

The management of retroperitoneal hematomas

M.A.Tolga Muftuoglu¹, Umit Topaloglu¹, Ali Aktekin¹, Mehmet Odabasi¹, Mehmet Ates², Abdullah Saglam¹

Scand J Trauma Resusc Emerg Med 2004; **12** ; 152-156

¹ The Fourth General Surgical Department of Haydarpasa Numune Teaching & Training Hospital, Istanbul, Turkey

² Department of Cardiovascular Surgery, Prof.Dr.Siyami Ersek Thoracic and Cardiovascular Surgery Center, Istanbul, Turkey.

Correspondence

M.A.Tolga Muftuoglu

Dr.F.Ayanoglu Cad. 28/6

Fenerbahce, 34726

Kadikoy/Istanbul, Turkey

E-mail: tmuftuoglu@ttnet.net.tr

ABSTRACT:

Background: Retroperitoneal hematomas are associated with high mortality rates. This study designed to find main causes of death.

Material and Methods: The data of 147 patients with traumatic retroperitoneal hematomas were collected retrospectively between January 1994 and December 2001 at Haydarpasa Numune Research and Training Hospital.

Results: We found that 127 of them had blunt and 20 patients had penetrating trauma. Retroperitoneal hematomas located in pelvic region were 68% of all. Hundred and twenty one patients were observed and 25 patients who did not respond to conservative treatment and they were operated. There were 11 deaths among the 25 operated patients with a 44% percent mortality rate.

Conclusion: The pelvic retroperitoneal hematomas, in the patients who are in shock and non-responders to resuscitation may undergo laparotomy. Packing can be life saving and opening the hematoma may cause uncontrollable bleeding. Central hematomas should be explored routinely. Generally, lateral hematomas do not need to be explored.

Keywords: Hemodynamic instability, Retroperitoneal hematoma, Trauma

Introduction

Retroperitoneum, is a wide space at the back of the peritoneum, which covers big vessels such as abdominal aorta and vena cava and their branches; solid organs such as pancreas, kidney and adrenal glands; organs which are perforated hollow viscous such as esophagus, duodenum, ureters, bladder, rectum, ascending and descending colons; vertebral column, spine and pelvic muscles. Surgeons specialized in trauma frequently meet blood and hematoma in the retroperitoneal space. Despite all the advances in the fields of technology and surgical techniques, retroperitoneal hematoma caused by the penetrating and blunt injuries still remains as a nightmare for the surgeons. There are still many uncertain points in respect to their diagnosis and treatment. Especially decision making for surgical intervention of pelvic retroperitoneal hematoma is very difficult and risky decision to make for the surgeons. Sometimes the bleeding can simultaneously stop, but the retroperitoneal hematoma that is explored, may cause the death of the patients. When the retroperitoneal hematoma is explored, there is always a risk of its turning into an unstoppable bleeding. As multiple organ injury is frequently seen in the patients, a multidisciplinary approach is required. A mortality rate between 18 – 60% is observed in the patients with retroperitoneal hematoma (1,2). Main reason for the death is the bleeding that cannot be taken under control. Infection and most of the times pelvic fractures

accompany retroperitoneal hematoma. The aim of this study is to enlighten the causes and the rates of mortality in the cases of retroperitoneal hematoma.

Patients and Methods

Records of the 147 patients, who admitted to the Haydarpasa Numune Training and Research Hospital, Istanbul, between January 1994 and December 2001 with of trauma and were diagnosed with retroperitoneal hematoma, were examined. During the period of this study, patient's age, type of injury, hospital stay, type of treatment (conservative or operative approach), type of operation, injured organs, mortality rates were recorded retrospectively. Diagnosis of retroperitoneal hematoma was made by using ultrasonography (US) or computed tomography (CT) in all of the patients, excluding 3 cases of severe vessel injury. Twenty-six patients underwent surgical operation. In all of 121 patients monitored US was used and in 49 patients CT was used together with US. Peritoneal lavage was not used in the patients in whom retroperitoneal hematoma was diagnosed by using either US or CT. In our study, retroperitoneal hematoma is classified under three regions, as defined by Selivanov et al. (3). 1- Pelvic hematoma (Zone III): it is the presence of hematoma or fluid in the retroperitoneal region limited with the dome of the bladder at the front and promontorium at the rear and iliac wings at both

sides. 2- Lateral hematoma (Zone II): it is a retroperitoneal hematoma region lying laterally to the psoas muscles, above the iliac wings and under the diaphragm and it is caused by the injury of kidney parenchyme, vessels feeding the left and the right colon and the injuries of the muscle vessel. 3- Central region (Zone I): There is diaphragm on this region, medial borders of psoas muscles are at its sides and the pelvis is under it. Central retroperitoneal hematoma is caused by injuries of abdominal aorta, vena cava, superior mesenteric artery, renal vessels, common iliac vessels and veins, portal vein, pancreas and duodenum.

