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# ADVANCING TRAUMA CARE: THE EMERGING ROLE OF DIAGNOSTIC LAPROSCOPY IN BLUNT ABDOMINAL INJURY

Surgery

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## ABSTRACT

This study aimed to study the role of laproscopy in blunt trauma abdomen and its benefits over other imaging techniques. This study included patients with blunt abdominal trauma admitted to surgical units of IGGMCH and Mayo Hospital Nagpur between March 2022 and August 2024. Thirty cases of blunt trauma to the abdomen were taken into consideration. Among the 50 patients, most of the patients belonged to the 21-30 age group. Males are more commonly affected by Blunt trauma to the abdomen (76.67%), with the most common etiology being road traffic accidents. Pain was the most common symptom in all 50 patients, followed by vomiting. 83% of patients presented with intra-abdominal organ injuries, and 30% of the patients had splenic involvement as diagnosed on both CECT (30%) and diagnostic laproscopy (30%). The liver was the second most affected organ with the second most common injury (13.3% on CT and 16.67% on diagnostic laproscopy), followed by minor bowel injury and mesenteric injury. 74% of patients were managed by diagnostic laproscopy with conservative management, and 24% of patients were managed by diagnostic laproscopy converted to exploratory laparotomy with a total mortality of 6.7%. Rest all patients recovered. Diagnostic laproscopy offers significant therapeutic advantages; it is minimally invasive, helps achieve timely diagnoses, and reduces the incidence of negative laparotomies. Limiting unnecessary investigations and shortening hospital stays not only enhances cost efficiency but also improves satisfaction for both patients and surgeons. Furthermore, it allows for adequate visualization of intra-abdominal injuries, reducing the need for non-therapeutic laparotomies and minimizing the reliance on serial examinations.

## KEYWORDS

Diagnostic laproscopy, blunt abdominal trauma, spleen

### INTRODUCTION-

Blunt abdominal trauma is a significant health issue in India, leading to high morbidity and mortality rates across all age groups. This type of trauma accounts for a large percentage of injuries, primarily due to road traffic accidents, assaults, falls from height, and work-related incidents. It represents 6% to 14% of all traumatic injuries and is present in 7% to 10% of trauma victims, often co-occurring with orthopedic, thoracic, or central nervous system injuries in severe cases. Given that trauma is a leading cause of death in individuals under 35, addressing these injuries is critical for public health and safety initiatives.

Identifying serious intra-abdominal injuries in blunt abdominal trauma can be challenging, often leading to misdiagnosis or delays that contribute to increased morbidity and mortality. When imaging techniques like ultrasonography and CT scans yield inconclusive results, the decision-making process for surgeons becomes complex.Diagnostic laproscopy has become a valuable tool for assessing and managing these cases, offering a less invasive option than traditional laparotomy. While laparotomy remains the standard approach, especially in cases of hemodynamic instability, laproscopy may be considered for its diagnostic and therapeutic advantages. Specific indications for surgical intervention should be carefully evaluated to optimize patient outcomes.

Deciding between surgical intervention and nonoperative management for blunt abdominal trauma often hinges on accurate diagnosis, which imaging alone may not provide. In such cases, diagnostic laproscopy has become an effective alternative for evaluating and treating intra-abdominal injuries.

The role of laproscopy has expanded significantly in recent years, demonstrating its ability to improve surgical outcomes. It can be performed safely in stable patients and has shown a sensitivity of 90-100% in detecting abdominal trauma. This high sensitivity helps reduce unnecessary laparotomies and their associated complications, making laproscopy a valuable tool in the management of blunt abdominal injuries.

### MATERIALS AND METHODS

This prospective study will include patients with blunt abdominal trauma admitted to surgical units of IGGMCH and Mayo Hospital Nagpur between March 2022 and August 2024. Thirty cases of Blunt trauma to the abdomen will be taken into consideration.

