



Effectiveness of laparoscopy in management of patients with penetrating and blunt abdominal trauma.

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ABSTRACT... Objectives: To study the role of laparoscopy in reducing the incidence of non-therapeutic Laparotomies in abdominal trauma, and management of penetrating (PAT) and blunt (BAT) abdominal trauma. **Study Design:** Prospective Experimental study. **Setting:** Department of Surgery DHQ Hospital Rawalpindi. **Period:** January 2018 to June 2018. **Material & Methods:** All Patients (n=50) were admitted through emergency and were allocated to one of two groups Laparoscopy or Laparotomy group (25 in each) by lottery method according to the inclusion criteria of haemodynamically stable patients with systolic BP > 90 mm of Hg. Patients in the Laparotomy group were managed according to the conventional protocol and decision of laparoscopy was based on clinical examination, imaging and laboratory investigations. Where as in Laparoscopy group after clinical examination and chemical laboratory reports diagnostic laparoscopy (screening tool) was done to identify injuries and decide whether patient needs laparotomy or not. Forward viewing 0 degree 10 mm laparoscope was used in all the cases following standard protocols for laparoscopy. Data analysis was done by SPSS 20. P-Value was set at 0.05. **Results:** Out of total 50 selected haemodynamically stable abdominal trauma patients (n=50) there were 77% males and 23% females. Average age of the patients was 37 years. Overall out of total of 50 patients 30 (60%) patients presented with PAT and 20 (40%) patients presented with BAT. Diagnostic laparoscopy was able to identify abdominal injuries in 96% (24 out of 25) patients. There were no missed injuries in both groups. Similarly there were no non-therapeutic laparotomies in Laparoscopy group where as in Laparotomy group 6 (24%) non-therapeutic laparotomies were done. **Conclusion:** Laparoscopy reduces the incidence of non-therapeutic laparotomies and missed injuries. It correctly identifies the injuries depending upon the experience of surgeon in selected stable trauma patients.

Key words: Blunt, Laparoscopy, Non-Therapeutic, Penetrating, Trauma.

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INTRODUCTION

Use of laparoscopy in abdominal trauma is being evaluated all over the world however it is used more commonly in penetrating trauma. It is also beneficial in blunt abdominal trauma. Being minimal invasive procedure it is less traumatic to the patient and patients recover early thus reducing hospital stay and management cost. Image on the monitor is magnified which helps in identifying intraperitoneal injuries (screening tool) thus significantly reducing incidence of non-therapeutic laparotomies. This in turn reduces complications of unnecessary laparotomies but selected patients should undergo laparoscopy as its application in trauma setting is still under trial and data is being collected all over the world.

Both diagnostic and therapeutic laparoscopies are being used in trauma setting for dealing with abdominal and thoracic trauma. This study mainly focuses on role of Diagnostic laparoscopy in both PAT and BAT. Therapeutic laparoscopy requires specialized skill to deal with the injuries found similarly diagnostic laparoscopy has a specific learning curve and sufficient experience is needed to identify the injuries. There are number of diagnostic modalities available for abdominal trauma e.g DPL, CT Scan, clinical and wound examination, sonogram for peritoneal breach, RBC Count, Hb% estimation, abdominal paracentesis and abdominal fluid analysis. All have their limitations and advantages e.g DPL is very sensitive and specific especially when

combined with abdominal fluid analysis but it is not possible to assess the retroperitoneum and source of bleeding in the peritoneal cavity by DPL. Despite the availability of so many diagnostic modalities incidence of non-therapeutic laparotomies is still high. Incidence ranging from 5% to 33% has been reported in literature.¹ Here comes the role of laparoscopy especially it's diagnostic aspect. As it is a minimal invasive technique it can be used to assess the injury in abdomen for its location, severity in selected haemodynamically stable cases and to treat them depending upon the expertise available thus reducing the hospital stay, management cost and unnecessary laparotomies significantly. Patients dealt with laparoscopically have low incidence of adhesional intestinal obstruction. Importance of laparoscopy has been emphasized in penetrating injuries where the protocol of always exploring the abdominal cavity is usually followed as it can be used to see from inside whether peritoneum is entered or not and proceed accordingly.

