A PROSPECTIVE STUDY ON PENETRATING INJURIES TO THE ABDOMEN IN S.V.R.R.G.G HOSPITAL, TIRUPATI

B. Sobha Rani¹, K. Lokesh², K. V. Madhusudhan³, Y. Mahesh babu⁴

ABSTRACT: INTRODUCTION: Penetrating trauma to abdomen is an important cause of surgical emergencies as young productive adults are involved. Patients with penetrating abdominal wound presenting with shock, peritonitis or evisceration are usually subjected to early laparotomy although a very few studies have been done to validate the criteria. AIMS & OBJECTIVES: To study the etiology, extent of organ involvement in the penetrating injury and organs most commonly involved. To assess patient, for surgical intervention and avoid negative laparotomy. To assess morbidity rate, due to different organs involved. To evaluate modalities of treatment, complications and prognosis. MATERIALS AND METHODS: STUDY DESIGN: Prospective Clinical Study. STUDY AREA: Sri Venkateswara Medical College Tirupathi. SOURCE OF DATA: The material for the present study is collected from the patients who present to the Out Patient Department of Surgery, Sri Venkateswara Medical College with swelling in the scrotal region fulfilling the inclusion criteria. METHODS: In a prospective study of 44 consecutive patients with penetrating wounds to anterior abdomen flank or lower chest, various clinical and radiological criteria were evaluated for their accuracy in predicting the presence of significant abdominal organ injury. All the patients with peritoneal penetration, signs of generalized peritonitis, hemodynamic instability underwent exploratory laparotomy. RESULTS: Overall 30 patients (68%) had significant abdominal injury requiring repair. The criteria for significant organ injury were shock on admission, generalized peritonitis, evisceration of omentum and or bowel. Mere penetration of peritoneal cavity is a poor indicator of organ injury. Extra luminal air or free peritoneal fluid on X-ray is unreliable to predict the organ injury or to add to the management in the presence of other signs. INTERPRETATION AND CONCLUSION: Signs of hemodynamic instability generalized peritonitis are reliable criteria by themselves for early laparotomy. Peritoneal penetration by itself is a poor indicator of significant organ injury. Majority of patients with evisceration require laparotomy regardless of what has eviscerated or presence of other indications. KEYWORDS: Evisceration; Peritonitis; Roentgenogram.

INTRODUCTION: Injury has been man’s constant companion since earliest time. In his age of speed civil violence, armed conflicts, crimes of passion and traffic accidents the incidence of penetrating injuries to abdomen have been on the increasing hand. Currently five of the twenty five leading causes of mortality are secondary to some forms of injury.

Penetrating abdominal injuries can also results from stab injuries, due to communal riots, political rivalry, business conflicts and family disputes. Other causes of penetrating injury being fall from a height on sharp object, industrial accidents, bull gore injuries, impalement injuries, bullet injuries, etc.
Abdomen occupies a vulnerable position in human anatomy and is the least protected and most susceptible part for accidental or homicidal injuries.

The direct cost to society in caring to the needs of trauma victims is enormous and with majority of patients affected being young individual, their loss of productivity to the family and to the society is immense.

Over the past century major advances in the field of imaging, Ultrasonography and injury assessing scoring system, a more selective approach is being applied to the treatment of traumatic injuries. This approach is also being applied to treatment of abdominal trauma secondary to penetration. Because of increased rates of negative laparotomy with penetrating injuries selective management are suggested by various studies. Introduction of new surgical techniques, improvement in the field of anesthesia and use of new generation antibiotics have all contributed to reduction in morbidity and mortality. In 1960, after observing the increased rate of negative laparotomy, Shaftan suggested the selective management of patients with stab wounds.

By the year 2020 death from all forms of injury are predicted to rise by 63% by which time accidents will be the third most common cause of death worldwide and second most in developing nations.

The incidence of penetrating injury is difficult to estimate, but it is believed to be in rise. No data can determine the exact number of penetrating abdominal injuries because in a country like India where majority of population reside in rural areas and trauma centers available in cities, the care of injured is far from satisfactory.

