Risk Factors in the Development of Rectus Sheath Hematoma and Treatment Modalities

Kubilay Dalci[1], Ugur Topal[1], Ahmet Gokhan Saritas[1], and Erdi Aydin[1]

[1]Cukurova University Faculty of Medicine

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Abstract

Aim: In this study,we aim to present the clinical features of patients with Rectus Sheath Hematoma (RSH), therapeutic management and results. Methods: The study included patients who were diagnosed with and received treatment due to spontaneous rectus sheath hematoma between the years 2010 and 2020. The demographic and clinical features of the patients,history of anticoagulant drug use and indication for anticoagulant drugs, laboratory parameters and radiological findings at the time of admission to the hospital, diameter of the hematoma, treatment modalities, follow-up parameters were analyzed retrospectively. Results: Our study included fifty-three patients. The median age was $65.7\pm14,68$ years and 63.3% of the patients were over the age of 65 years. Number of female patients was 35. Cases most often had an American Society of Anesthesiologists score of 3 (64.3%). The most frequently used anticoagulant was warfarin (30.1%) and it was most often used due to heart diseases (54.7%).International Normalized Ratio value at the time of admission to the hospital was $1.93+1.18$ and the hemoglobin value was 11.2 gr/dl. Average hematoma diameter was 74 mm and the most common stage was Type 1 (75.6%). 90.6% of the patients were followed up conservatively. Average duration of hospital stay being 15.1 days, mortality developed in 8 patients during their hospital stay. Conclusion: Spontaneous RSH should come to mind in elderly female patients who apply to the hospital with acute abdominal pain and are on anticoagulant therapy. Suspecting RSH can render early and true diagnosis possible, thus reducing morbidity and mortality in these patients.

Introduction

Rectus sheath hematoma (RSH) is a rare cause of stomach ache which is underestimated and has significant morbidity and mortality.[1] RSH is the accumulation of blood in the anterior rectus sheath due to rupture of the epigastric veins or the rectus muscle.[1] It is recognized as a "diagnostic dilemma" as it can be easily confused with the etiology of many acute abdominal pains.[2] RSH is characterized by presence of a palpable abdominal mass characterized by acute abdominal pain following abdominal muscle strain that is caused by trauma, coughing, sneezing etc. [3]

Many cases are referred to as spontaneous rectus sheath hematoma because they do not have a trauma history. Oral anticoagulation therapy or anticoagulant therapy administered with low molecular weight heparin are recognized as the most common risk factors known to be associated with spontaneous rectus sheath hematoma. Pregnancy, hypertension, previous abdominal surgery, coagulopathies or anti-platelet therapy have also been defined as risk factors. [1,4-6] Incidence of spontaneous rectus sheath hematoma (SRHS) increases upon increased administration of antiplatelet and anticoagulant therapies, and the estimated annual rate of SRSH is 1.2% to 1.5%.[7]

Early diagnosis and treatment are necessary in SRSH to minimize complications such as hemodynamic instability, abdominal compartment syndrome, multiple organ dysfunction syndrome, and death. Treatment options include conservative, interventional and surgical methods. Surgery might be fatal for many patients with RSH because they have other morbidities and hermorrhagic diathesis in advanced age. Therefore, the

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surgeon must be aware of the method that will best suit the patient. Hematoma might restrain itself with the help of conservative treatments like bed rest, analgesia, and correction of the bleeding disorder in many cases. Mortality can reach 4% even if SRSH restrains itself with the help of conservative treatment, and it can reach 25% in patients using anticoagulants. Radical interventions are required when conservative treatment modalities fall short.[7]

In the literature, data relating to rectus sheath hematoma are based on single center experiences and series with limited number of patients.[3,7-10]

In this study; we aim to analyze and discuss, in the light of the literature, the clinical features of patients diagnosed with rectus sheath hematoma in our clinic over a period of 10 years, and the therapeutic management and therapeutic results of SRSH.

Materials and Methods

Patients who were diagnosed with and received treatment due to spontaneous rectus sheath hematoma between the years 2010 and 2020 were included in the study. Patients with trauma induced hematoma, cases under 18 years of age, and patients whose data cannot be reached were excluded from the study. A database was created based on patient files, nurses' patient observation charts, and electronic records. Patients were analyzed retrospectively with the help of the database that was created.

