

The impact of etiological factors on mortality in retroperitoneal hematomas



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AIM: Retroperitoneal hematomas (RPH) mostly occur after blunt and penetrating traumas. However, these hematomas may develop spontaneously in the elderly and the patients who use anticoagulants. Between January 2006 and December 2011, 31 patients with RPH were evaluated retrospectively. The patients were allocated into three groups according to the underlying etiological factor: Group I; spontaneous RPH, group II; RPH caused by penetrating trauma, group III; RPH caused by blunt trauma.

RESULTS: There were 22 (71%) male and 9 (29%) female patients with a mean age of 35.7 ± 18.7 (range: 15-88 years). Spontaneous RPH was diagnosed in eight patients (25.8%) while RPH caused by penetrating trauma in 13 patients (41.9%) and RPH induced by blunt trauma in 10 (32.3%) patients. Retroperitoneal hematomas were located at zone I in 2 patients (6.5%) whereas zone II in 19 patients (61.3%) and zone III in 9 patients (29%). On the other hand, RPH was regarded to be at zone II-III in 1 patient (3.2%). Additional organ injury was defined in 18 patients (58.1%). Twenty patients (65%) were treated surgically. The morbidity rates were 12.5%, 7.7% and 20% and the mortality rates were denoted as 12.5%, 15.4% and 50%, for group I, group II and group III, respectively.

DISCUSSION: Additional organ injury, massive blood transfusion, the route of injury and the need for surgery are defined as the most significant factors associated with increased mortality.

KEY WORDS: Blunt trauma, Penetrating trauma, Retroperitoneal hematoma.

Introduction

Retroperitoneal hematomas (RPH) are an important cause of hospitalization in trauma patients, and appropriate treatment is still debated ¹. Retroperitoneal space contains many visceral and vascular structures of gastrointestinal, vascular, genitourinary, muscular and nervous systems ². Therefore, RPH may be caused by any injury arising from the distal esophagus, duodenum (sec-

ond, third and fourth portions), posterior walls of ascending and descending colon, colonic flexures, pancreas, rectum, kidneys, adrenal glands, ureters, urinary bladder, abdominal aorta, inferior vena cava, and portal vein as well as psoas major, quadratus lumborum, and iliacus muscles and pelvis traumas ³. More than 90% of RPH were emerged as a result of vascular injuries ⁴. Because of the low pressure of bleeding due to venous injuries, hemostasis may be achieved spontaneously ⁵. Thus, RPH caused by venous bleeding are usually restricted and located at the right side of the linea alba. On the other hand, RPH originated from arterial bleedings appear as a bright red mass, expand rapidly, and often locate at the left side of the midline ⁶. RPH may occur after blunt and penetrating traumas, and also spontaneously in the patients with older age and using anticoagulants. The signs and symptoms of RPH are revealed as the reflection of the findings of the injured retroperitoneal organs rather than those related with the

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hematoma itself. The pain caused by RPH usually shows itself at the anterior, posterior and lateral abdominal walls and pelvis, depending on the etiological factor. The clinical symptoms and signs of hypovolemic shock can be seen in the patients with the injuries of aorta abdominalis, vena cava and major branches and the major fractures of the pelvis ⁷. Several classifications of RPH have been made based on the localization of hematomas. In our study, we use Kudsk and Sheldon's classification described in 1982. In this classification, centromedial localization was described as zone 1, flank localization as zone 2 and pelvic localization as zone 3 (Table I) ⁸. The use of radiological imaging techniques depends on the hemodynamic status of the patients and the surgeon's suspect from the RPH ⁹. The treatment of RPH varies depending on the leading mechanism, such as; spontaneous, blunt and penetrating injuries, and the localization of hematoma.

The aim of this study is to evaluate the effect of the etiological factors of RPH on morbidity and mortality.

Materials and Methods

Between January 2006 and December 2011, a total of 31 patients, who diagnosed with and treated for RPH, were evaluated retrospectively. The patients were divided into three groups according to the underlying etiological factor: Group I; spontaneous RPH, group II; RPH caused by penetrating trauma, group III; RPH caused by blunt trauma. The medical datas regarding age, gender, radiological imaging, complete blood counts, blood transfusion, medical treatment, surgical intervention, hospital stay, morbidity and mortality were recorded. Massive blood transfusion was defined as the transfusion of at least four units of blood.