Penetrating injury forms an important component of surgical emergency. The importance of this category becomes further apparent when one realizes that most of such trauma victims are essentially healthy people and in prime of their life with an associated high risk of morbidity and mortality and has influenced me to undertake this surgical problem.

OBJECTIVES:

- To study the etiology, extent of organ involvement in the penetrating injury and organs most commonly involved.
- To assess patient, for surgical intervention and avoid negative laparotomy.
- To assess morbidity rate, due to different organs involved.
- To evaluate modalities of treatment, complications and prognosis.

Thus, the study aims at analyzing the incidents, clinical characteristics, the diagnosis, the indications for laparotomy, the therapeutic methods and the morbidity and mortality rates.

METHODOLOGY: Method of Study:

Study design: Prospective and Observational study

Sample size: 44 cases were studied prospectively.

Inclusion criteria:

1. Patient giving written informed consent.
2. Patient age above 16 years.
3. Patient presenting with penetrating injury to abdomen suicidal, assault or accidental.
Exclusion criteria:
   i. Pediatric age group (<16yrs).
   ii. Penetrating wounds in blast injuries
   iii. Severe cardiothoracic injuries.
   iv. Patients with severe head injuries.
   v. Patients who are hemodynamically unstable.

Study Setting: S. V. R. R. G. G. Hospital, S. V. Medical Collage, Tirupati.

Study period: 12 months.

Study Method: All patients with history of penetrating abdominal trauma admitted as inpatients during study period are included in this study.

   Documentation of patients, which included identification history, clinical findings, diagnostic test, operative findings, operative procedure, complications during the stay in the hospital and during subsequent follow up period were all recorded on proforma prepared. The demographic data collected included age, sex, occupation and nature and time of events leading to the injury.

   After initial resuscitation and achieving hemodynamic stability, all patients were subjected to clinical examination. Depending on the clinical findings, decision for further investigations as four quadrant aspiration, local wound exploration, x-ray chest and abdomen erect view and abdominal ultrasound were taken.

   The decision to operate on the patient is taken based on the clinical and investigation findings.

   On laparotomy, the examination of hallow viscus was seen for starting from stomach, duodenum, small intestine and large intestine with both exit and entry wound searched for. In small intestine, starting from duodenojejunal junction to ileocaecal junction both at mesenteric and antemesentric border were seen. The extent of solid organ injuries was graded according to the organ injury scale.

   In all the cases midline laparotomy incision is made. Statistics on post-operative complication was seen and cause for it was analyzed.

STATISTICAL METHODS: Percentages arithmetic mean and standard deviation were calculated.

SOFTWARE: Statistical software mainly SPSS 11.0 and Systat 8.00 was used for the analysis of the data and Microsoft word and excel have been used to generate graphs tables etc.

Consent from the patient and approval from ethical and scientific committee obtained.
ANALYTICAL RESULTS:

| Age  | No. of Patients | Percentage |
|------|----------------|------------|
| 13-20| 5              | 11         |
| 21-30| 10             | 23         |
| 31-40| 11             | 25         |
| 41-50| 11             | 25         |
| 51-60| 3              | 7          |
| >60  | 4              | 9          |
| TOTAL| 44             | 100        |

Table 1: Age Incidence

The age of patients ranged from 14- 80 years. The maximum incidence was found in age group of 31- 40 years and 41- 50 years, being 25% each, seconded by 21-30 years group constituting 23%.

| Gender | No. of Patients | Percentage |
|--------|----------------|------------|
| Male   | 35             | 80         |
| Female | 9              | 20         |
| Total  | 44             | 100        |

Table 2: Sex Incidence

Among 44 cases, there were 35 males and 9 females. Thus, male to female percentage being 80% and 20%. Thus male to female ration being 4:1.

GRAPH NO 1: AGE INCIDENCE

GRAPH NO 2: SEX INCIDENCE
The commonest mode of injury being stab wounds 59% of which majority was 52% homicide in nature, seconded by fall on sharp object 30%, followed by bull gore 11% and suicidal stab 7% injuries.