Table 1.

	Patients who were observed (n=121)	Patients who were operated (n=26)
Type of trauma		
Blunt trauma	104	23
Penetrating trauma	17	1
Gunshot	0	2
Location of trauma		
Pelvic hematoma	85	15
Lateral hematoma	32	9
Central hematoma	1	1
Pelvic-central hematoma	3	1

Legend:

The Type and Location of Trauma in 147 Patients with Retroperitoneal Hematoma.

Results

Hundred-five of the patients (71.2%) included in our study were male while 42 (%28.8) of them were females. The average age, which was ranging between 11 and 68, was 34. The details of location of retroperitoneal hematomas and the type of operations are presented in Table 1. The patients who underwent operation are those in whom hemodynamic stability could not be achieved despite the multiple blood transfusions were given. These patients were monitored conservatively and given 3.4 (between 1 and 8) units of blood in order to obtain hemodynamic stability. The mean duration of hospitalization was 8.1 (5- 18) days for the conservative treatment and 12.4 (8 -22) days for those who underwent operation.

Fifteen patients survived following an operation for the management of retroperitoneal hematoma. In 15 patients with an enlarging retroperitoneal hematoma, surgeons tried to take the retroperitoneal bleeding under control by “packing”. In 7 of these 15 patients, the retroperitoneum was not be explored for the purpose of controlling the bleeding and with a second operation and then the tampons were removed. In 7 patients who underwent operation, the packs were placed over the retroperitoneal hematoma, after it was seen that retroperitoneal hematoma did not become larger and the operation was ended. One patient with suffering vena cava injury was successfully treated with saphenous vein graft. We lost 11 patients after an intervention to retroperitoneal hematoma. These patients died who was undergone exploration of retroperitoneal space and 1 of these patients had been suffering aorta injury, 2 had been suffering vena cava injury and 8 had been suffering pelvic hematoma. Due to the enlargement of retroperitoneal

hematoma during the operation, retroperitoneal space was explored for the purpose of controlling the bleeding in 8 patients. Three patients were treated by packing of pelvis. It was required to perform a second surgery as the hemodynamic instability continued despite the performance of “packing” and the tampons were placed again by “repacking” in two patients. Although hypogastric artery was ligated in two of them, they died due to uncontrollable bleeding. The cause of the hemorrhage could not be detected in any of these 8 patients who died due to pelvic hematoma. (Table 2). Mortality rate was found 42 percent in the operated patients. In Table 3, additional injuries in the patients with retroperitoneal hematoma are shown. Operation was performed on 3 patients with vena cava injury. In 2 patients, vena cava repair was done and these patients died, one patient repaired with vein patch graft and survived. One patient operated for an aorta injury and died after the aorta repair.

Discussion

We frequently come across retroperitoneal bleeding in the cases of abdominal and pelvic injuries. Hematoma and bleeding in the retroperitoneal space are observed in 44% of the patients with blunt abdominal trauma and 6% of the patients with penetrating trauma (4,5). Retroperitoneal hematomas carry a high rate of mortality (18-33%) due to injures of other organs and the difficulty of its treatment (3). There are many treatment options in the retroperitoneal hematoma that develop following the trauma. A treatment strategy is determined, considering the ages, type of injury, accompanying diseases, additional organ injuries and especially the hemodynamic stabilities of the patient. Perforated hollow viscous and hemodynamic parameters that cannot be stabilized are the indications of operation. Henao et al. reported that only 13.3% of their patients with retroperitoneal hematoma were followed by the conservative method (6). In our study, 82% of the patients were followed by the conservative method. Most of the times, provision and maintenance of hemodynamic stability, which is one of the indispensable requirements of conservative treatment, is hard to achieve. The patients were monitored closely and every effort was made in order to maintain the hemodynamic stability by means of fluid or blood transfusions, when it was needed. In our study, 26 of the 147 patients diagnosed with retroperitoneal hematoma were operated and the mortality rate was found to be 44% as 11 of the patients who underwent operation died. In most of the cases, cause of death is hemorrhage or the shock developing after it. Three of 11 patients who died had large vessel injury and accompanying organ injuries. Eight of them died due to the retroperitoneal bleeding in the pelvic regions that cannot be taken under control. Most of the patients (86%) with retroperitoneal hematoma suffer due to blunt trauma. It is also necessary to take the organ injuries that may accompany the retroperitoneal hematoma. In our study, emphasis was put also on the frequency of the additional organ injuries especially in the cases of mortality. It is known that the mortality rates are higher in the patients with multiorgan injuries.

