Original Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20170429

Hollow viscus injury due to blunt abdominal trauma

Surya Ramachandra Varma Gunturi*, Venu Madhav Thumma, Jagan Mohan Reddy Bathalapalli, Nava Kishore Kunduru, Kamal Kishore Bishnoi, Nirjhar Raj Rakesh, Gangadhar Gondu, Digvijoy Sarma, Bheerappa Nagari

Department of Surgical Gastroenterology, Nizam's institute of Medical Sciences, Hyderabad, Telangana, India

Received: 19 January 2017 Accepted: 23 January 2017

*Correspondence:

Dr. Surya Ramachandra Varma Gunturi, E-mail: drsurya777@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Management of hollow viscus injury (HVI) due to blunt abdominal trauma (BAT) is a challenge to the clinicians even in the era of advanced imaging and enhanced critical care. Repeated clinical examination with appropriate imaging with multidisciplinary teamwork is the key for timely intervention in equivocal cases for successful outcomes. Aim of the study was to present our experience over last 4½ years.

Methods: This is a retrospective study of prospectively collected data of patients treated at surgical gastroenterology department, Nizam's Institute of Medical Sciences, Hyderabad, India over a period of 4½ years (2012-2016).

Results: A total of 126 BAT Patients were treated in our unit as inpatients during the last 4½ years. Out of 126, twenty patients (15.87%) with HVI in whom surgical intervention was done formed the study group. Contrast enhanced CT Scan abdomen and chest was done in stable patients (13/20), in rest of the patients (7/20) the decision to operate was taken more on clinical grounds along with X-ray abdomen and USG abdomen features. 12 (60%) had jejunal and ileal injuries, 5 (25%) patients had colonic injuries (sigmoid 4, caecum 1). One (5%) patient had extra peritoneal rectal perforation with ascending retroperitoneal fascitis and 2 (10%) had duodenal injury. Two (10%)patients required relaparotomy. We had mortality in 3 (15%) patients and 17 (85%) patients had complete recovery.

Conclusions: Hollow viscus injury should be suspected in all cases of blunt abdominal trauma. In equivocal cases careful repeat clinical examinations with close monitoring and repeat imaging is highly essential to prevent delay in intervention. Type of procedure is based on time of presentation, degree of contamination, associated injuries and general condition of the patient.

Keywords: Blunt abdominal trauma, Hollow viscus injury, Poly trauma

INTRODUCTION

Management of Traumatic injuries is a challenge to the clinicians. Traumatic injuries remain the leading cause of death among 12-45 year age group. Hollow viscus and mesenteric injury are found in 3-5% of patients treated for blunt abdominal trauma (BAT). They represent 16% of all lesions seen in BAT and in third in order of frequency after liver and splenic injury. Hollow viscus

injury (HVI) is difficult to diagnose and any delay in diagnosis will eventually increase the morbidity and mortality. Thus the aim of our study was to review our unit's experience in managing HVI following BAT.⁶

METHODS

This is a retrospective study of prospectively collected data of patients treated at surgical gastroenterology department, Nizam's Institute of Medical Sciences (NIMS) over a period of 4½ years (2012-2016). NIMS is a tertiary care referral centre in Hyderabad, India. A total of 126 BAT Patients were treated in our unit as inpatients during the last 4½ years. Out of 126, twenty patients (15.87%)with HVI in whom surgical intervention was done formed the study group.

The patients with complex pancreatico duodenal injuries were excluded from this study. The data was analysed in terms of following factors. Age, gender, mechanism of injury, clinical status, radiological investigation, time from injury to operative intervention, other associated injuries, operative details and outcomes.

Indications for surgical intervention in our study were haemodynamic instability from suspected intraabdominal injury, clinical features of peritonitis, clinical deterioration while on conservative therapy and suspicious radiological findings in cases with equivocal clinical findings.

RESULTS

Twenty Patients with HVI were analysed. All these patients underwent surgical intervention. The median age of this group was 32 years (range 14-55 years) with male (95%) predominance (Table 1).