There are many benefits of laparoscopy in blunt abdominal trauma also where non operative management (NOM) in stable patients is often done and one needs some adjunct diagnostic modality to continue NOM safely e.g it can be of paramount help in comatose patients (But it should be used with caution in severe head injury because CO₂ insufflation can lead to rise in ICP) and in those with bony injuries as in such patients it is not possible to elicit clinical signs. However there are limitations of laparoscopy e.g its inability to evaluate retroperitoneum and entire bowl properly, difficulty in viewing spleen due its deeper position in left hypochondrium. Finally there are some complications associated with laparoscopy e.g Intra-abdominal pressure above 20mmHg due to CO₂ insufflation can reduce cardiac output which is dangerous in hypovolumic patients.² To avoid this complication concept of gasless laparoscopy has emerged.

OBJECTIVES

1. To study the role of laparoscopy in reducing the incidence of non-therapeutic Laparotomies in abdominal trauma.
2. To study the role of laparoscopy in

management of penetrating (PAT) and blunt (BAT) abdominal trauma.

MATERIAL & METHODS

A Prospective Experimental study. This study was conducted in Department of Surgery DHQ Hospital Rawalpindi. This study was conducted from 1st January 2018 to 30th June 2018 over a period of six months. Total of 50 (n=50) patients were included in the study calculated by WHO calculator formula. Probability randomized sampling by lottery method was used in this study. All haemodynamically stable (Systolic BP>90mmHg) abdominal trauma (Both PAT and BAT) patients were included in the study. All patients in which laparoscopy is contraindicated e.g cardiac patients, allergy to CO₂, collagen vascular disease, pregnant females and serious head injury were excluded.

All Patients were admitted through emergency and were allocated to one of the two groups, Laparoscopy or Laparotomy group by lottery method according to the inclusion criteria. Patients in the Laparotomy group were managed according to the conventional protocol and decision of laparotomy was based on clinical examination and investigations like serial Hb estimation, CT scan, Fast Ultrasound and sometimes DPL. Where as in Laparoscopy group after clinical examination and laboratory investigations diagnostic laparoscopy was done to identify injuries and decide whether patient needs laparotomy or not. Forward viewing 0 degree 10 mm laparoscope was used in all the cases following standard protocols for laparoscopy. Infraumbilical 10 mm port for telescope was inserted by smiley incision. Another 10 mm port was inserted in epigastrium. Two 5 mm working ports were inserted in pararectal position at the level of umbilicus. Data was recorded on a pre-designed performa. Laparoscopy was done by different surgeons on duty, trained in laparoscopic surgery.

RESULTS

A total of 50 (n=50) selected haemodynamically stable abdominal trauma patients were included in the study. Patients were of both PAT

(Penetrating Abdominal Trauma) and BAT (Blunt Abdominal Trauma) category. Overall there were 77% males and 23% females. Average age of the patients was 37 years. Injury severity score of patients in two groups was nearly similar. In Laparoscopy group first Diagnostic Laparoscopy was done to identify the injury and accordingly proceed to open laparotomy if major intervention was required or deal with it laparoscopically if minor intervention was required (Therapeutic Laparoscopy). Overall out of total of 50 patients 30 (60%) patients presented with PAT and 20 (40%) patients presented with BAT. So in Laparoscopy group 14 (56%) patients were with penetrating trauma and 11 (46%) patients were with blunt trauma where as in Laparotomy group 16(64%) patients were with penetrating trauma and 9(36%) patients were with blunt abdominal trauma. Similarly overall most commonly injured organ was small gut in 22% cases followed by large gut in 18% cases, liver in 10%, spleen in 14% and mesentery in 6% cases. Few simple therapeutic procedures electric cauterization of a bleeding point in omentum, irrigation of peritoneal cavity and placement of drain were also done laparoscopically.

