



CLINICAL STUDY OF BLUNT ABDOMINAL TRAUMA IN TERTIARY CARE CENTRE

General Surgery

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ABSTRACT

Introduction: Blunt abdominal trauma is fairly common emergency and it is one of the important components of polytrauma. It requires high degree of suspicion, investigation and management. In spite of improved imaging techniques leading to early recognition it is still associated with high morbidity and mortality. **Methods:** The study was done in 40 patients presenting with blunt abdominal injury at the Casualty/ward of Tertiary Care Centre from November 2019 to December 2021 at DRVPMC, Nashik. **Results:** Road traffic accidents accounting (50%) followed by blunt object injury (27.5%). Most common symptom was Abdominal Pain in this study. Most Common Organ injured are Small bowel (30%) followed by Spleen (25%) and Liver (20%). **Conclusion:** Rapid diagnosis, early and timely referral, adequate and trained staff, close and careful monitoring, early wise and skilled decision to go for operative or non-operative management can help save many lives.

KEYWORDS

Blunt Abdominal Trauma, Road traffic Accidents.

INTRODUCTION

Abdominal trauma constitutes major amount of morbidity amongst injuries caused by road traffic accidents. Blunt injury of abdomen is also a result of fall from height, assault with blunt objects, sport injuries, industrial mishaps, bomb blast and fall from riding bicycle.⁽¹⁻⁵⁾ Blunt abdominal trauma (BAT) is quite common since many years and increasing day by day in emergency clinics. Many of time this injury is life threatening and require urgent treatment. Blunt abdominal trauma can result in laceration of solid organ usually causing bleeding which in its most severe form manifest as hemorrhagic shock or as perforation of GI tract. Abdominal compartment syndrome is now recognized as a frequent confounder of surgical critical care following blunt abdomen trauma. It is responsible for substantial morbidity and mortality. Around 75% of BAT cases are related to motor vehicle collision (MVC) or vehicle versus pedestrian accidents.⁽¹⁻⁵⁾

The spleen and liver are the most commonly injured solid organs in BAT. About 13% and 16% of these patients have hepatic and splenic injuries respectively.⁽¹⁻⁵⁾

The knowledge in the management of blunt abdominal trauma has progressively increasing due to the in-patient data gathered from different parts of the world. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains high. The reason for this could be due to the interval between trauma and hospitalization, delay in diagnosis, inadequate and lack of appropriate surgical treatment, post-operative complications and associated trauma especially to head, thorax and extremities.⁽¹⁻⁵⁾

AIMS AND OBJECTIVES

Aim:

To study blunt abdominal trauma in tertiary care centre.

Objectives:

1. To evaluate the incidence and clinical presentation of intra-abdominal injuries.
2. To evaluate various injuries caused by blunt abdominal trauma and their management.
3. To evaluate the complications, morbidity and mortality following blunt abdominal injury.

MATERIAL AND METHODS

Source Of Data

The study was done in 40 patients presenting with blunt abdominal injury at the casualty/ward of Tertiary Care Centre from November 2019 to December 2021 at DRVPMC, Nashik.

Inclusion Criteria:

1. Road traffic accidents.
2. Patients with history of recent assault by blunt and heavy object over

the abdomen.

3. Patients with a history of fall from height.

4. Patients on whom there is a clinical suspicion of trauma to abdomen.

5. Patients with history of hematuria, distension of abdomen, without any specific etiology.

Exclusion Criteria:

Patients with penetrating injuries like stab and gunshot injuries are excluded from the study.

Methods Of Collection Of Data

The study was conducted on a minimum of 40 patients admitted to the ICU/trauma wards/casualty of Tertiary Care Centre. But there was scope for increasing the number of cases depending on the availability of patients within the study period.

RESULTS

Table-1: Age Incidence:

Age group(years)	No. Of Patients	Percentage (%)
0-11	1	2.5%
11-20	10	25%
21-30	13	32.5%
31-40	7	17.5%
41-50	4	10%
51-60	3	7.5%
61-70	2	5%

In this series majority of patients belonged to 21- 30years (32.5%) age group followed by 11-20 years (25%) age group.(Table 1)

Table-2: Sex Incidence:

Gender	No. of Patients	Percentage
Male	34	85%
Female	6	15%

In this study 34 cases were male accounting 85% and only 6 cases were female accounting 15% of study population. (Table 2)

Table-3: Mode Of Injury:

