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Araştırma Makalesi / Research Article

The Diagnostic Value of Intra-abdominal Pressure in Patients with Blunt Acute Abdominal Trauma

Künt Karın Travmalı Hastalarda Karın İçi Basıncın Tanısal Değeri

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ABSTRACT

Purpose:The objective of this study was to determine the diagnostic value of intra-abdominal pressure measurement in blunt abdominal trauma patients.

Method: A prospective study was performed in 49 patients with blunt trauma in our university hospital for 1 years. Patients were randomly into two groups as intra-abdominal trauma (n=28) and extraabdominal trauma (n=21) groups. Intra-abdominal pressures was measured an classified as normal (10 cm H_2O or less), elevated (more than 10 cm H_2O) determined indirectly.

Results: No significant differences were found between abdominal trauma and extra-abdominal trauma groups from the point of intra-abdominal pressure (IAP). One the other hand, in abdominal trauma group; significant differences were observed between operated patients. Intra-abdominal bleeding was found in 10 patients and all of them elevated IAP values (exceeding 16 cm H_2O). For determining the intra-abdominal injury, IAP had a sensitivity of 93%, specificity 38% in patients.

Conclusion: IAP exceeding 16 cm H_2O with blunt abdominal trauma patients abdominal trauma can be detected. It is thought that IAP, indirect monitoring of abdominal trauma patients is a reproducible, scientific guide and simple method.To determine the efficacy of the measurement of intra-abdominal pressure in blunt abdominal trauma patients, further studies should be done.

Key Words:Intra-abdominal pressure; blunt trauma; abdominal;operation

ÖZET

Amaç: Bu çalışmanın amacı, künt karın travmalı hastalarda karın içi basınç ölçümünün tanısal değerini belirlemektir.

Yöntem: Üniversite hastanesi acil servisine 1 yıllık süre içinde künt travma nedeniyle başvuran 49 hastada yapılan prospektif bir çalışmadır. Hastalar randomize olarak intraabdominal travma (n:28) ve extraabdominal travma (n:21) olmak üzere iki gruba ayrıldı. Karın içi basınç ölçümü 10 cmH2O ve altında olan hastalar normal, 10 cmH2O üzerinde olanlar artmış olarak kabul edildi.

Bulgular: Karın ve karın dışı travma hastaları arasında karın içi basınç ölçümü anlamlı bulunmadı. Diğer yandan, abdominal travma grubunda; ameliyat edilen hastalarda anlamlı fark bulundu. Karın içi kanama saptanan 10 hastanın hepsinde karın içi basınç yüksek bulundu (16 cmH2O ve üzeri). Karın içi yaralanmayı saptamada, karın içi basınç ölçümünün sensitivitesi %93, spesifisitesi %38 olarak bulundu.

Sonuç: Karın içi basınç (16 cmH2O ve üzeri) olan künt karın travmalı hastalarda, karın içi yaralanma saptanabilir. Karın içi basınç ölçümü, künt karın travma hastalarında, indirek, basit ve kullanışlı bir yöntem olabilir. Bu yöntemin etkinliğini belirlemek için ileri çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Karın içi basınç, künt travma, karın, ameliyat.

INTRODUCTION

Abdominal compartment syndrome (ACS) may result from vascular injury of spleen, liver and other organs in abdomen due to major trauma or intra-abdominal surgical interventions. Multiple system organ insufficiency may be seen in the patients with suddenly increased intra-abdominal pressure (IAP), and even though death may be seen if the treatment is not started immediately[1,2,3,4].