**Inclusion Criteria**

- Hemodynamically stable patient with blunt abdominal trauma
- USG showing hemoperitoneum
- Suspected cases of diaphragmatic injury
- Cases of intraperitoneal rupture of the urinary bladder

**Exclusion Criteria**

- Patients requiring immediate surgical intervention because of evidence of severe, continuous internal bleeding
- Established peritonitis
- Patients with penetrating abdominal wound
- Nontraumatic abdominal emergencies
- Patients with head injury/intracranial pressure
- Patients who are unfit for general anesthesia
- Cardiac failure/pulmonary failure
- Chronic obstructive pulmonary diseases/ Chronic obstructive airway disease

**Study Design-** Prospective study

**Investigations-**

- **Blood:** Hb %, hematocrit, TLC, Blood Coagulation studies, Serum amylase, LFT, KFT, Arterial blood gas analysis
- **Urine:** Microscopy and analysis
- Plain x-ray of chest and abdomen
- USG Abdomen and pelvis and CT scan
- Diagnostic laproscopy

**Operative Procedure —**

The Preoperative protocol comprises detailed history, general examination, per abdominal examination, laboratory investigation, and radiological investigation, including X-ray chest and abdomen, USG, and CT, followed by Diagnostic Laproscopy, which is the mainstay operative procedure in blunt trauma abdomen in this study. Diagnostic laproscopy helps in direct visualization of abdominal contents.

After initial resuscitation with IV fluids, antibiotics, analgesics, and blood transfusion, diagnostic laproscopy with a standard technique of 10 mm umbilical port (Hassan's open technique) and another working port of 5 mm for blood suction and irrigation will be performed. The diagnostic laproscopy will note the organs injured with grading and the type of injuries, the amount of blood in the peritoneal cavity,and associated gut or diaphragmatic injuries.

A major limitation is the need to perform a comprehensive

examination of the entire abdomen, particularly the retroperitoneum. An important disadvantage is the requirement for General Anesthesia.

**Contraindication:**

- Risk of tension pneumothorax.
- Suspected diaphragmatic injury
- Risk of injury to major blood vessels.
- Risk of air embolism.

**Following are some procedural and intraoperative figures/images during Diagnostic Laproscopy:**

**Figure 1.** Laproscopic Ports Insertion

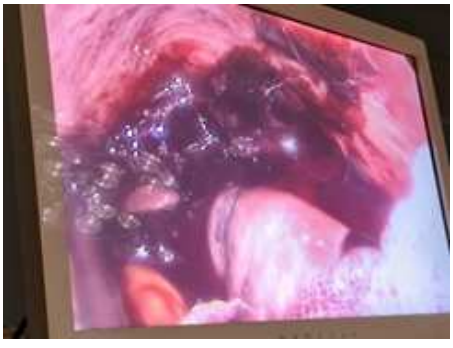

**Figure 2-** Hemoperitoneum secondary to blunt trauma to the abdomen

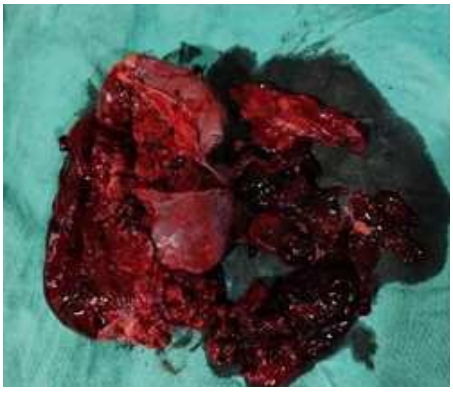

**Figure 3-** Diagnostic Laproscopy converted to exploratory laparotomy with Splenectomy

**Figure 4 -** Diagnostic Laproscopy converted to exploratory laparotomy with resection andanastomoses

**Study Factor-** The study focuses on assessing the role and effectiveness of laproscopy in managing patients with blunt abdominal trauma.