Latent period is the time of injury to time of surgery. Majority of patients’ i.e, 68% were take up for laparotomy of these 82% were taken up within 5 hours from the time of injury, seconded by 16% cases in 10 hours.
Associated injuries are seen in 16 cases out of 44 patients. Extremity injuries account for the highest being 50%.

| Associated injury       | No. of Patients | Percentage |
|-------------------------|-----------------|------------|
| Head & neck             | 5               | 31         |
| Chest                   | 3               | 19         |
| Extremities             | 8               | 50         |
| **Total**               | **16**          | **100**    |

Table 5: Associated Injuries

Associated injury is seen in 16 cases out of 44 patients. Extremity injuries account for the highest being 50%.
The common site of injury is left lumbar region accounting for 20%, seconded by left hypochondrium, right lumbar region 14% each.

All the patients with penetrating abdominal injuries underwent LWE for detection of peritoneal penetration. Wounds with evisceration of omentum, bowels were considered as positive peritoneal penetration and explored. Out of 44 patients 38 cases 86% had peritoneal penetration and 6 cases 14% did not had a breach in the peritoneum.
INDICATIONS FOR LAPAROTOMY

Of 44 patients, 38 cases presented with peritoneal penetration including evisceration. 10 cases 33% had signs of peritonitis and 9 cases 30% were taken up for surgery due to presence of evisceration. Only 11 out of remaining cases 37% with breach in peritoneum were taken up for surgery. The remaining 8 cases with breach were managed conservatively as they were stable on observation for 3 days.

Of 44 cases, abdominal plain X-ray erect posture was taken in all cases. Abdominal findings such as gas under diaphragm, generalized ileus, ground glass appearance, soft tissue abnormalities were noted in 29 cases 66%. In the remaining 15 cases 34%, X-ray findings were normal.
Out of 44 patients 30 cases 68% underwent exploratory laparotomy, of which it was therapeutic in 27 cases 61% and negative in 3 cases 7%. 14 cases 32% were managed conservatively.

| Role of laparotomy | No of patients | Percentage |
|--------------------|----------------|------------|
| Therapeutic        | 27             | 61         |
| Negative           | 3              | 7          |
| Conservative       | 14             | 32         |
| **Total**          | **44**         | **100**    |

Table 10: Role of Laparotomy

|   | No. of Patients | Percentage |
|---|----------------|------------|
| Operated | 30             | 68         |
| Conservative | 14             | 32         |
| **Total** | **44**         | **100**    |

Table 11: Ratio Of Laparotomy To Conservative Treatment
After a detailed clinical evaluation and suitable investigation, 30 (68%) out of 44 patients with peritoneal penetration with indications for laparotomy underwent exploration. Remaining 14 (32%) cases in which 8 (18%) had only peritoneal breach but no indications for exploration and 6 (14%) cases in which there was no peritoneal breach were kept under observation and managed successfully.

| Evisceration                | No of patients | Percentage |
|-----------------------------|----------------|------------|
| Omentum                     | 5              | 11         |
| Bowel with omentum          | 4              | 9          |
| Nothing                     | 35             | 80         |
| **Total**                   | **44**         | **100**    |

Table No: 12 Role of Evisceration

In the present study 44 cases, 5 cases 11% had evisceration of omentum, 4 cases 9% had bowel and omentum. In remaining 35 cases 80% there was no evisceration. All the 9 cases with evisceration were taken up for surgery. Omental evisceration is related more to the patient than the presence of significant internal injury.
In the present study, small bowel involvement is highest 12 cases 27% followed by mesocolon rent in 9%, liver laceration in 3 cases 7%, colon injury in 2 cases 5%. Everything was normal in 17 cases 38%. Thus hollow viscus injury is more common in penetrating injuries with small bowel being common organ affected. Six patients had multiple injuries. Negative laparotomy is seen in 3 cases 7%, with only bleed in the peritoneal cavity without significant internal organ injury.
Diaphragm rent was closed in 1 case; GJ was done for duodenal tear, resection & anastomosis for Jejunal tears in 2 and 1 case of ileal tear, primary closure was done in 4 of Jejunal and 3 cases of ileal tears. Ileostomy in a case, serosal tear repair in 2 cases of colon injury, gell foam application in 3 cases of liver laceration, splenectomy in a case, tears in omentum, mesentery and mesocolon closure in 6 cases. Negative laparotomy in 3 cases and secondary closure of stab wound in 14 cases was done.