TABLE I - *The Classification of retroperitoneal hematomas by localization*

Localization	Anatomical Borders
Zone 1 (centromedial)	The region extending from the diaphragmatic hiatus of aorta and esophagus to the promontorium (consisting of abdominal aorta, vena cava inferior, pancreas, and retroperitoneal duodenum)
Zone 2 (lateral)	The region, which is located in front of and at the lateral to the psoas muscle, extending diaphragma to the superior margin of iliac bones (kidney and retroperitoneal parts of the colon)
Zone 3 (pelvic)	The region constricted by Retzius space anteriorly, the wings of iliac bones laterally and sacrum posteriorly (consisting of iliac vessels)

Statistical analysis

In the evaluation of the study results, SPSS (Statistical Package for Social Sciences) Windows 11.5 program was used for statistical analysis. The quantitative data were indicated as mean $\pm$ standard deviation. Kolmogorov-Smirnov test was utilized for the compatibility of normal distributed data. In comparison of the groups, Mann Whitney-U test was used in analysis of non-parametric data, while Chi-square test was used in the analysis of categorical data. P values < 0.05 were accepted to be significant for all variables.

Results

There were 22 male (71%) and 9 female (29%) patients with a mean age of 35.7 ± 18.7 years (range: 15-88 years). Spontaneous RPH was diagnosed in eight patients (25.8%) while RPH caused by penetrating trauma in 13 patients (41.9%) and RPH induced by blunt trauma in 10 (32.3%) patients. RPH were located at zone I in 2 patients (6.5%) whereas zone II in 19 patients (61.3%) and zone III in 9 patients (29%). On the other hand, RPH was regarded to be at zone II-III in 1 patient (3.2%). Additional organ injury was defined in 18 patients (58.1%). Twenty patients (65%) were treated surgically, and 11 patients (45%) were managed conservatively. Twenty-three (74.2%) patients were discharged with full recovery while morbidity was developed in 4 patients (12.9%), and mortality in 8 (25.8%) patients. The average duration of hospital stay was found to be 6.4 ± 4.3 days (range: 1-16 days). The demographic and clinical features of the patients with RPH are summarized in Table II.

The patients with RPH caused by penetrating trauma had significantly younger age ($p=0.003$) and lower hemoglobin concentration at admission ($p=0.01$) than the patients in Group I. Therefore, these patients were more likely to receive blood transfusion ($p=0.02$). Group I patients had significantly higher INR when compared to group II and group III patients ($p=0.02$ and $p=0.01$, respectively). Group II and group II patients were found to be statistically similar except for age ($p=0.02$ for age and $p>0.05$ for others). The mortality rates were found to be higher for the patients who had additional organ injury than those who did not ($p=0.05$). The mortality rate for the patients who underwent surgery was found to be higher when compared to those treated conservatively ($p=0.05$). Moreover, the mortality rate was also higher for the patients receiving massive blood transfusion (4 units and more) ($p=0.05$). Complication rates were 12.5%, 7.7%, 20% while mortality rates were 12.5%, 15.4%, 50% for three groups, respectively ($p>0.05$). All three groups were statistically similar in term of the duration of hospital stay ($p>0.05$). The demographic and clinical features of the patients accord-

TABLE II - Demographic and clinical features of patients with retroperitoneal hematoma

Demographic Features	Group I (n=8)	Group II (n=13)	Group III (n=10)	p
Mean Age (years)	52.7 (18-88)	23.9 (15-38)	37.4 (19-69)	0.004
Gender				
Male	3	11	8	0.050
Female	5	2	2	
Concurrent Organ Injury				0.001
Small intestine		3		
Colon		3		
Liver		1	4	
Spleen		2		
Kidneys		1		
Pelvic bone fracture			4	NS
Localization of Hematoma				NS
Zone I		1	1	
Zone II	8	7	4	
Zone III		5	4	
Zone II-III			1	
Mean Hemoglobin (g/dl)	9.2 (7-12.3)	6.8 (3.6-8.7)	8.1(4.0-11.8)	0.050
Mean †INR	3.8 (0.8-13.7)	normal	normal	0.031
Blood Transfusion	3.1 (0-13)	6.0 (3-11)	4.9 (0-15)	0.050
Fresh Frozen Plasma Transfusion	5.7 (0-12)	2.9 (0-9)	3.3 (0-10)	
Management				0.018
Conservative	7		4	
Surgery	1	13	6	
Radiological Imaging				0.006
USG	1	1	1	
CT	6	2	8	
Complications	1	1	2	NS
Mortality	1	2	5	NS
Average Hospital Stay (days)	8.3 (3-16)	7.0 (1-15)	4.2 (1-10)	NS

†INR: International Normalized Ratio, NS: Not Significant

ing to the underlying etiological factor are demonstrated in Figures 1 and 2.

