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Prospective Study of Management of Solid Organ Injury in Blunt Trauma Abdomen.

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ABSTRACT

Background: Blunt injury to abdomen is one of the most common injury caused by road traffic accidents. The advent of newer imaging techniques with high resolution computed tomography scanners (CT scan) has enabled the clinicians to exactly diagnose the extent of the intra abdominal injuries. High grade injuries are commonly managed by surgery but the shift to selective non operative management (NOM) of blunt injuries to abdominal solid organs are one of the most notable trends in the case of trauma. **Methods:** This study was conducted on 50 patients of blunt abdominal trauma admitted in Guru Nanak Dev Hospital, attached to Govt. Medical College, Amritsar. Patients of all age groups with blunt trauma abdomen were admitted in hospital. **Results:** In the present study, most common age group affected was 21-40 years (70%); out of which males were more commonly affected (90%); most common mode of injury was road traffic accident accounting for 76% of patients of all age groups. In this study, 2 out of 13 patients expired who were kept on NOM due to liver injuries. Failure to resuscitate these patients was the main cause of mortality. 4 out of 12 operative cases expired. Most common organ injured was liver (50%) followed by spleen (36%). Other organs injured were pancreas and kidney, 6% each. Mortality rate in patients who were receiving NOM was 5.26% while patients who received operative management had mortality rate of 33.3%. **Conclusion:** Morbidity and mortality can be prevented by timely initial resuscitation and correct diagnosis as well as management (non operative or operative) which depends on patient's hemodynamic stability and findings of imaging studies.

Keywords: Blunt Abdominal trauma, non operative management, road traffic accidents.

INTRODUCTION

Advancement of technology and revolution has been occurring in South East Asia from past two decades with urbanization and increased motorization high speed vehicles are introduced in society. Due to mass motorization, trauma on roads has considerably increased. Lack of road safeties in India, road side accidents are most common cause of trauma followed by assaults and fall from height.

India is the leading nation in road side accidents as every hour, 13 Indians die in RSA. As per record in 2007,1,14,590 people died in accidents. In India, injury/morbities in RSA expected to use by 150% by 2020.[1]

Trauma is considered harm to body due to exchange of energy with environment which is beyond body's resilience.

Trauma is the commonest cause of deaths in age group of 1-44 years.

In 2006, trauma contributed 5.8 million deaths globaly.[2]

According to WHO, by 2020, trauma will be the leading cause of disability to human life for all developed and developing nations.

Road side accidents alone account approx. 83.5% of abdominal trauma, which includes motor vehicle and motor cycles.[3]

The second most common cause of traumatic death worldwide is the fall from height. An estimate of 424,000 individuals die from falls annually of which over 80% are in low- and middle-income countries; worldwide. The largest morbidity occurs in people aged 65years or older, young adults aged 15-29 years and children aged 15 years or younger.[4]

Intra-abdominal injury incidence is high 12-15% making doubtful diagnosis of patients who were unstable leading to urgent laprotomies. Main goal

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for a surgeon is to make accurate diagnosis and avoid unnecessary laparotomies in blunt trauma cases. Most common organs injured in blunt trauma are spleen and liver.

Patients are categorized into hemodynamically stable and unstable category depending upon their vitals. Hemodynamics unstable, patients required immediate assessment, resuscitation and imaging modality like X-ray, USG whole abdomen, FAST (focused assessment by sonography of trauma).

Blunt trauma patients have high mortality because of variety of intraabdominal injury. Some of them present late after admission.[5]

CT scan is done for stable patients. The accuracy of CT scan in finding the intraabdominal injury is high. It has sensitivity of 92%-97.6% and specificity of 98.6%. Diagnostic peritoneal lavage is also considered very sensitive but it does not detect the source of hemoperitoneum, to detect the source of retroperitoneal injury. CT scan is considered better.[6]

In blunt abdominal trauma, non operative management is treatment of choice in most of the patients (50%). This includes injury to liver, kidneys and spleen.[7]

Non operative management is also considered in splenic injuries also.