Table 1: Age distribution.

| Age in years | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 |
|----------------------|-------|-------|-------|-------|-------|
| No of patients n (%) | 6 | 4 | 6 | 3 | 1 |
| | (30%) | (20%) | (30%) | (15%) | (5%) |

Road traffic accidents (RTA) accounted for 70% (14/20) of injuries and 50% (10/20) of the injured were driving the vehicle at the time of accident(car/bike) (Table 2).

Table 2: Mode of BTA.

| Mode of BTA | RTA | Industrial/work site trauma | Fall from tree | Playing games |
|-------------|----------|-----------------------------|----------------|---------------|
| n (%) | 14 (70%) | 4 (20%) | 1 (5%) | 1 (5%) |

Contrast enhanced CT scan (CECT) abdomen and chest was done in stable patients (13/20), in rest of the patients (7/20) the decision to operate was taken more on clinical grounds along with X-ray abdomen and USG abdomen features.

In two patients a repeat CECT abdomen was performed while they were on observation in whom clinical examination findings were not significant (Figure 1 to 3) delineates the CT abdomen features along with operative photograph demonstrating large sigmoid colon perforation in one of these patients.



Figure 1: Initial CT abdomen without any pneumoperitoneum.

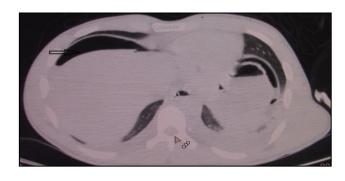


Figure 2: CT after 2 days with large pneumoperitoneum in the same patient.



Figure 3: Operative photograph demonstrating transacted sigmoid colon contusion over the skin can also be appreciated.

In one patient the CECT abdomen revealed moderate free fluid without any solid organ injury (Figure 4, and 5) with equivocal abdomen and he was taken up for surgery and laparotomy revealed faecal peritonis with terminal ileal injury along with mesenteric injury (Figure 6).



Figure 4: Peri hepatic free fluid without any solid organ injury.

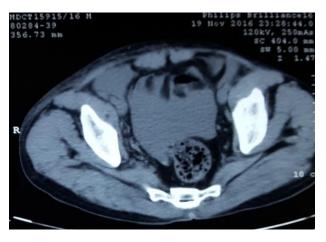


Figure 5: Free fluid in pelvis in same patient.

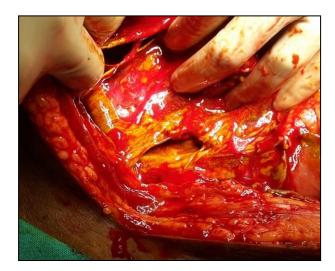


Figure 6: Faecal peritonitis.

The ileum (n = 8,40%) was the most common site of injury followed by colon (n = 5, 25%) in our study. Jejunal perforation was seen in 4 (20%) and duodenum in 2 (10%). One had extra peritoneal rectal perforation with ascending retroperiotoneal fascitis (Table 3).

Table 3: Site of injury.

| Site of injury | n (%) |
|----------------|--------------------------------------|
| Duodenum | 2 (10%) |
| Jejunum | 4 (20%) (multiple perforations in 1) |
| Ileum | 8 (40%) |
| Colon | 5 (25%) |
| Rectum | 1 (5%) |

Types of surgical repair were summarized in Table 4.

Table 4: Type of surgical repair.

| Type of Surgical repair | n (%) |
|-------------------------------------|-----------|
| Direct primary closure | 3* (15%) |
| Resection and hand sewn anastamosis | 6** (30%) |
| Stoma | 11 (55%) |

*one patient from this group underwent resection anastamosis in second surgery

** one patient from this group underwent stoma in second surgery.

In duodenal injury we did resection anastamosis along with feeding jejunostomy in one and in the other primary closure with Feeding jejunostomy and Retrograde duodenostomy was done. both of them had good recovery.