Discussion

Although RPH is infrequently encountered in daily clinical practice, early diagnosis and rapid management of this clinical entity is of vital significance. The literature usually offers single case reports and there is a small number of case series reviewing more than two subjects. The incidence of RPH varies according to the underlying etiological factor. According to the previously published studies, the incidence of blunt trauma related RPH has been reported to be 80%, 70%, and 67% and whereas the incidence of RPH related with penetrating trauma has been reported to be 20%, 30%, and 33% ¹⁰.

As for the present study, penetrating trauma (mostly due to gunshot injury) caused 56.5% of the traumatic RPH and blunt trauma was responsible for the remaining 43.5%. This relatively higher incidence of penetrating trauma related RPH may be attributed to the socio-economic, cultural and demographic features of our geographic region (rural areas). As a rarely reported clinical entity, spontaneous RPH usually affects the elderly and those using anticoagulant drugs ¹¹. The present study reviews a total of eight patients with spontaneous RPH (25.8%), six of them using anticoagulant treatment, and the majority of the patients diagnosed with spontaneous RPH were elderly women. On the other hand, the majority of the patients with traumatic RPH were men (p=0.050).

Nowadays, the management of RPH is still controversial. As for the management of RPH, non-operative (con-

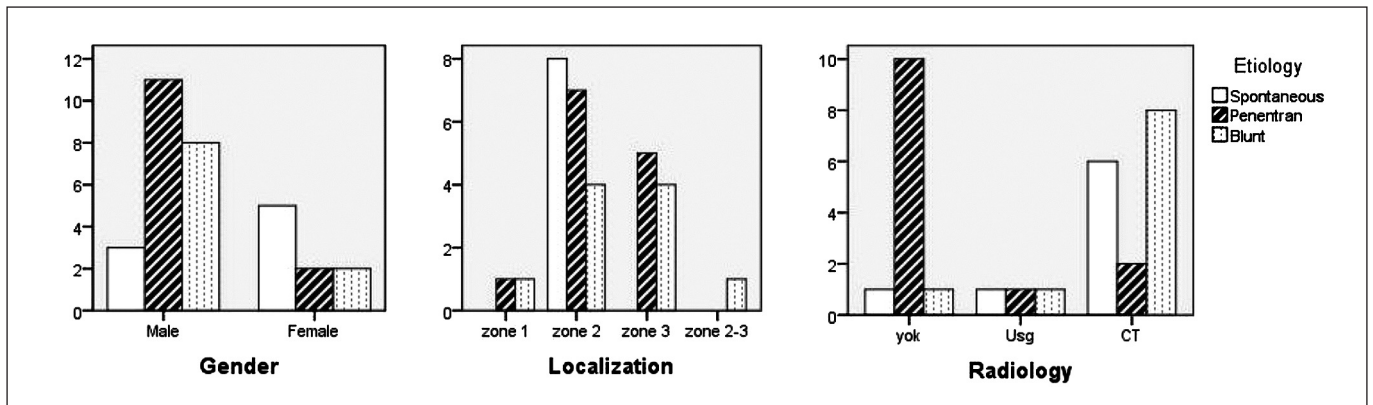


Fig. 1: The gender of the patients, localization of hematoma and radiological imaging techniques according to underlying etiological factors.