**RESULTS-**

**Table 1: Age Distribution Of The Patients**

| AGE INTERVAL | Number of patients & percentage (%) |
|---|---|
| 11-20 | 5 (18%) |
| 21-30 | 8 (27%) |
| 31-40 | 5 (16%) |
| 41-50 | 5 (16%) |
| 51-60 | 4 (13%) |
| 61-70 | 2 (8%) |
| 71-80 | 1 (4%) |

**Table 2: Sex Distribution Of The Patients**

| SEX | PATIENTS |
|---|---|
| MALE | 23 |
| FEMALE | 7 |

**Table 3: Mode Of Injury**

| MODE OF INJURY | Number of patients/Percentage |
|---|---|
| MOTOR VEHICLE COLLISION | 15 (50%) |
| BLOW WITH A BLUNT OBJECT | 9 (30%) |
| FALL FROM HEIGHT | 6 (20%) |

**Table 4: Latent Period**

| TIME INTERVAL | Number of patients / Percentage |
|---|---|
| 0-4 hrs | 15 (50%) |
| 4-8 hrs | 7 (23%) |
| 8-16 hrs | 4 (15%) |
| 16-24 hrs | 3 (10%) |
| >24 hrs | 1 (2%) |

**Table 5: Signs And Symptoms**

| SIGNS AND SYMPTOMS | No. of patients (%) |
|---|---|
| Pain | 30 (100%) |
| Vomiting | 15 (50%) |
| Distension | 27 (90%) |
| Urinary symptoms | 3 (10%) |
| Tenderness | 30 (100%) |
| Tachycardia | 30 (100%) |

**Table 6: Individual Organ Injured**

| Injured Organs | Number of patients | Percentage % |
|---|---|---|
| Spleen | 9 | 30 |
| Liver | 5 | 16.67 |
| Mesentery | 2 | 6.67 |
| Small intestine | 3 | 10 |
| Kidney | 2 | 6.67 |
| Large intestine | 2 | 6.7 |
| Pancreas | 1 | 3.3 |
| Urinary bladder | 1 | 3.3 |
| Diaphragm | 2 | 6.67 |

**Table 7: Findings On Diagnostic Laproscopy Missed On CT**

| Findings on diagnosticlaproscopy | |
|---|---|
| Findings | Number of patients (%) |
| Normal study | 3 (33) |
| Hepatic injury | 5 (12) |
| Large bowel injury | 2 (8) |
| Small bowel injury | 3 (8) |
| Splenic injury | 9 (23) |
| Renal injury | 1 (3.3) |
| Mesenteric tear | 2 (6.67) |
| Bladder rupture | 1 (3.3) |
| Diaphragm injury | 3 (10) |
| Pancreatic injury | 1 (3.3) |

**Table 8: Duration Of Hospital Stay And Outcome:**

| Duration of hospital stay | |
|---|---|
| Duration and outcome | Cases n (%) |
| Duration (Days) | |
| 0-3 | 21 (76) |
| 3-6 | 8 (20) |

| | |
|---|---|
| 6-9 | 1 (4) |
| Outcome | |
| Recovered | 28 (93.3) |
| Expired | 2 (6.7) |
| Total | 30 (100) |

**Table 9: Line Of Management**

| Line of management | Cases | Percentage |
|---|---|---|
| DL with Conservative management | 22 | 74 |
| DL converted to exploratory laparotomy | 8 | 26 |

## DISCUSSION-

### 1) Distribution Of Age

In this study, most of the patients belonged to the 21-30 age group, similar to the results obtained by N. Mehta et al. (35). In the study by Suhas et al. (37) and Sreenidhi et al. (36), the 11-20 age group was the most commonly involved age, the second most common age group in our study. 77% of the patients belonged to 11-50 years of age. Thus, in general, most of the victims belonged to the young and working community.

### 2) Distribution Of Sex

Males are more commonly affected by Blunt trauma to the abdomen. 76.67% were males in our study, 79% in N. Mehta et al. (35), and 79.4% in Fazili et al. l (38). The ratio of males to females was found to be 3:1. In the study by Suhas et al. (37) and Sreenidhi et al. (36), 90% of males were involved. All studies (35,36,37,38) showed a male preponderance. There is a male preponderance as they are involved in outdoor activities, including travel.