Causative agent	No. Of cases	Percentage
Road traffic accident	20	50%
Fall from height	9	22.5%
Blow to abdomen with blunt objects	11	27.5%

In this study the most common cause was road traffic accidents accounting (50%) followed by blow to abdomen with blunt objects accounting (27.5%) and fall from height accounting (22.5%) of cases. (Table 3)

Table-4: Symptoms Wise:

Symptoms	No. Of patients	Percentage
Abdominal pain	31	77.5

Vomiting	8	20
Abdominal distension	22	55
Hematuria	2	5

In the present study abdominal pain (77.5%) was the most common symptom, followed by abdominal distension (55%), vomiting (20%) and hematuria (5%).(Table 4)

Table-5: Sign Wise:

Signs	No. Of patients	Percentage
Abdominal tenderness	32	80
Guarding & rigidity	15	37.5
Pulse > 90/min	28	70
BP < 90mm systolic	18	45

Table-6: Associated Injuries:

	No. Of cases	Percentage (%)
Head	7	20.5
Orthopaedic	5	14.7
Thoracic	6	17.6
Soft tissue	12	35.2
Combination	4	11.76
Total	34	100%

Table-7: Latent Period:

Hours	No. Of cases	Percentage (%)
0-5	3	7.5
6-10	5	12.5
11-15	10	25
16-20	8	20
21-25	6	15
26-30	3	7.5
31-35	3	7.5
36-40	2	5

Table-8: Operative And Conservative Management:

	No. Of patients	Percentage
Operative	23	57.5%
Conservative	17	42.5%

Table-9: Investigations:

Feature	No. of patients	Percentage (%)
Gas under diaphragm (GUD)	10	25%
Enlarged soft tissue shadow (ESTS)	10	25%
Ground glass appearance (GGA)	6	15%
No radiological abnormality (NRA)	10	25%
Multiple air fluid levels (MAFL)	4	10%

Table-10: Four Quadrant Aspiration:

Result	No. Of cases	Percentage
Positive	15	60%
Negative	10	40%
Total	25	

Table-11: Ultrasound Report:

Organ injured	No. Of patients	Percentage (%)
Spleen	10	25%
Liver	8	20%
Bladder	2	5%
Free fluid without solid organ injury	20	50%

Table-12: Organ Injuries Detected On CT Scan

Organs injured	No. Of patients	Percentage
Spleen	3	30%
Liver	2	20%
Retroperitoneum	3	30%
Dilated bowel loops with free fluid	2	20%

Table-13: Organ Wise Injury:

Organ involved	No. Of cases	Percentage
Small bowel	12	30%
Spleen	10	25%
Liver	8	20%
Mesentery	3	7.5%
Omentum	1	2.5%
Bladder	2	5%

Retroperitoneum	3	7.5%
Stomach	1	2.5%

Table-14: Operative Procedures:

Procedure	No. of patients	Percentage
Closure of small bowel perforation	15	44.1%
Splenectomy	4	11.7%
Spleenorrhaphy	3	8.8%
Hepatorrhaphy	4	11.7%
Repair of mesentery	2	5.8%
Resection and anastomosis	4	11.7%
Closure of gastric perforation	1	2.9%
Omental ligation	1	2.9%

Table-15: Post-operative Complication:

Post-operative complication	No. Of patients	Percentage
Wound infection	4	11.8%
Wound dehiscence	2	5.9%
Pelvic abscess	1	2.9%
Anastomotic leakage	2	5.9%
Respiratory complications	3	8.8%
Faecal fistula	1	2.9%

Table-16: Severity wise:

No. Of days	No. Of patients	Percentage
1 to 10	10	25%
11 to 20	20	50%
21 to 30	4	10%
31 to 40	4	10%
41 to 50	1	2.5%
51 to 60	1	2.5%

Table-17: Mortality Wise Distribution Of The Study:

Cause of death	No. Of cases
Sudden cardiac arrest	2
Septicaemia	3
ARDS	1

Table-18: Mortality Wise Distribution Of Organ Injury (Total – 6 Cases):

Organ injury	Death	Cause of death
Spleen	1	Sudden cardiac arrest
Liver	1	ARDS
Small bowel	4	1 - sudden cardiac arrest 3 - septicemia

DISCUSSION

Age Wise Distribution:

In the present study most of patients (32.5%) were in the age group between 21 -30 yrs. Moreover most of the patients were in the first four decades of life indicating trauma is more common in the younger age group because they are earning members in the family due which they are more prone to travel that makes them vulnerable to road traffic accidental trauma which creates huge social impact in the family.⁽⁵⁻¹⁰⁾ (Table 1)

This study is comparable with Reina Khadilkar (2015)¹⁵ et al which showed maximum number of cases was between 21 -30 years of age group (48%) as of this present study. In Davis JJ (1976)¹⁶ et al study majority of patients belonged to 21 – 30 years of age group.