Demographic features, body mass indexes (BMI), comorbidities, American Society of Anesthesiologists scores(ASA), past surgical histories, histories of anticoagulant and antiplatelet drug use and indications, laboratory parameters at the time of admission to the hospital, physical examination and radiological findings of the patients; stage, location and diameter of the rectus sheath hematoma; treatment modalities; number of transfusions; follow-up parameters; durations of hospital stays; and mortality data were evaluated.

SRH was staged based on the the staging system in (**Table 1**)which was created by Berná et al. [11]

Clinical conditions of the patients were considered in the selection of the treatment modalities. Conservative treatment included bed rest, analgesia, discontinuation of the anticoagulant, and transfusions carried out based on daily clinical follow-ups and daily follow-up of laboratory test results while surgical therapy included hematoma drainage accompanied by ligation of the epigastric vein.

This study was carried out at a university hospital and all the data was collected and evaluated following the approval thereof by the ethical committee of the same institute.

Statistical Analysis

IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows 24 (IBM Corp., Armonk, N.Y., USA) package program was used in the statistical analysis of the data. Categorical measurements were summarized as numbers and percentages, and continuous measurements were summarized as mean and standard deviation (minimum-maximum when necessary).

Results

Our study included fifty-three patients. Median age was 65.7 ±14,68 years and 63.3% of the patients were over the age of 65. Number of female patients was 2 times as many as the number of male patients. Cases most frequently had an ASA score of 3 (64.3%). The most common comorbid diseases were hypertension (50.9%) and atherosclerotic heart disease (49%). The most frequently used anticoagulant was warfarin (30.1%) which was most often used due to heart diseases (54.7%). Clinical and demographic features of the patients are outlined in (Table 2)

Average International Normalized Ratio (INR) during admission to the hospital was 1.93+ 1.18 and the hemoglobin value was 11.2 gr/dl. Laboratory parameters are outlined in (Table 3)

The average hematoma diameter was 74 mm and the most common stage was Type 1 (75.6%). Distribution of the localization of the hematoma was equal in the right and left sides of the abdomen, and the hematoma

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displayed bilateral localization in 22.6% of the patients. Diameter, staging, and localization details of the hematoma are outlined in (Table 4)

90.6% of the patients were followed up conservatively. Average duration of hospital stay was 15.1 days and mortality developed in 8 patients during their hospital stay. Follow-up and treatment results are outlined in (Table 5)

Discussion

RSH was reported in modern literature by Richardson for the first time in 1857.[12] Although it has been a well-defined disease since the very first report, it is often misdiagnosed. Although it makes up less than 2% of all patients who are admitted to the hospital due to acute abdominal pain alone, it is a pathology that should not be overlooked due to its mortality and complications.[8,13]

RSH is more common among women in their sixties.[6,10]This is attributed to women's having a smaller amount of rectus abdominis muscles and reduction in the flexibility of epigastric veins with increasing age due to atheromatous changes in the epigastric vein walls. Another reason for increased incidence of SRSH in the old age is increased use of anticoagulant and antiaggregant drugs by the elderly.[10] In line with the literature, majority of the patients in our series were female and predominantly in the 6th decade of their lives.

Possible risk factors for RSH are trauma, rapid and sudden changes in position, anticoagulant therapy, some hematologic diseases which disrupt blood clotting mechanisms, von Willebrand disease, hypertension, obesity, recent anterior abdominal wall surgery, cough attacks due to asthma and COPD exacerbations, injections, and pregnancy.[6,7,9] Anticoagulant therapy has been identified as the most commonly reported risk factor for RSH.[1,2,6,9,10] Patients with cardiovascular diseases and an ASA score of 3 made up the great majority of our series. Furthermore, the average body mass index of our patients was 28.3. Two thirds of our patients were on anticoagulant and/or antiplatelet therapy. Average INR value was 1.93.