In a study of 190 patients, 102 (54%) of them were managed conservatively or with non operative management. 56 patients underwent splenectomy (29%), 32 patients underwent spleenoraphy (17%).[8]

Non operative management is considered in spleen injury patients till patient is hemodynamically stable. In unstable patients, regardless of grade of injury, splenectomy is the treatment of choice.[9]

Non operative management in hemodynamically stable patient is considered better now a days in solid organ injury.

Careful monitoring of patient is required, if clinical signs of a patient are deteriorating. Then only laparotomy is considered.[10]

Liver injuries have better outcome on non operative management than splenic injuries and patients usually require blood transfusion and fluid management.[11]

AIMS AND OBJECTIVES

- To study the criteria for initiation of non-operative management in cases of Blunt trauma abdomen including the clinical, laboratory and radiological findings attributing to the same.
- To study the course of illness during the implication of the non-operative management.
- To study the outcome of non-operative management in the cases in terms of morbidity, mortality, and conversion ratio into operative management.

MATERIALS AND METHODS

The study was conducted on 50 patients of blunt trauma abdomen admitted in Guru Nanak Dev Hospital Amritsar,affiliated to Government Medical College Amritsar during January 2017 to November 2018.

Inclusion Criteria

All patients with blunt abdominal trauma involving solid organ injury.

Exclusion Criteria

All patients with penetrating trauma to abdomen, hollow viscous injury and severe head injury (GCS<8).

Selection of cases was done as above and study was conducted based on following points:

1. Detailed clinical history was recorded including age, sex, symptoms, mode of injury, associated injuries, external bleeding and mental status.
2. Thorough physical examination was carried out to assess hemodynamically stability, vital signs,systemic examination,severity of injury and other associated injuries.

RESULTS

In a study of 50 cases of blunt abdominal trauma, following observations were recorded.

Table 1: Distribution Of Patients According To Age

Age group (years)	Frequency	Percentage
<20	4	8
21-40	35	70
41- 60	9	18
>60	2	4
Total	50	100

[Table 1] suggests: The patients most commonly afflicted were young adults in the age group of 21-40 years, forming almost 70% of total sample size.

Table 2: Distribution Of Patients According To Gender

Gender	Frequency	Percentage
Male	45	90
Female	5	10
Total	50	100

[Table 2] suggests: Distribution of the patients according to the gender showed that 90% of those affected were males as compared to 10% females which shows clear predilection for male population.

Table 3: Distribution Of Patients According To Aetiology/Mode Of Injury

Gender	Frequency	Percentage
RTA	38	76
FFH	8	16
Alleged assault	4	8
Total	50	100

[Table 3] suggests: The frequency distribution of the aetiology, road traffic accident (RTA) turned out to be the leading cause of trauma forming a large percentage of 76% of the total. Other causes were

fall from height being the second major cause with 19% and alleged assault contributing 5% of the total aetiology.

Table 4: Distribution Of Patients According To Clinical Signs And Symptoms

Sign/ Symptom	Frequency	Percent
Abdominal distension	38	76
Abdominal tenderness	42	92
Pain abdomen	50	100
Guarding	18	36
Haematemesis	4	8
Haematuria	5	10
Pallor	28	56
Obliteration of liver dullness	18	36
Shifting dullness	5	10
Hematoma/ Bruise/ Abrasion	2	4

Table 5: comparison of hb between group a and group b (group a- non operated, group b- operated)

Group	Group A	Group B	95% C.I.		P-value
			Lower	Upper	
Hb Ad	7.54	7.35	0.45	1.52	0.286
Hb 12 Hr	7.52	6.77	0.93	1.61	0.597
Hb 24 Hr	7.72	6.62	-0.46	3.21	0.140
Hb 36 Hr	8.24	6.98	-0.20	3.83	0.077
Hb 48 Hr	8.37	6.86	-0.02	4.66	0.052

[Table 4] suggests: Abdominal pain was found to be the most common presenting symptom of the patients present in 100% of the patients. Second most commonly observed complaint was abdominal tenderness found to be present in 92% of the patients followed by abdominal distension present in 76% of the patients.

