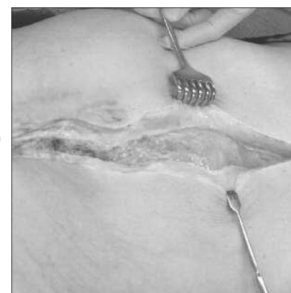


ORIGINAL

(CLINICAL PRACTICE ARTICLE)

PROF-850

BLUNT ABDOMINAL TRAUMA; ROLE OF ULTRASONOGRAPHY VS FOUR QUADRANT TAP

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ABSTRACT ... almeraj2000@yahoo.com **Objective:** (1) To define the role of ultrasonography and four quadrant tap in deciding the treatment plan (conservative/operative) in blunt abdominal trauma . (2) To find out the specificity and sensitivity of ultrasonography and four quadrant tap in blunt abdominal trauma. **Design:** Prospective study. **Setting:** Allied Hospital Faisalabad. **Period:** From Jan 2001 to Jan 2002. **Materials and methods:** Fifty patients irrespective of age, sex and mode of blunt injury included in the study. All the patients presented in emergency ward with blunt abdominal trauma underwent ultrasonography & four quadrant tap. **Results:** In 30 out of 50(60%) patients, the abdominal ultrasonography showed positive findings with the sensitivity of 90.62%, the specificity 94.44% and accuracy 92%. Four quadrant tap was positive in 29 patients out of 50(58%) with 87.09% sensitivity, 89.47% specificity and 88% accuracy. **Conclusion:** Four quadrant tap is as effective as ultrasonography to pick up the intra-peritoneal fluid in the assessment of blunt abdominal trauma patient but with slightly less sensitivity, specificity and accuracy.

Keywords: Blunt abdominal trauma, Four quadrant tap, Ultrasonography

INTRODUCTION

Blunt abdominal trauma is one of the most common causes of abdominal injuries and is usually associated with multi-organ injury. Unrecognized abdominal trauma is distressingly common cause of preventable death after trauma¹. Majority of patients can be saved from morbidity and mortality by appropriate resuscitation and timely decision. Evaluating patients who have sustained blunt abdominal trauma remain one of the most challenging

and resource intensive aspect of acute trauma care.

The basic tools for the initial evaluation of a blunt abdominal trauma patient are history and clinical examination. Unfortunately these are not always conclusive. Associated injuries often cause tenderness and spasm in the abdominal wall and make diagnosis difficult. Lower rib fracture, pelvic fracture and abdominal wall contusions may mimic the signs of peritonitis.

Powell et al has reported 65% accuracy rate of clinical evaluation alone in series of 955 patients with abdominal trauma².

In an unstable patient, the question of abdominal involvement must be expediently addressed. This is accomplished by identifying free intra abdominal fluid using four quadrant tap, diagnostic peritoneal lavage (DPL) and focused assessment with sonography for trauma (FAST) examination. The objective is to rapidly identify patients who need a laparotomy³.

Computerized tomography is also invaluable in picking up intra abdominal injuries but it is relatively expensive, not readily available and requires haemodynamically stable patients that can be transported to CT scan room⁴.

Diagnostic peritoneal lavage is invasive and time consuming. Further more it is difficult to perform in obese, pregnant and patients with history of multiple abdominal surgeries³.

Ultrasonography is a rapid, economical, safe, non-invasive, method of investigation in the initial assessment of a patient with blunt abdominal trauma. It can also be repeated when required even at bedside and need for laparotomy in patients with a negative ultrasonography is rare⁵. It is increasingly being used with portable apparatus by emergency room surgeons to provide a speedy survey of the injured abdomen^{5,6}. The American College of Surgeons has included the use of ultrasound in the advanced trauma life support⁷. Four quadrant tap is also quick, simple method and it can be performed with few complications⁶.

Objectives:

1. To define the role of ultrasonography and Four Quadrant tap in deciding the treatment plan (conservative/operative) in blunt abdominal trauma patients.
2. To find out the specificity and sensitivity of ultrasonography and four quadrant tap in blunt abdominal trauma.

PATIENTS AND METHODS

Fifty consecutive patients with blunt abdominal trauma who presented to the Emergency Department Allied hospital Faisalabad from 2001 to 2002 were included in the study.

After resuscitation, all patients were evaluated by history, clinical examination and with baseline investigations. Ultrasonography and four quadrant tap was also performed in all patients.

Technique of four quadrant tap.

After skin preparation with pyodine, an 18-gauge short bevel spinal needle was attached to a 20cc syringe and inserted through the abdominal wall after prior infiltration of the site with a local anesthetic agent (2% xylocaine).

Suction was applied to the syringe as the needle was slowly advanced into the abdomen at the sites just below the costal cartilage lateral to rectus sheath on both sides of upper abdomen and in both iliac fossae. Return of non-clotted blood or intestinal contents was considered positive tap.

RESULTS

Age range was 6-50 years with maximum patients belonging to 21-30 year group (Table I).