ACS has been classified into primary, secondary, and tertiary subtypes. Primary ACS occurs in disease or trauma within the abdomino-pelvic region such as blunt and penetrating trauma, hemorrhage from ruptured abdominal aortic aneurysm, and closure of the abdomen under tension postoperatively. Secondary ACS occurs in diseases remote from the abdomen, such as massive fluid resuscitation in burns and severe acute pancreatitis. Tertiary ACS defines the recurrent condition after a successful treatment of primary or secondary ACS[5]. Though the treatment, diagnosis and prognosis of the ACS have been widely written in the literature, the importance of the ACS has not been emphasised in the clinic until last decade[1,2,3,4]. The pathophysiological impact of elevated IAP on cardiac, pulmonary, and renal function was well defined over 150 years ago. It has only been within the past 15 years that physicians worldwide rediscovered this long-forgotten pathophysiological knowledge and began to actively reconsider the disease[6]. There is no sufficient study, the measurement IAP blunt abdominal trauma. In this clinical study, IAP of blunt abdominal trauma patients was measured using a simple method in an early period, and the results were compared with the diagnosis of the patients.

MATERIAL and METHOD

We prospectively measured the intraabdominal pressure by using intravesical catheter in adult blunt trauma patients with suspected blunt abdominal injury presenting to university hospital for 1 years. The study was performed after receiving the approval of the ethics committee. All enrolled patients provided informed consent for participation.

IAP was measured by measuring intra vesicle pressure in 49 patients. Patients were randomly. The control patients with trauma but non abdominal trauma had had soft tissue or organ injury in their head, thorax and extremities. Patients with known ascites, intra-abdominal malignancy, blood at external urethral meatus and pregnancy were excluded.

To evaluate the diagnostic values of the procedure, patients were allocated into three groups according to following criteria related to the clinical course: Discharged patients requiring no additional treatment, Operated patients due to having sign of acute abdomen also supported and confirmed with the additional laboratory and clinical evaluation. The patients had been died in emergency department.

Foley urinary catheter was inserted to all patients. After evacuating the bladder, we injected saline (100 ml) via the Foley catheter. Then, a central venous pressure (CVP) manometer was inserted to the Foley catheter in order to measure the IAP. Only one person was responsible for measurement of IAP.

Symphysis pubis was considered the level at which pressure was equal to 0. After measuring the intra-vesicle pressure, we did diagnostic peritoneal lavage (DPL) and/or ultrasonography (USG) for only stabilized patients to all patients suspected of having intra-abdominal bleeding. Normal bladder pressure (IAP) was defined as 10 cmH_2O or less and an elevated bladder pressure as more than 10 cmH_2O.

Non-parametric tests (Man-Whitney-U and Student-t) were used for the statistical analysis of the data. A p-value less than 0.05 was considered statistically significant.

RESULTS

There were 33 (%67, 35) male and 16 (%32, 6) female patients. The mean age for all patients 38,13+15,86, male patients 40,15+18,45 and female patients 32,28+9,65 were found. Etiological factors in 39 (%79, 6) patients and 10 (%20, 49) patients were traffic accident and fall from the high place, respectively. 14 (%50) of the total 28 patients with blunt abdominal trauma and unstable vital signs immediately underwent DPL after the measurement of the intra-vesical pressure. USG was performed for 9 (%32, 1) of the remaining 14 patients representing stable vital signs. Despite showing the stable vital signs, the last 5(%17, 9) patients experienced with DPL because of being suspected of having intra-abdominal bleeding after the USG.

Mean intra-abdominal pressure (MIAP) was 13, 2 +- 2, 7 cmH_2O in discharged patients. On the other hand, MIAP in patients with blunt abdominal trauma taken into operation room was 16, 7+-4, 6 cmH_2O, while patients, who had died before the operation, had the greatest MIAP value (19, 2 +- 2, 9 cmH_2O) among the all groups.

No statistical differences were found between groups consisted of patients without abdominal trauma, whereas there were statistical differences between groups composed of patients suffering from abdominal trauma (Table 1).

13 (%46, 4) patients were discharged, in whom acute peritonitis was excluded according to the findings obtained from clinical examination, DPL and USG during 24-Hour-Follow-Up period. Re-examination of these patients after 7 – 10 days from the trauma revealed no intra-abdominal pathology.