[Table 5] suggests that average haemoglobin values were less in the patients who required operative intervention when compared to those who were managed conservatively. Serial haemoglobin evaluations were carried out at 12 hourly intervals. Significant difference was observed between the two groups at 36 and 48 hours with p values 0.077 and 0.052 respectively.

Table 6: Comparison Of PR Between Group A And Group B (Group A- Non Operated, Group B- Operated)

Group	Group A	Group B	95% C.I.		P-value
			Lower	Upper	
PR Ad	132.92	143.33	-19.01	-1.81	0.019
PR 30 min	119.89	140.00	-30.58	-9.62	0.000
PR 2 Hr	111.94	136.25	-35.66	-12.93	0.001
PR 6 Hr	104.13	128.08	-38.08	-9.81	0.001
PR 12 Hr	95.23	101.33	-34.81	20.62	0.671
PR 24 Hr	87.92	103.38	-45.13	14.80	0.314
PR 48 Hr	80.44	104.75	-54.84	6.24	0.116

[Table 6] shows vital monitoring carried at admission and serial intervals thereafter and it was observed that both group A and group B patients had tachycardia at presentation. However tachycardia was significantly more in the patients who required surgical intervention, significant difference were observed between the two groups at 0 min, 30 minutes, 2 hours and 6hours with p values 0.019, 0.00, 0.001, 0.001 respectively.

Table 7: Distribution Of Patients According To Cect Abdomen

Distribution of the patients based on CECT findings.	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Total Frequency	Percentage
Liver	1	4	8	10	2	0	25	50
Spleen	1	5	7	3	2	0	18	36
Pancreas	1	2	0	0	0	0	3	6
Kidney	0	1	1	1	0	0	3	6
Multiple	1	0	0	0	0	0	1	2

Table 8: distribution of patients according to operative procedure performed.

Operative procedure	Frequency	Percentage
Hepatorraphy	5	41.66
Spleenectomy	6	50.00
Nephrectomy	1	8.34

[Table 7] shows; Liver was found to be the most commonly injured organ in 25 patients while spleen was the second most commonly injured organ. Among those with liver injuries 10 patients were found to have grade 4 injury, 8 patients suffered from grade 3 injury while grade 5 injury was present in 2 patients. On the other hand, patients with splenic injury was found to have grade 3 injury forming bulk with 7 patients. While grade 4 and grade 5 injury was found to be present in 3 and 2 patients respectively.

[Table 8] suggests: Out of 50 patients, 12 required operative intervention. Hepatorraphy and spleenectomy were the most commonly performed procedure in 41.66% and 50% of the patients respectively.

Table 9: Comparison Of Mortality Between Group A And Group B

Organ injured in mortality cases	Group A	Group B
Liver	2	3
Spleen	0	1
Kidney	0	0

[Table 9] shows: Comparison of mortality between patients on the basis of non operative management and operative management. This study shows that non operative management has less mortality as compared to operative management.

DISCUSSION

In the present study, we evaluated a total of 50 subjects who sustained blunt abdominal trauma. Out of these, 70% of the patients belonged to the age group of 21 to 40 years with mean age of 34.39 years. Our results are in concordance with the results obtained by Jones et al and Reddy et al who reported a mean age of 36 years and 34.9 years in their study population respectively.

90% of the patients in our study were males while remaining were females. This was found to be consistent with the previous studies conducted by Jones et al and Reddy et al who reported percentage of males in their study to be 79.3% and 68% respectively.[12,13]

The most common cause of the blunt trauma abdomen in the present study was found to be road traffic accidents (RTA) followed by fall from height (FFH) accounting for 76% and 16% of cases respectively. Approximately 72% of cases of blunt abdominal trauma in study conducted by Aziz et al were due to road traffic accidents. This is also in concordance with the results of various other studies which advocate RTA as the major cause of blunt abdominal trauma.[3]

We observed that on clinical examination, abdominal pain was the most common finding present in 100% of the subjects, followed by abdominal tenderness and abdominal distension, which were seen in 92% and 76% of the subjects respectively. Our results are in concordance with the results obtained by Solanki and Patel et al.[2]

