were associated with motor vehicle accidents in all cases i.e in 100% cases in this study whereas it was 90% in a study by Gomez RG et al[7].In studies by Cass AS, Luxenberg M[8] 6-10% of patients with pelvic fracture have3 bladder injuries.In this study 5% cases i.e,2 out of 40 cases of pelvicfracture had bladder injuries, fracture of the pubic arch was specifically associated in both these cases which had extraperitoneal laceration of bladder. A significant percentage (10-29%) of patients with bladder injuries will have associated urethral rupture as noticed in studies by James J et al,[9] and case. Similar mechanism of injury is involved in bladder and urethral rupture. In this study none of the patients had an associated urethral injury.

Extraperitoneal bladder injury is more common than intraperitoneal bladder injury and accounts for about 66% of cases as observed by Wirth, G.J. et al.[10] Intraperitoneal ruptures alone constitute 25% of all bladder injuries and are combined with extraperitoneal ruptures in 12% as studied by Carroll PR, Mc Aninch JW[11] whereas in this study 50% cases (2 out of 4 cases) had intraperitoneal rupture and combined intra and extraperitoneal injuries were not seen.

All cases Extraperitoneal rupture were associated with pelvic fracture, specifically pubic rami fracture whereas cases with intraperitoneal rupture were not associated with pelvic fracture in this study. In a study James J. McCort, Robert E.[9]Mindelzun 62.5% cases of extraperitoneal bladder rupture had a pelvic fracture and 70% of intraperitoneal rupture were not associated with pelvic fracture which states that pelvic fracture is more common with extraperitoneal injuries though not completely absent in intraperitoneal injuries. A similar picture is seen in this study.Hence we can suggest that extraperitoneal rupture of bladder need to be suspected in cases with pelvic fractures.

Out of 4 cases studied,1 case expired on the 7th post operative day due to ARDS.Mortality in patients with bladder injuries in this study is 25% whereas it is recorded as 12-22% in studies by,Cass AS et al,[8]Carroll PR et al,[11]Corriere JN et al[12].Most of the bladder injuries are associated with other severe injuries which are the usual cause for death.

Out of 45 cases off blunt pelvic trauma 2 cases of rectal laceration were seen (4.4%) which suggests that blunt rectal injury is rare. According to Strate RG et al,[13] rectal injuries comprise about 11% of blunt colorectal trauma. In studies by Abcarian H,[14] about 95% of rectal injuries are caused by penetrating injuries and rectal injuries following blunt trauma are much more rare and more difficult to diagnose,and therefore have a potentially more disastrous outcome.This is especially true in motor vehicle accidents with crushed pelvis.

Demetrides D,et al,[15]state that penetrating trauma is the most common cause of rectal injuries and in most cases,gunshot wounds account for 80%-85% of the cases.Other causes of rectal injuries include stab wounds,blunt trauma,iatrogenic injuries during surgery,foreign bodies,and sexual misadventure.In this study,50% rectal injuries(2 cases) were due to penetrating trauma.As there were only 4 cases,this tends to give a picture of equal incidence of blunt and penetrating trauma,which is not the case in many other studies where penetrating trauma is commoner than blunt trauma.

According to Ferrera PC et al,[16] pelvic trauma is associatedwith injury to the anorectum and genitourinary tract. The incidence of rectal injury ranges from 17% to 64% while that of genitourinary injury ranges from 23% to 57%.In this study,4.4% of patients with blunt pelvic trauma sustained rectal laceration.There were 2 cases with rectal laceration distal to peritoneal reflection (Extraperitoneal) and 2 cases with rectal laceration proximal to the peritoneal reflection.Emergency exploratory laparotomy and faecal diversion with loop colostomy was done in both the patients.Primary repair was done in only one case of intraperitoneal rectal laceration.

In a study by Gonzalez et al,[17] fourteen patients suffering non-destructive penetrating extraperitoneal rectal injuries were treated without fecal diversion or direct suture repair.In none of these patients infectious complications occurred. Mc Grath& Fabian in 1998 found no difference in pelvic infection rates comparing those patients with and without distal washout/irrigation of distal rectum.Similarly McGrath and Fabian[18] also found no difference in presacral infection rates. Presacral drainage was not done in any of the cases in this study and none of the cases(100%) were associated with complications (prevesical/perirectal abscesses) post operatively. This suggest that presacral drain does not play a major role in all the cases cannot be underestimated and hence further study with larger sample size associated with high energy trauma and contamination need to be evaluated.

Because of the greater number and severity of associated injuries,morbidity and mortality are higher in blunt rectal trauma than in penetrating rectal trauma reported mortality rates exceeding 20% and complication rates of 20-70% attest to the severity of extraperitoneal rectal injuries. There were no deaths or complications associated with rectal injuries in this study.The overall prognosis of patients with rectal injury in this clinical study was good but this may not be applicable to all rectal injuries where other associated injuries exist increasing the mortality and morbidity related to rectal trauma.

Pelvic fracture was associated with 2 cases i.e 5% of pelvic fractures in this study were associated with anal canal injury.Pubic rami fractures seen in both cases. Perineal laceration was seen in 1case and primary repair was not done,it healed by secondary intention. None of the cases were associated with bladder injury.One case was associated with urethral and rectal laceration.

Blunt injury to vagina is rarer and usually associated with pelvic fractures, urethral, anorectal lacerations. Vaginal lacerations can occur in open or closed pelvic fractures and are relatively rare, in a 10-year retrospective review of 114 female patients with

pelvic fractures Niemi TA, et al[19] found a 3.5% incidence of vaginal lacerations. In this study there was one patient with vaginal laceration and associated pelvic fracture i.e 1 out of 9(11.1%) female patients with pelvic fracture sustained a vaginal laceration.

CONCLUSIONS

Blunt injury to the pelvic is more common than penetrating injury in this study.Most common mode of blunt injury is motor vehicle accident/road traffic accident and men within the age group of 20 to 40 yrs are most commonly injured.Pelvic fracture (88.8%) is the most common injury associated with blunt trauma to pelvis than pelvic visceral injuries(37.7%).Posterior urethral rupture(17.5%) is the most common associated pelvic visceral injury in pelvic fracture and rectal injury(2.5%) is the least common. Most of the injuries required second (definitive) surgery and prolonged hospital stay. There are no mortalities recorded in present study.

Although pelvic fractures may result in prolonged hospitalization and can be a cause of extended disability. It is an infrequent cause of mortality.

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