Sex Wise Distribution:

In the present study 85% of cases were male and 15% were female. This is comparable with Khadilkar R (2015) et al which also showed blunt abdominal trauma was more common in males. This is also comparable to Tripathi MD (1991)¹⁷ et al, Gupta S (1996)¹⁸ et al and Davis JJ (1976) et al which also showed it is more common in males.(Table 2)

Mode Of Injury:

In the present study Road traffic accidents (50%) are the most common mode of Blunt abdominal injuries. Khadilkar R (2015) et al and Mohapatra S (2010)¹⁹ et al also reported 62% cases of blunt injury abdomen were due to RTA. Another study by Curie A et al also reported 58.6% cases of blunt injury to abdomen were due to RTA.(Table 3)

Symptoms:

In the present study most common symptom was abdominal pain

(77.5%) followed by abdominal distension (55%) and vomiting (20%). Another study by Tripathi MD (1991) et al also reported pain abdomen in 91% of their patients. (Table 4)

Signs:

In the present study abdominal tenderness (77.5%) is the most common clinical sign followed by pulse >90 (70%). Systolic BP <90 mm Hg was considered shock and most patients with pulse > 90 and systolic BP <90 mm Hg underwent emergency laparotomy and had significant injuries.

This study is comparable to study by Tripathi MD (1991) et al which reported Tenderness as most common sign in 80% of their patients and shock in 37.2% of their patients. Another study by Mohapatra S (2010) et al also reported tenderness as most common sign in 70.85% of patients and 13.9% of patients with shock. (Table 5)

Associated Injuries:

Associated extra abdominal injuries were seen in 34 patients. The common among extra abdominal injuries in this study were soft tissue injuries (35.2%) followed by head injuries (20.5%), thoracic injuries (17.6%) and orthopaedic injuries (14.7%). In a similar study by Davis JJ (1976) et al also showed 9% of head injury 27% thoracic and 15% orthopaedic injuries. Khanna R (1999)²⁰ et al also showed similar results. (Table 6)

Latent Period:

Latent period is the interval between the times of injury to the time of surgery. In this study majority (25%) of patients were taken for surgery between 11 – 15 hours of latent period. The second most common latent period was between 16 – 20 hours (20%). This time lag is due to the site of accidents, which are usually rural, and the time taken to transport them to the hospital. Some patients were put on conservative management initially and since their condition was deteriorating they were taken for delayed exploratory laparotomy⁵. (Table 7)

Operative And Conservative Management:

In the present study 57.5% of patients underwent operative management and 42.5% underwent conservative management. This is comparable with Gupta S (1996) et al study which showed 36% conservative management and 63% operative management. Davis JJ (1976) et al showed 77% operative and 22% conservative management. Non operative management is gaining increasing acceptance mainly because of the easy availability of CT scan. With the aid of CT scan it is possible to accurately grade the extent of injury to solid organs like liver and spleen. Minor lacerations and capsular tears, difficult to diagnose clinically can be easily demonstrated by CT scan and selected for non-operative management. The disadvantages of non-operative management are those of missed injuries and delayed treatment resulting in excessive morbidity and mortality¹⁸. (Table 8)

Plain X Ray Abdomen:

In the present study plain X ray abdomen was done in all the patients. Gas under diaphragm and Enlarged soft tissue shadow was done in 10 (25%) patients each.