The standard treatment for pelvic hematomas with blunt trauma almost never includes operation if the patients who do not have gastrointestinal perforation, vascular injury, continuing bleeding and non-expanding hematoma. But, it is general recommended that retroperitoneal hematoma from penetrating trauma should be explored, since it is associated with a high incidence of vascular and visceral injury. There is still no consensus over the management of penetrating trauma, because some surgeons believe that conservative treatment can be chosen if the patient is stable and asymptomatic. In our series, we operated one patient from 18 with retroperitoneal hematoma suffering from penetrating trauma.

Hemodynamic stabilization is sometimes very difficult to achieve in some patients with pelvic hematoma or bleeding. In the event of continuous bleeding, enlarging hematoma, hemodynamic parameters, which cannot be kept stabilized despite of multiple blood transfusions, are frequently occurring cases that give hardship to the trauma surgeons. In case of such patients, it is hard to give this decision. The most striking point about our study is that the patients died as the pelvic region was explored for the purpose of controlling the bleeding and the bleeding came into an uncontrollable stage. In our study, the most common type of retroperitoneal hematoma was hematoma located in the pelvic and these constitute 68.5% of our patients. Most of the pelvic hematomas are caused by the vein ruptures in the pelvic regions. The surgeons should keep their suspicion in the cases of patients with pelvic bone fractures or hematuria. As it is stated in the previous studies, periton lavage may cause negative results in the retroperitoneal hematomas, which is why periton lavage was not used in the patients diagnosed with retroperitoneal hematoma in our study (7-9). Ultrasonography is a simple diagnostic tool and can easily detect blood and hematoma in retroperitoneal region (10,11). Computed tomography plays an important role in the diagnosis of retroperitoneal hematoma.

Table 2.

The patients who died (n:11)		The patients who survived (n:15)	
Operations Performed for the management of retroperitoneal hematoma:			
Great vessels injuries:		Eksploratory laparotomy 7	
Primary vena cava repair	2	(Nonexpanding hematoma)	
Aorta repair with grafting	1	Packing	7
Uncontrollable bleeding:		(Intact retroperitoneum)	
(Exploration of retroperitoneum)		Repair of vena cava with saphenous vein graft	1
Packing	3		
Repacking	3		
Packing + Ligation of hypogastric artery	2		
Associated Operations Performed:			
Evacuation of subdural hematoma	1	Splenectomy	1
Thoracotomy and pneumorrhaphy	1	Splenorrhaphy	1
Gastrorrhaphy	1	Distal pancreatectomy	1
		Pelvic fixation	4
		Repair of renal artery	1
		Repair of vena cava	1
		Colorrhaphy	1
		Enterorrhaphy	2
Legend: Operations Performed Upon 26 Patients			

Computed tomography is the imaging modality of choice for further evaluation of hemodynamically stable patients. While intra and retroperitoneal hematomas can be detected by using ultrasonography, solid organ injuries and retroperitoneal hematomas can be discovered by computed tomography (12). Pelvic fixation is considered to be the effective treatment sometimes completed with packing the true pelvis (13). Bleeding from hematoma could not be taken under control in 8 of 15 patients with pelvic expanding hematoma. Hematoma should not be opened for the purpose of maintaining the effect of the tampon if there is not another injury, due to the fact that it is difficult to stop the bleeding of pelvic hematoma. By applying pressure with compresses on the pelvis, the bleeding can be stopped (14). While these interventions are performed on the patients, necessary resuscitation should be made and the blood and the blood products should be provided. However all of 7 patients who were not operated and whose pelvic hematoma was not explored survived after they were treated with "packing". Hematoma that occurs in the retroperitoneal region, which is a closed region, can also be taken under control to an extent by applying pressure on the bleeding region. Opening of this closed system imposes "a chimney effect" and when the pressure on the bleeding regions is ended, the bleeding may become even more severe. In our serial, more than half of the patients with pelvic hematoma died after they underwent operation. Taking this data into consideration, it can be seen that opening and exploring the hematoma for the purpose of controlling the bleeding in the operation of patients with pelvic hematoma should be the last resort for the surgeon. Choosing for the operation or conservative treatment in the patients with enlarging retroperitoneal hematoma is a very hard and risky decision to make for the surgeons, as it is really difficult to achieve the hemodynamic stability in the case of a expanding retroperitoneal hematoma. Arteriography and embolization are tools that are used in the diagnosis and treatment of the patients with pelvic hematoma. Angiographic embolization is reported to be effective in selected patients with pelvic arterial bleeding, but it is clear that not all of the clinics have such facilities (2, 15). Although, it is stated in the literature that if there is an enlarging hematoma in the pelvic region, periton can be opened, bilateral hypogastric artery and iliac internal artery can be ligated and thus the bleeding can be taken under control, little success was achieved in the efforts to control the bleeding as pelvic venous is rich in terms

Table 3.