| Organ      | Procedures Done          | No. | Percent |
|------------|--------------------------|-----|---------|
| Ileum      | Resection & anastomosis  | 1   | 2       |
|            | Primary closure          | 3   | 7       |
| Colon      | Serosal tear repair      | 2   | 5       |
| Liver      | Gell foam tamponade      | 3   | 7       |
| Spleen     | Splenectomy              | 1   | 2       |
| Mesentery  | Rent closure             | 2   | 5       |
| Omentum    | Repair                   | 2   | 5       |
| Mesocolon  | Rent closure             | 4   | 9       |
|            | Negative                 | 3   | 7       |
| Secondary closure |                   | 14  | 31      |

Table 14: Operative Procedures Done

Table 15: Post-Operative Complications

| Complications     | No of patients | Percentage |
|-------------------|----------------|------------|
| Respiratory system| 5              | 11         |
| Wound infection   | 7              | 16         |
| Normal            | 32             | 73         |
| **Total**         | **44**         | **100**    |
In the present study, wound infection is the commonest complication. There are 7 cases 16% of wound infection among 44 cases following trauma to small bowel. Respiratory infection is seen in 5 cases 11%. The duration of stay was from 3-20 days. There was no mortality in the intra operative and post-operative period due to adequate resuscitation and care.

**DISCUSSION:**

In the present study 50% of patients belong to 31-50 years followed by 21-30 years with 23%. Nance FC et al. 1974 study people in age group of 21-30 years were commonly affected with 45%. In Nagy K et al. 1999 study, majority of patients with penetrating trauma were in 20-35 years age group.

| Age     | No of patients | Nance FC et al 1974 |
|---------|----------------|---------------------|
| 13-20   | 5              | 5                   |
| 21-30   | 10             | 45                  |
| 31-40   | 11             | 19                  |
| 41-50   | 11             | 15                  |
| 51-60   | 3              | 8                   |
| >60     | 4              | 8                   |
| **TOTAL** | **44**         | **100**             |

Table 16: Age Incidence

| Gender | Present study | Nance FC et al 1974 | Leppaniemi AK et al 1999 |
|--------|---------------|---------------------|--------------------------|
| Male   | 35            | 85                  | 87                       |
| Female | 9             | 15                  | 13                       |
| **Total** | **44**     | **100**             | **100**                  |

Table 17: Sex Incidence
In the present study of the 44 cases, 35 were male 80% and 9 were female 20%. In Nagy K et al., 4 1999 88% cases were male and 12% were female. In Nance FC et al.,3 1974 male comprised 85% cases and female 15% of cases. In Leppaniemi AK et al.,5 1999 87% were male and 13% were females.

| Present study | Nance FC et al3 1974 |
|---------------|----------------------|
| Homicide      | 23                   |
| Suicide       | 3                    |
| Bull gore     | 5                    |
| Fall on sharp objects | 13 |

**Table 18: Modes Of Penetrating Abdominal Injuries**

The commonest mode of penetrating abdominal injury in our study was stabs, of which homicidal stabs was 23(52%) and suicidal stab was 3(7%), total of 26. This is followed by bull gore injury in 5(11%) and fall on sharp objects in 13(30%) cases.

Nance FC et al.,3 1974 study, stabs to abdomen accounted to 53% of all penetrating injuries while gunshot wound accounting to remaining 47%.

The difference is because the reference study was carried out in an urban center and possession of guns and fire arms was common in the study population.