Diagnostic laparoscopy was able to identify abdominal injuries in 96% (24 out of 25) patients where as in one patient of blunt abdominal trauma there was 250ml of blood in pelvis and retroperitoneal haematoma of zone 3 was seen

but source of bleeding could not be identified that turned out to be torn teticular vein by pelvic fracture on open laparotomy. Inspection of spleen was most difficult part of the procedure which was done in trendelenburgs position and in most of the cases all the surfaces of spleen were not visualized completely but whenever blood was seen in its vicinity and near splenic flexure of colon injured spleen was confirmed on open laparotomy as described in literature. There were no missed injuries in both groups. Similarly there were no non-therapeutic laparotomies in Laparoscopy group where as in Laparotomy group 6 (24%) non therapeutic laparotomies were done.

NO. OF PATIENTS HAVING SPECIFIC INJURED ORGAN.

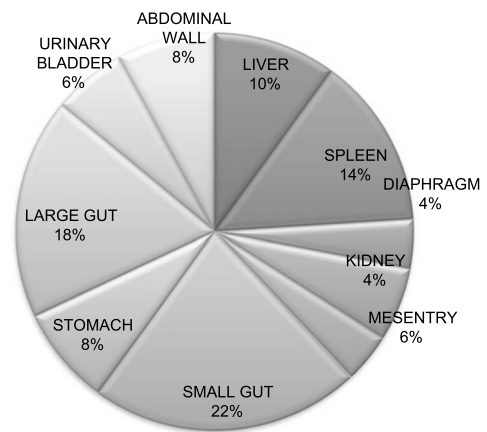


Figure-1. Overall pattern of injuries.

Type of Trauma	Laparoscopy Group (n=25)	Laparotomy Group (n=25)
Penetrating abdominal trauma (PAT)	14 (56%)	16 (64%)
Gunshot Wound	8 (32%)	9 (36%)
Stab Wound	6 (24%)	7 (28%)
Blunt abdominal trauma (BAT)	11 (46%)	9 (36%)
Profession related injury.	1 (4%)	0(0)
Fall from height	4 (16%)	3 (12%)
Social violence	1 (4%)	1 (4%)
RTA	5 (20%)	5 (20%)

Table-I. Types of trauma.

Overall (n=50) PAT was 30 (60%) and BAT was 20 (40%).

Parameter	Laparoscopy Group (N=25)	Laparotomy Group (N=25)	P-Value
Number of patients in which injuries were correctly Identified.	24 (96%)	25(100%)	1.02
Missed injuries.	0(0)	0(0)	0.00
Number of Non-Therapeutic Laparotmies.	0(0)	6 (24%)	6.82

Table-II. Parameters studied from two groups.

DISCUSSION

This study mainly focuses on role of diagnostic laparoscopy in both penetrating and blunt abdominal trauma and to find out what benefit of its therapeutic aspect can be taken keeping in view our limited resources and expertise of trauma surgeons. Traditionally Penetrating injuries of abdomen are managed by early surgery, a concept given by Bowers³ saying "With penetrating abdominal wounds the question is not if we should operate but when". On the other extreme Shaftan et al⁴ framed the observant and expectant criteria of managing abdominal trauma. Of course balance has to be kept between the two extremes. Velmahos et al mention in their study that patients should be selected for NOM (Non operative management) and clinical examination is a safe method for this selection. Observation period of 24 hours is enough for those abdominal trauma patients who have no abdominal symptoms. Although the standard of care in haemodynamically unstable patients (systolic BP < 90mmHg-According to ATLS Principles)⁵ is early laparotomy but in stable patients observant management is usually done by using different diagnostic aids e.g FAST Ultrasound, C.T Scan to make this observation period safe for the patient. According to Victor Justin et al⁶ this NOM (Non Operative Management) has acceptable results in solid organ injuries but injuries involving Hollow viscus, mesentery and diaphragm are not suitable for this approach and require early surgical intervention. In this scenario role of laparoscopy with its both diagnostic and therapeutic aspects becomes more valuable in maintaining the balance between the two extreme approaches as if the diagnostic laparoscopy comes out to be negative it will reduce non therapeutic laparotomies but again the adequate expertise is the key factor and in experienced hands laparoscopy using its diagnostic and therapeutic potential can be of enormous help to the patient. The study conducted by Yehya B.A also supports this study saying that laparoscopy is an excellent tool in haemodynamically stable patients to identify peritoneal breach and diaphragmatic injuries.⁷ He also declares laparoscopy an efficient, cost effective and safe tool with little complications. However he stresses the need for further clinical

trials in this regard.