In jejunal perforation group (n = 4) resection anastamosis was done in two cases. primary closure was done in the other two and one patient in this group required re laparotomy due to leak and resection anastamosis was performed. In ileal injury (n = 8) five patients underwent ileostomy. Three underwent resection anastomosis. And one in this group required relaparotomy and stoma was performed during the second surgery. In colonic injury (n = 5) the site is sigmoid colon in 4/5 and caecum in 1/5. In all these patients stoma was performed. Rectal injury (n = 1) patient had sub fascial sepsis hence stoma was done along with fasciotomy and drainage. Majority of our patients had associated injuries (Table 5).

Table 5: Associated injuries in the 20 patients.

| Associated injuries | n (%) |
|------------------------------|---------|
| Hepatic injury | 1 (5%) |
| Renal injury | 1 (5%) |
| Degloving injury | 2 (10%) |
| Pelvic fracture | 3 (15%) |
| Urinary bladder rupture | 2 (10%) |
| Long bone fracture | 5 (25%) |
| Lower limb ischemic gangrene | 1 (5%) |
| Spinal injury | 1 (5%) |

The time interval between incident and surgery ranged from 6 hours to 120 hours (5 days) delay in most of the cases is due to transportation from distant places and referral of patients from other centres. 13 out of 17 patients who recovered were discharged within 2 weeks and post-operative hospital stay ranged from 7-35 days. The mortality rate in our study group is 3/20 (15%). The cause of mortality in these patients is due to delayed presentation to our centre and severity of injuries.

DISCUSSION

Hollow viscus and mesenteric injury are found in 3-5% of patients treated for blunt abdominal trauma (BAT).²⁻⁵ The incidence of HVI in our series was high (15.87%) when compared with existing literature, this could be due to small sample size, referral bias and also there might be increased incidence of HVI, when the severity of the trauma increases. These lesions occur as a result of high energy trauma involving motor vehicle accidents in 70-90% of cases.²⁻⁹ The most common cause of HVI in our study is RTA (70%) and most of the patients were young and there is a need to focus on the preventive aspects also.

Clinical examination plays an important role. Intestinal or mesenteric injury should be suspected in all high injury blunt trauma.⁵ A part from assessing haemodynamic stability physical examination should assess tenderness and guarding. The assessment will become difficult in cases of brain or spinal injury or intoxication with alcohol or drugs.⁵ In haemodynamically stable patients CECT abdomen plays an important role, CT signs of intestinal injury include discontinuity of the intestinal wall, thickening of bowel wall and enhancement of intestinal wall defect after intravenous (IV) contrast injection. CT findings suggestive of mesenteric injury include IV contrast extravasation or abrupt discontinuation of opacification along a vascular branch, infiltration of mesenteric fat. Other signs include pneumoperitoneum, free fluid in peritoneal cavity in the absence of obvious solid organ injury.10

In patients with isolated free fluid without any evidence of solid organ, intestinal or mesenteric injury with equivocal abdominal signs surgical intervention should be considered. We had similar findings in one case where laparotomy revealed ileal injury (Figure 4, 5,6). Existing literature reports estimate the need of laparotomy in 27% of similar type of cases.¹¹ Primary repair of the defect is suitable for small, early perforations. In our study majority of cases were presented late and hence resection anastamosis or stoma was performed. Type of procedure is based on time of presentation, degree of contamination, associated injuries and general condition of the patient. In our study 13 out of 17 patients who recovered were discharged within 2 weeks inspite of delayed presentation and this can be attributed to choosing the appropriate on table procedure. Delay in surgery more than 8 hours after injury is associated with increased morbidity and mortality.¹² All efforts should be made to refer these patients from primary care centres to higher centres at the earliest possible.

The mortality rate of 15% is on higher side due to delay in transportation from distant places and referral of patients from other centres in most of the cases. The Mortality could be even worse if appropriate on table procedure was not chosen. In BAT once the mode of injury is expected to be severe, then even if the patients are stable without any clinical or radiological signs it is prudent to monitor these patients with repeated clinical examination. The clinicians should have a low threshold to repeat imaging with CT scan if there are any equivocal signs.