Most of the cases coming to our hospital are from low socio economic background and from rural areas, where weapons like knife, sickle and axe are commonly used for house hold activities and are easily available. Also cattle are part of livelihood used for ploughing the fields and for transportation and account for bull gore injury.

| No. of Hours | Present Study |
|--------------|---------------|
| 1-5hrs       | 36            |
| 5-10hrs      | 7             |
| 10-15hrs     | 1             |
| >15hrs       | 1             |

**Table 19: Latent Period**

Most of the patients, 36 (82%) in our study were operated within 1-5hours of injury, which correlates well with Allen B.R. series6. Injuries managed soon after the insult has less morbidity than when treatment is postponed. In our study those who were treated within 5 hours, the complication rate was less and that treated after 5 hours was more. Nance FC et al 3 1974, in a study of selective management of abdominal stab wounds reported 49% complication rate in those operated less than 6 hours and 50% complicate in those with a delay exceeding 6 hours.
In our study, the extra abdominal injuries were present in 16 cases, accounting to 36%, in which extremities was commonest. But in Nance FC et al., 1974 chest injury was 42% and head injury 32%. Extra abdominal injuries are also to be given equal importance and should be managed along with the abdominal injuries on priority basis.

In our series, 64% injuries were inflicted in upper abdomen and in Crech et al 1962 75% wounds occur in the upper abdomen.

In present study, peritoneal penetration was noted in 38 cases 86%. In Nance FC et al 1974 also peritoneal penetration was noted in 82% of stab wounds to abdomen.

In the present study X-ray was abnormal in 15 (34%) cases of penetrating abdominal trauma in contrast with Kester et al., 1986 where 8% cases had abnormal X-ray. So this shows that abdominal radiography was unreliable in the diagnosis of penetrating abdominal trauma.
Indications | Present Study
--- | ---
Peritoneal penetration | 11
Peritonitis | 10
Evisceration | 9

Table No: 24 Indications For Laparotomy

In present study, peritoneal penetration, generalized peritonitis and evisceration were prime indicators for exploratory laparotomy. In 11 (37%) cases, peritoneal penetration was noted. In Leppaniemi AK et al., 1999 peritoneal penetration was present in 72% cases. The difference can be explained by the fact that in 6% cases in reference study, the peritoneal penetration was undetermined.

In another study Nagy K et al., 1999 evisceration constituted 73% of cases and was the indication for laparotomy. In our study omentum and bowel evisceration occurred in 9 (30%) cases.

10 % cases presented with generalized peritonitis. In a study by Nagy K et al., 1999 generalized peritonitis was present in 10 (33%) cases. In present study, hemodynamically unstable cases were excluded. In Nagy K et al., 1999 9% patients were in shock

| Present study | Leppaniemi AK et al., 1999 |
|---|---|
| Operated | 30 | 68 |
| Conservative | 14 | 32 |
| Total | 44 | 100 |

Table 25: Ratio Of Laparotomy To Conservative Treatment

In present study, 30 (68%) cases of penetrating abdominal injury underwent exploratory laparotomy. In Leppaniemi AK et al., 1999 the number of operated cases constituted 68%. Similarly in Nance FC et al 1974 75% of cases underwent laparotomy.

| Role of laparotomy | Present study | Nance fc et al 1974 |
|---|---|---|
| Therapeutic | 27 | 78% |
| Negative | 3 | 22% |

Table 26: Role Of Laparotomy

In the present study the laparotomy was therapeutic in 27 (61%) cases and in remaining 3 (7%) it was negative. In Nance FC et al., 1974 in 78% of cases the laparotomy was therapeutic. Even in Nagy K et al., 1999 78% of all cases required laparotomy for repair of intra-abdominal injury.

| Evisceration | Present study | Nagy K et al 1999 |
|---|---|---|
| Omentum | 5 | 75% |
| Bowel with omentum | 4 | 25% |
| Nothing | 35 | |

Table 27: Incidence Of Evisceration
Omental evisceration indicates peritoneal penetration and in some studies it was associated with serious abdominal injuries in up to 75% of cases. In another study patients with omental protrusion were managed without operation without any complications. Omental evisceration is probably related more to the size and location of the penetrating wound and the omental anatomy in an individual patient than to the presence of significant internal injury. In the present study omental evisceration was present in 5 (11%) of cases and in Nagy K et al, 1999 where 75% of cases had omental protrusion.