Age in years	No. of cases	% age
0-10	02	04%
11-20	14	28%
21-30	22	44%
31-40	10	20%
>40	02	04%

In 30 (60%) patients the abdominal ultrasonography was positive, but in one patient (2%), laparotomy was negative. Therefore, it was true positive in 29(58%) patients. Free intra-peritoneal fluid was ruled out in 20(40%) patients, but 3(6%) patients out of these deteriorated and had to be operated. It means

ultrasonography was false negative in 6% patients.

Four quadrant tap was positive in 29(58%) patients. But it was false positive in two (4%) patients. It means that it was true positive in 27(54%) patients. Four quadrant tap was negative in 21(42%) patients. Four (8%) patients out of these 21 deteriorated and had to be operated. Remaining 17 patients were successfully managed conservatively. In 17(34%) patients out of 27, with four quadrant tap frank blood came out. In remaining 10 patients, intestinal contents were found, in three of them bile was mixed with intestinal contents.

Fig-1. Distribution of patients according to sex in percentage

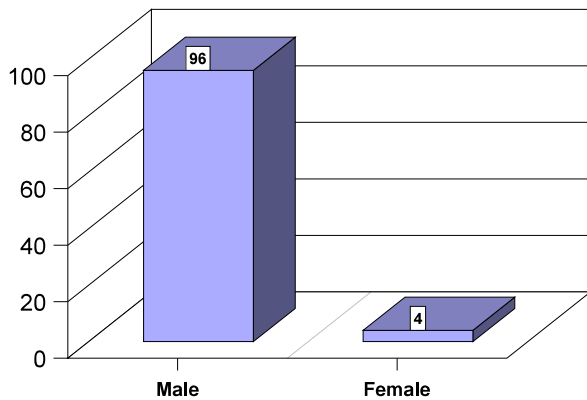
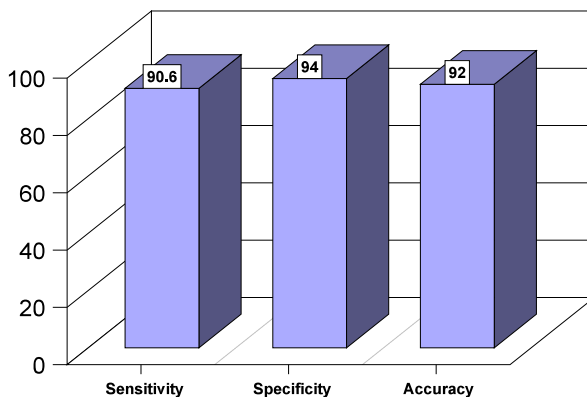


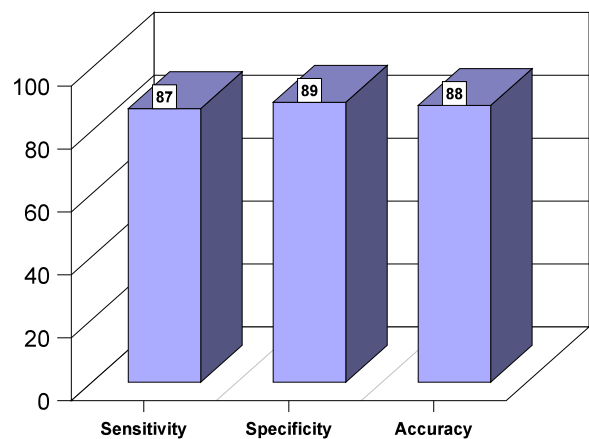
Fig-2. Results of USG in blunt trauma patients in our study (%age)



DISCUSSION

Ultrasonography has a sensitivity of 87%, specificity of 100% and an overall accuracy of 96% for detecting free intra-peritoneal fluid. It has been found that in individual organ injury, its sensitivity is 92.4% for liver, 90% for spleen, 92.2% for kidneys, 71.4% for pancreas and 34.7% for intestines. So ultrasonography is reliable for detection and identification of solid organ injuries despite its poor sensitivity for intestinal injuries⁸.

Fig-3. Results of four quadrant tap in our study



Four quadrant tap is a useful diagnostic modality, but only for those cases of abdominal trauma in which after physical examination, the examiner continues to suspect intra-abdominal haemorrhage⁹. The abdominal tap has been particularly useful as a diagnostic adjunct for comatose patients with head injury in whom tap is simple, economical and quick with relatively few complications and can be performed anywhere¹⁰.

In our study, the sensitivity of abdominal ultrasonography in the detection of intra-peritoneal fluid was 90.62%, the specificity 94.44% and the accuracy was 92%. The positive predictive value was 96.66% and negative predictive value was 94.44%.

These findings are comparative with the results of other studies. In a study done by Yoshii et al in 1998, the sensitivity, specificity and accuracy of ultrasonography

in blunt abdominal trauma patients was 94.6%, 95% and 94.9% respectively⁵. Abu-Zaiden et al, in 1996 have mentioned a sensitivity, specificity and accuracy of 85%, 100% and 96% respectively for ultrasonography in blunt abdominal trauma¹¹ According to the study by Lentz et al, the ultrasonography was 87% sensitive, 100% specific and 96% accurate in picking up the free intra peritoneal fluid in blunt trauma victims¹².