Another study (Mohapatra S (2006) et al) reported accuracy of x-ray erect abdomen to be 100% in detecting Hollow viscous injuries. Davis JJ (1976) et al reported that in their series, abdominal X ray was abnormal in 21% of cases; pneumoperitoneum was detected in 6% of cases and dilated bowel loops in 6% of cases¹⁹. (Table 9)

Four Quadrant Aspiration:

Four quadrant aspirations were done in 25 patients, among which 15 cases (60%) were positive and 10 (40%) cases were negative. Out of the 10 negative cases, 2 cases were false negative. On laparotomy, they were found to have hemoperitoneum. In the present study sensitivity is 88% and specificity is 100%. This is comparable to another study (Mohapatra S (2006) et al) which showed diagnostic aspiration to be accurate in 95% cases. Gupta S (1996) et al also showed similar results¹⁹. (Table 10)

Ultrasound Examination:

All the 40 patients were subjected to ultrasound examination, out of which 26 patients had scan detected solid organ injuries for which they underwent laparotomy or conservative management accordingly. But ultrasound was not sensitive in detecting retroperitoneal and hollow viscus injuries. In this study free fluid was seen in 50% of cases

followed by spleen in 25% and liver in 20%. Sensitivity of USG in detecting solid injuries in this study was 87%. This is comparable to other studies like Khadilkar R (2015) et al showed USG as reliable investigation for solid organ injuries.¹⁹ (Table 11)

CT Scan:

CT scan was done in 10 patients. Since most of the patients were not affordable, only those who were affordable were subjected to CT scanning. Since only 10 patients were subjected to CT scanning it is not comparable with other studies. (Table 12)

Organ Wise Injury:

In this study small bowel was most commonly involved in 30% of patients. Small bowel was the most commonly involved organ. It was involved in 30% of cases followed by spleen (25%), liver (20%) and mesentery (7.5%).

Spleen is the second most commonly involved organ in this study seen in 10 patients (25%) out of which 7 patients underwent operative management and 3 patients had conservative management. Splenectomy was done in 3 patients. Another study by R. Curie (1964) et al reported 27.5% of cases had splenic injuries, out of which 15% were operated. Khadilkar R (2015) et al also reported 30% of splenic injury in their study¹⁵.

Liver injuries were seen in 8 patients (23.3%) out of which 4 patients underwent operative management and 4 underwent conservative management. Davis et al.; reported liver injuries in 16% of population in their study and Khanna R (1999) et al reported 37% of liver injuries²⁰. (Table 13)

Post-operative Complication:

In this study wound infection is the most common complication seen in 4 patients (11.8%) followed by respiratory complications (8.8%) followed by wound dehiscence (5.9%), anastomotic leakage (5.9%), pelvic abscess (2.9%) and faecal fistula (2.9%). Another study by Davis JJ (1976) et al showed wound infection as a complication in 15% of the cases. Khadilkar R (2015) et al showed respiratory complication as the most common complication¹⁵. (Table 15)

Morbidity:

The duration of stay for most of the patients in this study was between 11-20 days with mean of 15 days for those who underwent operative management and a mean of 8.5 days for conservative management. Khadilkar R (2015) et al showed 8.78 days for patients managed conservatively and 16.62 days for patients managed operatively¹⁵.

Mortality:

A total of 6 patients died in the present study. 4 patients belonged to the operative group and died in the post-operative period. One patient died while being managed conservatively. Therefore mortality in this study was 10%. Gupta S (1996) et al showed 11% mortality in their study¹⁸. Another study by Davis JJ (1976) et al showed 13% mortality¹⁶. (Table 17, 18)

SUMMARY AND CONCLUSIONS

In this prospective study of 40 cases conducted at the casualty of Tertiary Care Centre, from November 2019 to December 2021 following conclusions were made

- Males are most commonly affected. People belonging to young age group of 21-30 were most commonly affected.
- Road traffic accident forms the most common mode of injury.
- Abdominal pain is the most common symptom seen in 85% of patients.
- Abdominal tenderness is the most common presenting sign seen in 86% of patients.
- A thorough and repeated clinical examination and appropriate diagnostic investigations lead to successful treatment in these patients.
- Associated extra abdominal injuries were found in 34 cases. The common among extra abdominal injuries in this study were soft tissue injuries (35.2%) followed by head injuries, chest injuries such as rib fractures, extremity fractures and pelvic fractures were seen.
- Majority (25%) of patients were taken for surgery between 11 – 15 hours of latent period. The second most common latent period was between 16 – 20 hours (20%).
- Plain x ray abdomen erect was sensitive in detecting hollow viscus