According to Tammy Kindel et al⁸ laparoscopy is a valuable diagnostic and therapeutic tool for surgeons dealing with trauma because it has advantage of being minimal invasive added with early post operative recovery and easy wound care which in context of day by day increasing number of diagnostic and therapeutic options available to surgeon, has an incentive for him to use it in selected haemodynamically stable patients of PAT. Furthermore he says that "laparoscopy has its own unique complication profile". These complications must be timely identified and managed to gain full benefits of laparoscopy. Similarly SN Zafar⁹ Applauds the therapeutic role of laparoscopy in producing better outcomes in trauma scenarios. Where the problem of limited expertise exists or due to some other technical reason full advantage of therapeutic potential of laparoscopy cannot be taken laparoscopic assisted approach (LAA) is the answer. Modies Z.Koto¹⁰ states in his study that LAA is underutilized for PAT patients and it can be used as a both diagnostic and therapeutic tool in stable patients because it has the benefit of being minimal invasive as well having versatility of an open surgery. Christopher K. Salvino¹¹ did a different study and compared the results of DPL with Diagnostic laparoscopy and reported that "DL has no advantage over DPL as a primary assessment tool in blunt trauma" but he accepts the advantage of diagnostic laparoscopy in management of stab wounds of abdomen. He further confirms the role of diagnostic laparoscopy in redefining the criteria of DPL using it as an adjunct to it in selected cases. Importantly his study proves the role of therapeutic laparoscopy in avoiding the unnecessary laparotomies. Renz et al² in his research work concludes that complications of unnecessary laparotomies are source of morbidity in trauma patients.

Complications occurred in 19.7% of 81 patients with negative laparotomy. He appreciates the current efforts as by the use of laparoscopy, to reduce the incidence of non-therapeutic laparotomies thus supporting the present study which is actually an effort to establish the

effectiveness of laparoscopy in eliminating the occurrence of unnecessary laparotomies with their complications and morbidity. In his another study M.Z.Koto and F.Mosai et al¹² declare laparoscopy a safe procedure in selected patients but multiple injuries make it a difficult procedure which requires advance skills so conversion rate to open procedure becomes high in such cases. However he claims that negative laparotomies were completely eliminated by using laparoscopy in his study. Matsevych et al¹³ in his research paper goes even one step ahead by declaring laparoscopy a feasible option in PAT patients with organ evisceration and associated intra-abdominal injuries. He reports that laparoscopy accurately identifies the injuries and effectively avoids negative laparotomies so confirms the results of this study. Teo Li Tserng¹⁴ in a recent study published in 2017 reports his work of using laparoscopic approach for the management of penetrating diaphragmatic injury. He documents in his study that laparotomy or thoracotomy is the standard treatment for thoracoabdominal trauma which has nontherapeutic rate of 12-40% and also has 40% morbidity. He terms laparoscopy a promising and safe approach compared to traditional laparotomy in selected patients in penetrating diaphragmatic injuries. Lim KH¹⁵ shared his recent experience of laparoscopic management of abdominal trauma patients over a period of 7 years. His results show that laparoscopic surgery can be performed safely in selected stable patients of PAT and BAT with the advantage of short hospital stay, fast postoperative recovery with less pain and low morbidity. Choi et al.¹⁶ has described a systematic method of examination of abdominal cavity during diagnostic laparoscopy which is very effective in identifying the injuries and eliminating the incidence of negative laparotomies.

CONCLUSION

This study concludes that laparoscopy definitely reduces the incidence of non-therapeutic laparotomies and missed injuries with their associated morbidity thus enhancing post-operative recovery and decreasing hospital stay. It correctly identifies the injuries depending upon the experience of surgeon in selected stable

trauma patients.


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