Majority of the patients in our study were managed conservatively (76%) with serial physical examinations, laboratory investigation and ultrasound and CECT to avoid unnecessary laparotomy. This is in concordance with the results obtained by Mehta et al who reported that 70% of the patients could be managed conservatively.[14]

Our results are in contrast with the results obtained by Doklestić et al who reported that majority of patients (51.4%) in their study were managed operatively.[15]

On comparing the Hb findings between the operative and non operative groups, we didn't observe any statistically significant difference (p- value > 0.05) at the time of admission of patients. However, significant results were obtained while comparing the mean Hb levels between operative and non-operative patients at 36 hours and 48 hours post-management (p- value < 0.05). However; rise in Hb levels post-treatment was comparatively higher in patients undergoing non- operative management in comparison to the patients undergoing operative management.

Our results are in correlation with the results obtained by John et al who reported a significant rise in mean Hb levels, in non-operative patients in comparison to operative patients, from baseline values to 12 hours post treatment values (P- value < 0.05). Patients undergoing operative management had significant lower Hb levels as compared to patients receiving conservative management.[16]

In the present study, we observed a significant difference in the mean value of pulse rate (PR) in patients undergoing operative and non-operative treatment respectively. Patients undergoing operative treatment had significantly higher pulse rate in comparison to the patients undergoing conservative treatment, all time internals post-treatment.

Our results are in concordance with the results obtained by Sreeramulu et al, who reported that majority of patients in their study presented with tachycardia but the mean pulse rate in operative management was on higher site as compare to patients who undergo operative management.[17]

In the present study, on comparing the mortality between the operative group and the non- operative group, we observed that 5.26% of the patients who were managed conservatively died, while 33.33% of the patients, who were managed operatively, died; the results of which are found to be statistically significant (P- value < 0.05).

Overall, out of 50 patients included in the present study, 2 patients died with conservative management (Mortality rate= 5.26%) and 4 patients died with operative management (mortality rate 33.3%). Solanki et al in their study showed significant results with operative mortality of 40% and non operative mortality of 5.2%. Compared with Solanki's study our 3% of patients expired who being treated conservatively. Overall mortality in our study was 12%, this is in correlation with the results of Solanki et al who reported mortality rate of 11.36%. Two patients in conservative group could not be resuscitated due to higher grade of injury.[2]

In a study by Lin B.C, mortality rate of surgical liver trauma patients remained high accounting for 52% mortality rate (30/58 patients). However patients with higher injury grade (IV/V) had higher mortality rate.[18]

In this study it was found that most commonly injured organ was liver. 50% of the patients succumbed to liver injury, which is in accordance with studies conducted by Schnüriger et al who reported liver injury in 44.26% of the patients.19 Hospital stay remains low in patients who were managed conservatively, when compared to patients who underwent surgical management hence our study is in tune with study of Sreemullu et al who concluded hospital stay of conservative and operative groups were 17 and 19 days respectively (p value is significant, 0.04).[17]

CONCLUSION

Now trauma is the most common cause of mortality in younger age group,also causing loss of productive days even more than other dreadly diseases like

cardiovascular diseases and malignancies. However, the incidence of blunt injuries to the abdomen is now at its peak since the whole period of mankind.

No abdominal organ is safe from injury while injuries of solid organs being more in case of blunt abdominal trauma.Prompt primary resuscitation and timely definitive treatment are the goals of the surgeon for treating blunt abdominal victims especially being the initiation of management within the golden hour. CT scan along with assessment of hemodynamic stability is required to decide surgical intervention or non-operative management. A combined evaluation comprising of physical examination,imaging techniques, hemodynamic assesement and monitoring the patient have decreased the number of non-therapeutic laparotomies and have increased the non-operative management of solid organ injuries.

In short,morbidity and mortality can be prevented by timely initial resuscitation and correct diagnosis as well as management(operative or non-operative) which depends on patient's hemodynamic stability and findings of imaging studies.

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