- injuries
- Four quadrant aspirations is a simple and an important tool for diagnosis.
- Ultrasound examination gives a clear picture of solid organ injury and free fluid.
- The most common injured viscera in the present study is small bowel
- They were managed by closure of perforation and resection and anastomosis.
- The second most common organ involved is spleen and were managed by splenectomy and conservative management.
- Liver is the third most organs involved and were managed conservatively and with packing.
- Retroperitoneal hematoma was seen in a small proportion of patients which also included renal injuries were managed conservatively.
- Hematuria was seen in few patients and were managed conservatively with Foley's catheterisation and observation.
- Postoperative complications like wound infection, wound dehiscence, respiratory complications, pelvic abscess and faecal fistula were seen.
- The duration of stay for most of the patients in this study was between 11-20 days with mean of 15 days for those who underwent operative management and a mean of 8.5days for conservative management.
- Mortality in this study was 6 patients only.
- Rapid diagnosis, early and timely referral, adequate and trained staff, close and careful monitoring, early wise and skilled decision to go for operative or non-operative management can help save many lives.

REFERENCES

1. Ameh EA, Nmadu PT. Gastrointestinal injuries from blunt abdominal trauma in children. *East Afr Med J* 2004; 81(4):194-7.
2. Isenhour JL, Marx J. Advances in abdominal trauma. *Emergency Medicine Clinics of North America* 2007;25(3):713-33.
3. Davis JJ, Cohn Jr IS, Nance FC. Diagnosis and management of blunt abdominal trauma. *Annals of surgery* 1976;183(6):672.
4. Shah SM, Shah KS, Joshi PK, Somani RB, Gohil VB, Dakhda SM. To study the incidence of organ damage and post-operative care in patients of blunt abdominal trauma with haemoperitoneum managed by laparoscopy. *Journal of Minimal Access Surgery* 2011;7(3):169.
5. Abbasi HR, Mousavi SM, Akerdi AT, Niakan MH, Bolandparvaz S, Paydar S. Pattern of traumatic injuries and Injury Severity Score in a major trauma center in Shiraz, Southern Iran. *Bulletin of Emergency & Trauma* 2013;1(2):81.
6. Brown RA, Bass DH, Rode H, Millar AJ, Cywes S. Gastrointestinal tract perforation in children due to blunt abdominal trauma. *Br J Surg* 1992;79(6):522-4.
7. Joseph TM. Blunt Injury of the Abdomen. 2015.
8. Gwinnutt CL, Driscoll PA. Advanced trauma life support. *European Journal of Anaesthesiology*. 1996;13(02):95-101.
9. Hashemzadeh SH, Hashemzadeh KH, Dehdilani M, Rezaei S. Non-operative management of blunt trauma in abdominal solid organ injuries: a prospective study to evaluate the success rate and predictive factors of failure. *Minerva Chirurgica* 2010;65(3):267-74.
10. Raza M, Abbas Y, Devi V, Prasad KV, Rizk KN, Nair PP. Non operative management of abdominal trauma—a 10 years review. *World Journal of Emergency Surgery* 2013;8(1):14.
11. Sabiston's Text book of surgery: 17th edition: vol 1: 2004: p483-531.
12. Decker GAG. Lee McGregor's Synopsis of Surgical Anatomy, Bristol; John Wright and Sons LTD, 1986.
13. Surgery of the liver and biliary tract: L.H. Blumgart: vol 1: 3rd edition: 2000.
14. Hamilton Bailey's Emergency surgery: 13th edition: 2000: p446-471.
15. Khadilkar R, Yadav AS, D'silva A. A clinical study to evaluate and manage solid organ injuries in blunt abdominal trauma. *CIB Tech Journal of Surgery* 2015;4(1):5-9.
16. Davis JJ, Cohn I, Nance FC. Diagnosis and management of Blunt abdominal trauma. *Ann Surg* 1976;183(6):672-678.
17. Tripathi MD, Srivastava RD, Nagar AM, Pratap VK, Dwivedi SC; Blunt abdominal trauma with special reference to early detection of visceral injuries. *Indian I Surg* 1991; 53(5):179-184
18. Gupta S, Talwar S, Sharma RK, Gupta P, Goyal A. Blunt trauma abdomen: a study of 63 cases. *Indian J Med Sci* 1996;50(8):272-6.
19. Mohapatra S, Prahad S, Rao KRRM, Bastia B; Options in the management of solid visceral injuries from blunt abdominal trauma. *Indian J Surg* 2003; 65(3):263-268.
20. Khanna R, Khanna S, Singh P, Puneet, A K Khanna; Spectrum of blunt abdominal trauma in Varanasi; *Quart J*; 1999; 35(1&2): 25-28.