### 3) Mode Of Injury

In all the series (35,36,37,38), a road traffic accident was the most common etiology. It was the reason for Blunt trauma to the abdomen in 50% of patients in this study and 53% of patients in N. Mehta et al. (35) study. This is due to modernization and an increase in personal automobile use. Prevention of road traffic accidents can significantly decrease the incidence of Blunt trauma to the abdomen. This is followed by blows with blunt objects (30%), which is comparable to that obtained in the Fazili et al. study (38) (28.4%).

### 4) Latent Period (LP)

In this study, 50% of patients presented in the first 4 hours of injury, and 23% presented in the next 4 hours. In a study conducted by N. Mehta et al. (35), 53.5% presented in the first 4 hours of injury. 25% of patients presented after 8 hours, which resulted in clinical deterioration and increased morbidity. The lesser the latent period, the better the prognosis.

### 5) Signs And Symptoms

Pain was the most common symptom in our series, presenting in 100% of cases, while it was present in 92.9% in N. Mehta et al. study (35), similar tothe other two studies (36,37). Vomiting was present in 50%. Pain is a reliable symptom, and it should not be overlooked. Localized pain may also be indicative of possible organ injury. Tenderness was the most common sign in 100% of patients in this study. In other studies (35,36,37,38), it was also the most common sign in more than 80% of cases.

### 6) Injured Organs

83% of patients presented with intra-abdominal organ injuries, and 30% of the patients were having splenic involvement. The spleen was the most common injured organ in the three series (35,36,38), though the percentages are variable, consistent with the international series (28). The reason for the difference is the inclusion and exclusion criteria. In this study, we excluded all head, chest, and orthopedic injuries requiring immediate intervention as they might affect morbidity and mortality. The liver followed the spleen in this series. Solid organ injury was more commoner than hollow viscus injury, the spleen being the commonest among solid organs and the small intestine being every day among hollow viscus injuries. In the genito-urinary tract, the kidney was most commonly injured. Among retroperitoneal organs, the kidney was the most common.

### 7) Findings Of Diagnostic Laproscopy Missed On Ct Abdomen

In this study, the splenic injury was the most common organ involved and the most common injury, as diagnosed on both CECT (30%) and diagnostic laproscopy (30%). The liver was the second most affected organ with the second most common injury (13.3% on CT and 16.67% on diagnostic laproscopy), followed by minor bowel injury and mesenteric injury. These observations were comparable with a study held by R Sahu et al. (39) in which the most common injured organ and most common injury was to the spleen (45%), followed by the liver (40%).

### 8) Line Of Management

74% of patients were managed by diagnostic laproscopy with conservative management, and 24% were managed by diagnostic laproscopy converted to exploratory laparotomy.

### 9) Hospital Stay And Outcome

A total of 2 patients died in our series. Twenty-eight patients were recovered after diagnostic laproscopy. Therefore, mortality in the present study is6.7%.

At the end of our discussion, we found that young male patients are particularly susceptible to abdominal trauma, with road traffic accidents (RTA) being the most common cause of injury. The spleen and liver are the organs most frequently injured, while bowel injuries are more prevalent among those who have undergone surgery. Mortality rates are higher in operated patients and those who present later for treatment. Overall, conservative management is more effective, yielding better outcomes than surgical intervention.

## CONCLUSION-

Laproscopy and Contrast-Enhanced Computed Tomography (CECT) are vital in diagnosing blunt abdominal trauma (BAT), especially when conventional methods fail. Diagnostic laproscopy (DL) offers significant therapeutic advantages; it is minimally invasive, helps achieve timely diagnoses, and reduces the incidence of negative laparotomies. By limiting unnecessary investigations and shortening hospital stays, DL not only enhances cost efficiency but also improves patient and surgeon satisfaction. Furthermore, it allows for adequate visualization of intra-abdominal injuries, reducing the need for non-therapeutic laparotomies and minimizing the reliance on serial examinations.

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