In BAT the patients with intestinal injuries will have either clinical or radiological signs in most of the cases early in the course. In patients with mesenteric injuries there will be a sub set of patients who have a normal clinical picture initially but the signs may evolve over a period of time and this may manifest after few days. In very few patients of mesenteric injury they tolerate the insult initially but can present with stricture of small bowel in few months as a consequence of mesenteric injury. In BAT there should be a high index of suspicion for HVI and requires a multidisciplinary team approach for better management. In BAT the patients who were eligible for non-operative management should be closely monitored initially. Once they completely recover, the non-operatively managed patients also need long followup.

CONCLUSION

Hollow viscus injury should be suspected in all cases of blunt abdominal trauma. In equivocal cases careful repeat clinical examinations with close monitoring and repeat imaging is highly essential to prevent delay in intervention. Type of procedure is based on time of presentation, degree of contamination, associated injuries and general condition of the patient.

ACKNOWLEDGEMENTS

Authors would like to sincerely thank all the team members who were involved in treating these patients and in data retrieval for their support and team work.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

institutional ethics committee

REFERENCES

1. Magu S, Agarwal S, Singh RG. Multi detector computed tomography in the diagnosis of bowel injury. Indian J Surg. 2012;74(6):445-50.

- 2. Watts DD, Fakhry SM. EAST multi-institutional hollow viscus injury research group incidence of hollow viscus injury in blunt trauma: analysis from 275,557 trauma admissions from the East multi-institutional trail. J Trauma. 2003;54(2):289-94.
- 3. Mcnutt MK, Chinapuvvula NR, Beckmann NM. Early surgical intervention for blunt bowel injury: the bowel injury prediction score (BIPS). J Trauma Acute Care Surg. 2015;78(1):105-11.
- 4. Bhagvan S, Turai M, Holden A, Ng A, Civil I. Predicting hollow viscus injury in blunt abdomjnal trauma with computed tomography. World J Surg. 2013;37(1):123-6.
- Bege T. Hollow viscus injury due to blunt trauma: a review. Journal Visceral Surgery. 2016, http://dx.doi.org/10.1016/j.jviscsurg.2016.04.007
- Stuhlfaut JW, Lucey BC, Varghese JC, Soto JA. Blunt abdominal trauma: utility of 5-minute delayed CT with a reduced radiation dose. Radiology. 2006:238(2):473-9.
- 7. Alsayali DMM, Atkin C, Winnet J, Rahim R, Niggemeyer LE, Kossmann T. Management of blunt bowel and mesenteric injuries: experience at the Alfred hospital. Eur J Trauma Emerg Surg. 2009;35(5):482-8.
- 8. Elton C, Riaz AA, Young N, Schamschula R, Papadopoulos B, Malka V. Accuracy of computed tomography in the detection of blunt bowel and mesenteric injuries. Br J Surg. 2005;92(8):1024-8.

- 9. Hughes TMD, Elton C, Hitos K, Perez JV, Mcdougall PA. Intra-abdominal gastrointestinal tract injuries following blunt trauma: the experience of an Australian trauma centre. Injury. 2002;33(7):617-26.
- Brofmn N, Atri M, Hanson JM, Grinblat L, Chugtai T, Brenneman F. Evaluation of bowel and mesenteric blunt trauma with multidetector CT. Radiographics. 2006;26(4):119-31.
- 11. Rodriguez C, Barone JE, Wilbanks TO, Rha CK, Miller K. Isolated free fluid on computed tomographic scan in blunt abdominal trauma: a systematic review of incidence and management. J Trauma. 2002;53(1):79-85.
- 12. Fakhry SM, Brownstein M, Watts DD, Baker CC, Oller D. Relatively short diagnostic delays (<8 hours) produce morbidity and mortality in blunt small bowel injury: an analysis of time to operative intervention in 198 patients from a multicentre experience. J Trauma. 2000;48:408-14.

Cite this article as: Gunturi SRV, Thumma VM, Bathalapalli JMR, Kunduru NK, Bishnoi KK, Rakesh NR, et al. Hollow viscus injury due to blunt abdominal trauma. Int Surg J 2017;4:861-5.