| Peritoneal penetration | Total | Therapeutic laparotomy | Conservative/negative |
|------------------------|-------|------------------------|-----------------------|
| Present                | 38    | 27                     | 11                    |
| Absent                 | 6     | 0                      | 6                     |
| Total                  | 44    | 27                     | 17                    |

Table 28: Significance Of Peritoneal Penetration On LwE

As per above data the positive predictive value for peritoneal penetration is 0.71, in Leppaniemi AK et al, 1999 where the positive predictive value was 0.6. Negative predictive value is 1. The difference in PPV is due to the difference in the size of study population.

| Evisceration | Total | Therapeutic | Conservative/negative |
|--------------|-------|-------------|-----------------------|
| Present      | 9     | 9           | 0                     |
| Absent       | 35    | 18          | 17                    |
| Total        | 44    | 27          | 17                    |

Table 29: Significance Of Omental & Or Bowel Evisceration

As per the data the positive predictive value for omental or & bowel evisceration in the present study is 1. In Leppaniemi AK et al, 1999 the PPV for omental evisceration is 0.65.

| Organs             | Present Study | Leppaniemi AK et al, 1999 | Nance FC et al, 1974 |
|--------------------|---------------|---------------------------|----------------------|
| Stomach            | 12            | 8                         | 13                   |
| Small bowel        | 2             | 15                        | 29                   |
| Large bowel        | 2             | 9                         | 6                    |
| Liver              | 3             | 22                        | 30                   |
| Spleen             | 1             | 4                         | 4                    |
| Gall bladder       |               |                           | 2                    |
| Mesentery & mesocolon | 6          | 14                        | 8                    |
| Omental            | 2             |                           |                      |
| Diaphragm          | 1             |                           | 11                   |

Table 30: Organs Injured

Hallow viscus injuries are more frequent in patients with penetrating abdominal trauma. In Nance FC et al., 1974 study liver and small bowel are the commonest organs to be injured. The other series of studies Feliciano DV et al., Lowe RJ et al, gunshot wounds to abdomen commonly cause injury to small bowel, colon and liver.
In the present study, most frequent complication is wound infection accounting for 16%. There were no cases of intra-abdominal sepsis, fecal fistulas, wound dehiscence. In Ivatury RR et al.11 1988 17% of the colonic trauma cases developed intra-abdominal sepsis. In Croce MA et al.,12 1992 intra-abdominal sepsis developed in 5 to 20% of cases after penetrating stomach and small bowel injury.

| Complications         | No of patients | Percentage |
|-----------------------|----------------|------------|
| Respiratory system    | 5              | 11         |
| Wound infection       | 7              | 16         |
| **Table 31: Post-Operative Complications** |

In the present study, duration of stay of patients in the hospital ranged from 3 to 30 days with an average of 10 days. In Leppaniemi AK et al.,5 1999 the duration of stay ranged from 1–38 days with an average of 6 days. In Nance FC et al.3 1974 mortality rate is 1.4%.

**SUMMARY:** The prospective study of 44 cases of stab wounds and other penetrating injuries to the abdomen, in S.V.R.R. Government General Hospital, Tirupati can be summarized as follows. Maximum number of cases 50% was in the age group of 31-50; Males comprised 80% of the study.

Stab injury to the abdomen accounts for 59% of the cases of penetrating abdominal trauma, homicidal more than suicidal; extremities are commonly involved. Left lumbar region is most common site of insult indicating assailants to be right handed.

Peritoneal penetration was present in 86% patients. Radiographs were abnormal only in 34% cases. 82% were operated within hours of injury. 68% cases underwent exploratory laparotomy.

Common organ injured is small bowel. Laparotomy is therapeutic in 61% of cases. PPV for peritoneal penetration is 0.71 and for evisceration is 1.

None of the conservative group needed delayed laparotomy. 27% developed post op complications. Wound infection is common post-operative complication. Average duration of stay is around 10 days. Mortality is not seen.