In our study every patient underwent four quadrant taping after abdominal ultrasonography. It was 87.09% sensitive, 89.47% specific and 88% accurate with positive predictive value of 93.1% and negative predictive value of 98.47%. Mansoor et al conducted a study on 50 patients of blunt abdominal trauma in Apr. 2000. They found that four quadrant tap was true positive in 92% of cases and false positive rate was 8%¹³. The results of this study are comparable with our study where it was true positive in 93.1% of cases and false positive in 7% cases. Park concluded in 1991 that the false negative rates of four quadrant tap ranges from 5-25% in different series of patients presented with blunt abdominal trauma¹⁴. In our study, the false negative rates were 8%.

The four quadrant tap was positive in 29 patients out of 50. In 27 patients, it was found to be true positive confirmed by laparotomy and in two patients laparotomy was negative. 21 patients out of 50, were managed conservatively. 4 patients out of 21 deteriorated and had to be operative. Remaining 17 patients managed conservatively successfully. In three out of these four false negative patients, intra-peritoneal fluid was not even picked up by ultrasonography. When we compared the results of both ultrasonography and Four quadrant tap in the initial assessment of a patient presented with blunt abdominal trauma we found that these results were comparable with each other.

CONCLUSION

Ultrasonography is rapid, economical, safe, non-invasive and accurate test for the detection of intra-peritoneal fluid in the blunt abdominal trauma victims and the need for laparotomy in the patients with a negative ultrasonography is rare. So abdominal ultrasonography should be the first step in the radiological assessment of

all patients presented with blunt abdominal trauma.

Four quadrant tap can be performed in the initial evaluation of a patient presented with blunt abdominal trauma, especially when ultrasonographic facility could not be available in the multi trauma patients to rule out abdominal injuries quickly before performing surgery. Four quadrant tap is as effective as ultrasonography, to pick up the intra-peritoneal fluid in the assessment of blunt trauma patient but with slightly less sensitivity, specificity and accuracy and a little bit invasive.

REFERENCES

1. Bonlanger-BR, McLellan BA, Brenneman FD et al. **Emergent abdominal sonography as a screening test in a new diagnostic algorithm for blunt trauma.** J-Trauma 1996 Jun; 40(6); 867-74
2. Powell DC, Bivins BA, Bell RM. Diagnostic peritoneal lavage. Surg Gynecol Obstet 1982 Aug; 155(2): 257-64.
3. Udeani J, Ocampo Jr HP, Steinberg SR: **Abdominal trauma, blunt.** <http://www.emedicine.com/med/topic2804htm>. Updated Aug 2004.
4. Akgur-FM, Aktug ,T, Olguner M, Kovanlikaya A, Hakguden G. **Routine usage of ultrasonography as the initial diagnostic modality of the evaluation of children sustaining blunt abdominal trauma.** J-Trauma. 1997 Apr; 42(4) ; 626-8.
5. Yoshii-H, Sato M, Yamamoto S eta al. **Usefulness and limitation of ultrasonography in initial evaluation of blunt abdominal trauma.** J-Trauma 1998 Jul ; 45 (1); 45-50; discussion 50.
6. Ingeman-JE, Plewa MC, Okasinski RE, King RW, Knoth FB. **Emergency physician use of ultrasonography in blunt abdominal trauma.** acad-Emerg-Med. 1996 Oct ; 3(10) ; 931-7.
7. The American College of Surgeons. **Committee on trauma advanced trauma life support manual.** Chicago, Ill: American College of Surgeons 1997
8. Chuang JH, Haung SC: **Posttraumatic hepatic cyst-an unusual sequela of liver injury in the era of imaging.** J-Pediatric Surgery. 1996;31(2); 272-74.
9. Ruf G, Mappes HJ, Kolhberger E, Baumgartner U,

- Farthmann EH: **Diagnosis and therapy of diaphragmatic rupture after blunt abdominal and thoracic trauma.** Zentralbl-Chir. 1996; 121(1): 24-9.
- 10 Wherrett LJ, Boulanger BR, Mclelan BA et al: **Hypotension in blunt abdominal trauma. The role of emergent abdominal sonography in surgical triage.** J trauma 1996; 41(5): 815-20.
- 11 Abu Zaiden et al. Trauma in Sabiston DC. Lyerly KM eds. **Textbook of Surgery 15th ed**, Philadelphia Saunders 1996; 296-339.
- 12 Lentz KA, McKenney MG, Nunez Jr, DB, Martin L. **Evaluating blunt abdominal trauma; a role of ultrasonography** J-Ultrasound Med 1996 Jun; 15(6):447-51.
- 13 Mansoor T, Zubari S, Masiulla. **Department of Surgery.** JN Medical College Aligarh Apr 2000.
- 14 Parks TG. **Abdominal Injuries Surgical management 2nd edition**, 1991; p-270.

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