10 (%35, 7) patients thought to have signs of acute abdomen consistent with the clinical and laboratory finding were taken into operation room. Laparotomy showed that all patients had suffered from visceral injury. There were 3 (% 30) livers, 3 (% 30) small intestines, 1 (%10) diaphragm, 1 (%10) spleen injuries. Multiple injuries were seen in two (%20) patients. One of them had spleen and kidney injuries, while the other had spleen and colon injuries together.5 (%17, 9) patients had died from the acute impairment of their general status before having the chance of operation.

3 (%14, 3) of 21 patients in the control group died without any surgical intervention 8 patients (%16, 3) in study groups died with no surgical intervention. The reasons for the death were un-controlled hypovolemic shock, ARDS, and cerebral damage associated with ARDS in 5 (%10, 2), 1 (%2), and 2 (%4, 1) patients, respectively.

Table 1. As patients and control groups the distribution of IAP

RESULTS	Patient Group IAP (cm H_2O)	Control Group IAP (cm H_2O)	P VALUE
Discharged	13.2±2.7(13)	9.9±2,7(n=18)	P=0.143
Operation	16.7±4.6(4=10		P=0.032
Dead	19.2±2.9(n=5)	12.0±4,0 (n=3)	P=0.015
Median	16.3±4.1(28)	10.9±2.9(n=21	P=0.239

DISCUSSION

Abdominal compartment syndrome (ACS) may be described as an acute increase of abdominal pressure that affects functions and perfusion of intra-abdominal tissues negatively. Abdominal compartment syndrome may result from intra or retro abdominal bleeding, solid organ injury and visceral oedema following trauma as well as intra-abdominal mass, asides and liver transplantation following chronicle processes[1]. If abdominal compartment syndrome results from a trauma, it may disturb the functions of kidney, heart, liver, lung and brain, and so it also affects the prognosis of the patient directly[7]. For this reason, to control and to monitor the intra-abdominal pressure are important for establishing the diagnosis and prognosis. This study was planned to show the importance of IAP. Although IAP was found higher in patients with blunt abdominal trauma than non-abdominal trauma patients (control), there was not a statistically significant increase (15.5 + 4.1 cm H_2 O; 10.2 + 2.9 cm H_2 O) between two groups.

The reason for this situation may be explained as the number of the patients could not be enough for the study, or used method is not clear enough for the diagnosis.

Elevations in IAP are classified as mild (10–20 mm Hg), moderate (20–40 mm Hg), and severe (>40 mm Hg). The exact level at which intra-abdominal hypertension requires intervention is not well established (2). The measurements of abdominal trauma patients who were sent to home without further treatment were 13.2+2.7 cm H_2O, of the patients who were operated were 16.7+4.6 cm H_2O, of the patients who died in the emergency department without operation were 19.2+2.9 cm H_2O.

In a study Yanturalı et al showed that 10 of totally 20 abdominal trauma patients had had extremely high pressure (18.59+6.68 cm H_2O), whereas other 10 had had normal values (7.01+2.94 cm H_2O). Intra-abdominal bleeding was found in 4 patients of 10 high measurements patients (exceeding 10 cm H_2 O). In other 6 patients there were no bleeding. In the patients who had had IAP below 10 cm H_2 O there was no intra-abdominal haemorrhage[8]. Cirocchi et al showed that among 10 patients with laparotomy, 8 patients developed IAH < 20 mm Hg but they have not reported significant organ dysfunction , while 2 patients (20%) developed an IAH > 20 mm Hg associated whit organ dysfunction[9]. In our study, Intra-abdominal bleeding was found in 10 patients of 10 high measurement patients (exceeding 16 cm H_2 O). Laparotomy showed that all patients had suffered from visceral injury.

CONCLUSION

Our findings suggest that increased IAP is common in critically blunt abdominal trauma patients and that physicians should maintain acute awareness of elevated IAP in such patients. IAP exceeding 16 cm H_2O with blunt abdominal trauma patient's abdominal trauma can be detected.It is thought that intra vesicle, indirect monitoring of abdomen in abdominal trauma patients is a reproducible, scientific guide and simple method.To determine the efficacy of the measurement of intraabdominal pressure in blunt abdominal trauma patients, further studies should be done.

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