**CONCLUSION:** Penetrating abdominal injury is one of the common surgical emergencies. Productive middle age male between 31 -50 age groups are predominantly affected. The patients affected are from LSE status. The commonest mode of injury is by stab wounds to abdomen. Hence measures taken for the care of patients at the trauma site and establishing well equipped...
trauma care centers at least at every district hospital will go a long way in preventing morbidity and mortality in these unfortunate victims.

Careful and repeated clinical examination and appropriate diagnostic investigations lead to successful treatment. Majority of the patients with peritonitis, evisceration of bowel and omentum, peritoneal penetration with collection in the peritoneum need laparotomy but this was a poor indicator for significant intra-abdominal trauma.

Evaluation of the patient with DPL, CT, FAST will help in reducing the rates of negative laparotomy. Radiographs are unreliable completely to predict intra-abdominal injury. All patients with evisceration underwent therapeutic laparotomy. Peritoneal penetration is seen in majority of the cases. Small bowel is the most common organ injured. Management depends on duration, number and size of the insult.

Post-operative complications are minimal though done in emergency and mortality is nil due to adequate resuscitation and appropriate timely management.
FIGURE NO 11: ASSOCIATED NECK LACERATION

FIGURE NO 12: STAB INJURY OVER RT HYPOCHONDRIUM

FIGURE NO 13: ILEAL PERFORATION

FIGURE NO 14: ILEAL PERFORATION PRIMARY CLOSURE

FIGURE NO 15: MULTIPLE JEJUNAL PERFORATIONS

FIGURE NO 16: MULTIPLE JEJUNAL PERFORATIONS PRIMARY CLOSURE
BIBLIOGRAPHY:

1. Shaftan GW. Indications for operation in abdominal trauma Am J Surg 1960; 99: 657-664.
2. Cayten CG, Nassoura ZE. Abdomen. In: Evatury RR, Cayten CG, editors. Penetrating trauma. Philadelphia: Williams and Wilkins, 1996; pp 281-299.
3. Nance FC et al. Surgical judgement in the management of penetrating wounds of abdomen: experience with 2212 cases. Ann Surg 1974; 179: 639-646.
4. Nagy K et al. Eviseratio n after abdominal stab wounds. Is laparotomy required? J Trauma 1999.
5. Leppaniemi AK,Voutilainen PE, Haapiainen RK. Indications for early mandatory laparotomy in the abdominal stab wounds. Br J Surg 1999; 76-80.
6. Allen Robert B, George J Cuny – Abdominal trauma. Study of 297 consecutive cases. Am J Surg 1981; 937: 398-404.
7. Moss Lk, Crech et al. Analysis of 550 stab wounds of abdomen. New Orleans Los Angeles, 1962; 28: 483-489.
8. Kester DE, Andrassy RJ, Aust JB. The value and cost effectiveness of abdominal roentgenograms in the evaluation of stab wounds to the abdomen. Surg, Gynecol Obstet 1986; 162: 337.
9. Feliciano DV et al Management of traumatic injuries to extrahepatic biliary ducts. Am J Surg 1985; 150: 705.
10. Lowe RJ et al. The negative laparotomy for abdominal trauma J trauma 1972; 12: 853.
11. Sherman R. perspectives in management of trauma to the spleen. J trauma 1980; 20: 1.
12. Croce MA et al. Correlation of abdominal trauma index and injury severity score with abdominal septic complications in penetrating and blunt trauma. J trauma 1992; 32: 380.

AUTHORS:
1. B. Sobha Rani
2. K. Lokesh
3. K. V. Madhusudhan
4. Y. Mahesh babu

PARTICULARS OF CONTRIBUTORS:
1. Professor Incharge, Department of General Surgery, S. V. Medical College.
2. Post Graduate, Department of General Surgery, S. V. Medical College.
3. Post Graduate, Department of General Surgery, S. V. Medical College.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. B. Sobha Rani,
1ST Floor, 5-5-330,
Reservoir Road,
Tirupathi-517501.
E-mail: drsobhanibathena1312@gmail.com

Date of Submission: 16/09/2015.
Date of Peer Review: 19/09/2015.
Date of Acceptance: 21/09/2015.
Date of Publishing: 26/09/2015.