	Patients who were observed (n=121)	Patients who were operated (n=26)
Liver	4	4
Spleen	3	2
Pancreas	-	1
Large Intestine	-	1
Small Intestine	-	2
Stomach	-	1
Vena Cava	-	2
Aorta	-	1
Renal Artery	-	1
Legend: Associated Intra-abdominal Injuries		

of collaterals and most of the bleeding is caused by venous torn (16).

As there is a high possibility of big vessel injury in the patient with central hematoma, urgent laparotomy is recommended. Central hematomas, which could be associated with great vessel injuries or rupture of the duodenum, pancreas, or other retroperitoneal processes, should generally be explored. The necessity of urgent operation in the urgent operation is not so high in the patients with lateral hematoma. Perinephric or lateral hematomas associated with blunt trauma rarely require exploration. Eight of our 40 patients with lateral hematoma underwent operation and survived.

In conclusion, utmost effort should be paid in order to maintain the stability in pelvic hematomas. In the patients that underwent operation, opening pelvic hematoma may cause the bleeding enter into uncontrollable stage. In the central retroperitoneal hematomas, as the cause is generally big vessel injuries, urgent hematoma exploration is recommended. An approach should be adopted, considering that kidneys and vessels may cause lateral hematomas as well.

References:

1. Grieco, J, Perry, JF Jr Retroperitoneal hematoma following trauma. *J Trauma* 1979; **20**: 716-733.
2. Velmahos GC, Toutouzas KG., Vassiliu P, et al. A prospective study on safety and efficacy of angiographic embolization for pelvic and visceral injuries. *J Trauma* 2002; **53**: 303-308.
3. Selivanov V., Chi H.S., Alverdy JC., et al. Mortality in retroperitoneal hematoma. *J Trauma* 1984; **24**: 1022-1027.
4. Allen RE, Eastman BA, Halter BL, et al. Retroperitoneal hemorrhage secondary to blunt trauma. *Am J Surg* 1969; **118**: 558-561.
5. Steichen FM, Dargan, EL, Pearlan DM, et al The management of retroperitoneal hematoma secondary to penetrating injuries. *Surg Gynecol Obstet* 1966; **123**: 581-591.
6. Henao F, Aldrete JS. Retroperitoneal hematomas of traumatic origin. *Surg Gynecol Obstet* 1985; **161**: 106-116.
7. Feliciano DV. Management of traumatic retroperitoneal hematoma. *Ann Surg* 1990; **211**: 109-123.
8. De Vries JE, Van Der Slikke, W. False positive peritoneal lavage due to retroperitoneal haematom. *Injury* 1980; **12**: 191-193.
9. Hubbard S, Bivins BA, Sachatello C, et al. Diagnostic errors with peritoneal lavage in patients with pelvic fractures. *Arch Surg* 1979; **114**: 844-846.
10. Shih HC, Wen YS, Ko, TJ, et al. Noninvasive evaluation of blunt abdominal trauma: prospective study using diagnostic algorithms to minimize nontherapeutic laparotomy. *World J Surg* 1999; **23**: 265-269.
11. Liu M, Lee CH, P'eng FK. Prospective comparison of diagnostic peritoneal lavage, computed tomographic scanning, and ultrasonography for the diagnosis of blunt abdominal trauma. *J Trauma* 1993; **35**: 267-270.
12. Falcone RA, Luchette FA, Choe A, et al. Zone I retroperitoneal hematoma identified by computed tomography scan as an indicator of significant abdominal injury. *Surgery* 1999; **126**: 608-614.
13. Miller PR, Moore PS, Mansel, E, et al. External fixation or arteriogram in bleeding pelvic fracture: initial therapy guided by markers of arterial hemorrhage. *J Trauma* 2003; **54**: 437-443.
14. Stylianos S. Abdominal packing for severe hemorrhage. *J Pediatr Surg* 1998; **33**: 339-342.
15. Kushimoto S, Arai M, Aibosh J. The role of interventional radiology in patients requiring damage control laparotomy. *J Trauma* 2003; **54**: 171-176.
16. Saueracker AJ, McCroskey BL, Moore EE, et al. Intraoperative hypogastric artery embolization for life threatening pelvic hemorrhage: preliminary report. *J Trauma* 1987; **27**: 1127-1129.