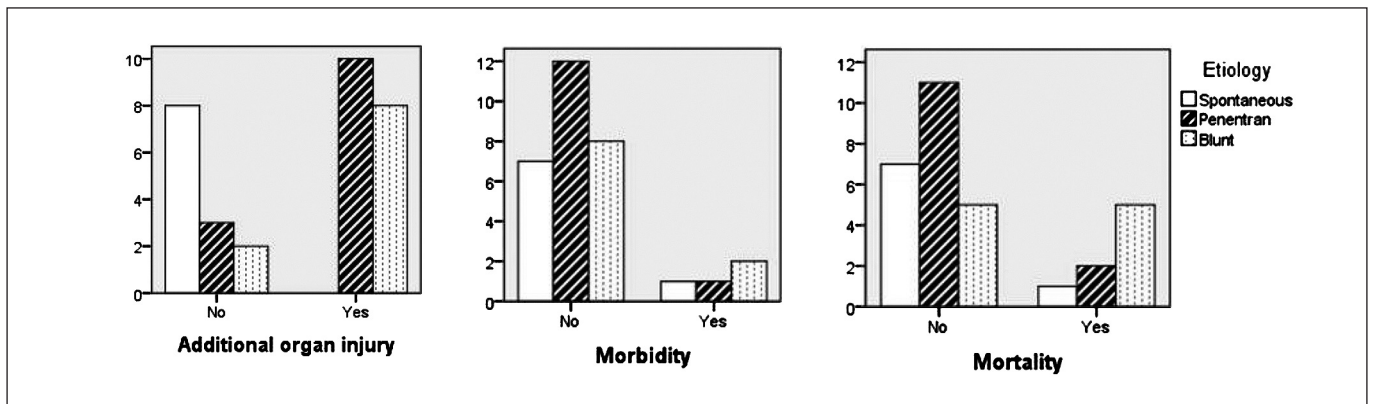


Fig. 2: The injured additional organs, the number of morbidity and mortality according to underlying etiological factors

servative approach/interventional radiology) and operative methods have to be confronted. The treatment of RPH should be planned with taking into consideration the factors, such as; underlying etiology, localization and expansion of the hematoma, and hemodynamic status of the patients¹². Because of the great vessels exist in Zone I and any vascular damage is likely to have poor prognosis, surgical exploration is indicated whenever a hematoma emerges at this zone after blunt or penetrating trauma. Similarly, surgical exploration is frequently required for hematomas depending on penetrating trauma at zone II. However, conservative management is recommended for the non-expanding (stable) hematomas due to blunt trauma that appear at zone II. If there is a zone III hematoma secondary to penetrating trauma, surgical management is required because of the apparently increased risk of injury in iliac vessels. If a zone III hematoma secondary to blunt trauma arises, generally there is synchronous pelvic fracture. External fixation and, if any, angiographic embolization of the bleeding vessel should be performed in this group of the patients⁴. In a study by Ekici et al., 16 patients with spontaneous RPH were assessed

and angiography has been preferred in some patients instead of surgery¹³. In accordance, seven of the eight patients with spontaneous RPH in the present study were managed by close surveillance (via ultrasonography and/or computed tomography) and transfusion of blood and blood products when required. The remaining one patient was treated surgically, since the perforation at the second portion of duodenum was the underlying cause of the hematoma. There was no requirement of angiographic embolization in any of the patients with RPH that occur spontaneously. All of the patients with RPH caused by penetrating trauma in our study underwent surgery, and radiological imaging techniques were performed only 3 of them. After the pelvic stabilization was performed in 4 patients due to pelvic fracture, the patients with RPH caused by blunt trauma were evaluated in terms of the results of radiological images and hemodynamic status. Six of these patients (60%) were treated surgically. Additional organ injuries were determined in ten patients with RPH associated with penetrating trauma and in 8 patients with RPH induced by blunt trauma (n=18, 58%). Seven of these 18 patients (38.9%) died. The mortality rate was

significantly higher in patients who had additional organ injury and received massive blood transfusion ($p=0.05$ for both).

Kharmene et al.¹⁴ have been stated that 10.1% of the patients with spontaneous RPH depending on the anti-coagulant treatment were lost within a month. Stagnitti et al.¹⁵ reported a mortality rate of 12.9% for patients with RPH induced by trauma. Abdullah M et al.¹⁶ declared that the mortality rate was 32.6% for patients who had extensive RPH caused by blunt trauma¹⁵. As for the present study, the mortality rate for patients with spontaneous RPH was 12.5%. Moreover, the mortality rates were found to be 15.4% and 50% for patients with RPH caused by penetrating trauma and blunt trauma, respectively. The length of hospital stays were Similar Between The Patients With Spontaneous And Traumatic RPH.

Conclusion

The diagnosis and treatment of RPH is a complicated and difficult problem for the clinicians. However, it is of vital importance that the decision as to the conservative treatment or surgery is made correctly. The decision for the surgical management of RPH is made by considering the etiology of injury, the localization of retroperitoneal hematoma, the existence of additional organ injury and the hemodynamical status of the patient. Additional organ injury, massive blood transfusion, the etiology of injury and the need for surgery are defined as the most significant factors associated with increased mortality in patients diagnosed with RPH.

Riassunto

La formazione di un ematoma retroperitoneale (RPH) si forma per lo più dopo un trauma contusivo chiuso oppure un trauma penetrante. Comunque questi ematomi possono generarsi spontaneamente negli anziani che usano anticoagulanti.

Tra il gennaio 2006 e il dicembre 2011 sono stati individuati e studiati retrospettivamente 31 pazienti, suddividendoli in tre gruppi in rapporto all'elemento etiologico della formazione del loro RPH. Nel primo gruppo gli ematomi spontanei, nel secondo gruppo i RPH conseguenti ad un trauma penetrante e nel terzo gruppo gli ematomi conseguenti ad un trauma chiuso.

Nel complesso di trattava di 22 uomini (71%) e 9 donne (29%), dell'età media di $35,7 \pm 18,7$ (da 15 a 88 anni)

L'ematoma spontaneo è stato riconosciuto in 8 pazienti (25,8%) mentre quello conseguente ad un trauma penetrante si è avuto in 13 pazienti (41,9%), e infine quello conseguente ad un trauma chiuso in 10 pazienti (32,3%).

Per quanto riguarda la localizzazione il RPH era localizzato nella zona I (secondo la classificazione di Kudsk and Sheldon descritta nel 1982) in 2 pazienti (6,5%), nella zona II in 19 pazienti (61,3%) e nella zona III in 9 pazienti (29%). In un ultimo paziente il RPH era localizzato contemporaneamente nella zona II e nella III (3,2%). La contemporanea presenza di lesioni organiche aggiunte si è riconosciuta in 18 pazienti (58,1%).

20 pazienti (65%) sono stati trattati chirurgicamente. L'incidenza della morbidità è stata del 12,5%, del 7,7% e del 20% rispettivamente nei gruppi I, II e III, e la mortalità altrettanto rispettivamente del 12,5%, 15,4% e 50% nei tre gruppi.

I fattori più significativi associati all'aumento della mortalità sono risultati l'aggiunta di lesioni organiche, la necessità di trasfusioni massive (oltre 4 U), il percorso del trauma e la necessità di ricorrere alla chirurgia.

References

1. Moreno C, Moore EE, Rosenberger A, Cleveland HC: *Hemorrhage associated with major pelvic fracture: A multispecialty challenge*. J Trauma, 1986; 26:987-94.
2. Henao F, Aldrete JS: *Retroperitoneal Hematomas of traumatic origin*. Surg Gynecol Obstet, 1985; 161:106-116.
3. Feliciano DV, Burch JM, Graham JM: *Abdominal vascular injury*. In: Mattox KL, Moore EE, Feliciano DV (eds): *Trauma*. East Norwalk: Appleton & Lange, 1988; 519-36.
4. Asensio JA, Chahwan S, Hanpeter D, Demetriades D, Forno W, Gambaro E, Murray J, Velmahos G, Marengo J, Shoemaker WC, et al.: *Operative management and outcome of 302 abdominal vascular injuries*. Am J Surg, 2000; 180:528-33.
5. Chapellier X, Sockeel P, Baranger B: *Management of penetrating abdominal vessel injuries*. J Visc Surg, 2010; 147:1-12.
6. Mullins RJ, Huckfeldt R, Trunkey DD: *Abdominal vascular injuries*. Surg Clin N Am, 1996; 76:813-32.
7. Fingerhut A, Leppäniemi AK, Androulakis GA, et al.: *The European experience with vascular injuries*. Surg Clin North Am, 2002; 82:175-89.
8. Kudsk KA, Sheldon GF (eds): *Abdominal trauma*. New York: Thieme-Stratton, 1982; 279-93.
9. Weil PH: *Management of retroperitoneal trauma*. Curr Prob Surg, 1983; 20:539-620.
10. Feliciano VD: *Management of traumatic retroperitoneal hematoma*. Ann Surg, 1990; 211:109-23.
11. González C, Penado S, Llata L, et al.: *The clinical spectrum of retroperitoneal hematoma in anticoagulated patients*. Medicine, 2003; 82:257-62.
12. Carrillo EH, Bergamini TM, Miller FB, Richardson JD: *Abdominal vascular injuries*. J Trauma, 1997; 43:164-71.
13. Ekici Y, Aydogan C, Yagmurdu MC, et al.: *Treatment approaches for spontaneous retroperitoneal bleeding*. Int Surg, 2009; 94: 257-62.

14. Sunga KL, Bellolio MF, Gilmore RM, Cabrera D: *Spontaneous Retroperitoneal Hematoma: Etiology, Characteristics, Management, and Outcome*. J Emerg Med, 2011; 10:1-5.
15. Stagnitti F, Toccaceli S, Spaziani E, et al.: *Traumatic retroperitoneal haematoma*. G Chir, 2007; 28:356-62.
16. Abdullah M, Al-Salamah SM: *Extensive retroperitoneal hematoma in blunt trauma*. Saudi Med J, 2010; 31:1232-237.