RSH is diagnosed by means of such imaging techniques as Ultrasonography (USG), Computed Tomography (CT), and Magnetic Resonance (MR). Sensitivity of USG, which is the fastest and the easiest diagnosis tool for patients with suspected RSH, ranges between 80% and 90%.[14,15] As it is difficult to distinguish between intraabdominal lesions and abdominal lesions by means of USG, Abdominal BT has become the gold standard imaging technique in the diagnosis of RSH. [10] Furthermore, Berná et al.[11]developed a classification system for RSH that pays attention to CT results. In our study, CT imaging was the standard method used. Average hematoma dimater was identified as 74 mm. Contrary to the series in the literature, the most common RSH in our series was Type 1 (75%).[1,7,10]

In the literature, surgical intervention is not recommended for Rectus Sheath Hematomas other than Type III Rectus Sheath Hematomas. Medical treaments such as bed rest, cessation of anticoagulants, hydration, transfusion based on decrease in hemoglobin, and Fresh Frozen Plasma for warfarin intoxication are recommended.[7] In the literature, success rates ranging between 80% and 90% were reported for conservative treatment. [7,16] Surgical treatment is recommended in patients with Type III RSH whose hemodynamic stability cannot be insured via aggressive hydration and blood transfusion. Selective embolization of the epigastric arteries must be preferred over surgery even in this patient group as open surgical interventions intensify bleeding by eliminating the buffer capacity of the hematoma. Open surgery is recommended when bleeding cannot be controlled through embolization, when the hematoma is infected, and when compartment syndrome has developed.[1,7] Limited number of studies are available in the literature relating to the comparison of treatment modalities used to treat rectus sheath hematomas. In their study comparing surgical treatment, percutaneous treatment, embolization therapy and conservative treatment; Gradauskas et al demonstrated that embolization of the epigastric artery is a useful method in stopping the bleeding in hemodynamically unstable patients. In the same study, similar results were obtained in terms of all parameters, including hematoma size, between percutaneous drainage and conservative treatment groups in patients who had Type I and Type II hematomas. Duration of hospital stay of patients who underwent percutaneous drainage was two times longer than those of the group that underwent conservative treatment. No serious complications asso-

ciated with hematoma developed in both groups and readmission to the hospital was not required. Therefore, Gradauskas et al recommended that percutaneous drainage should be avoided as far as possible as it carries a potentially higher risk of infection.[17] Smithson A et al suggested that most cases in their series responded to conservative treatment and that selective embolization of the epigastric artery could be the first treatment option in patients using low molecular weight heparin.[1] The conservative approach was primarily adopted in all patients in our series and success was achieved in 90% of the patients with this treatment. One patient underwent percutaneous drainage and four patients underwent surgical treatment. Hemodynamic balance of the patients was determinative in determining the indication for surgical treatment.

Mortality rate of RSH varied between 12% and 20% in the studies carried out in the literature in the previous years.[18,19] however, it has decreased to 4-5% in the recent studies. The principal reason for such decrease in mortality rate is the inclusion of selective embolization of epigastric arteries in treatment modalities.[1] In the literature, mortality rate seems to be more related to significant comorbodities, anticoagulant therapies, large SRSHs, increased blood transfusion, and upper gastrointestinal system bleeding.[10,20] In our series, incidence of mortality during hospital stay was 15% and this was not considered to be associated with rectus sheath hematoma alone. Mortality developed in many patients due to aggrevation of the comorbidities accompanying SRSH. Accompanying hemodynamic instability and/or comorbidities can account for increased mortality rate.

The significant limitations of our study is its retrospective design, along with the heterogeneity of the study population. Despite these limitations, our study provides the literature with detailed clinical data relating to this rare clinical condition.

In conclusion, SRSH is a cause of acute abdominal pain which is seen more often today due to an increase in the use of anticoagulant and/or antiaggregant drugs for various reasons. SRSH must be kept in mind in patients who have a comorbidity, use anticoagulant drugs in particular, have a palpable mass accompanied by newly developing abdominal pain, and have a low hemoglobin level. Such conditions as coughing, sneezing and compulsion that increase intraabdominal pressure must be investigated together with a detailed medical history of the patient. Suspecting of SRSH in such circumstances will render early and true diagnosis possible, and prevent morbidity and mortality with the help of an appropriate treatment method before hemodynamic instability occurs in these patients.

Footnote

Conflicts of interest

No conflicts of interest were declared.

Ethical Statement The study was approved by the local Institutional Review Board (05/06/2020-100/26).

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Tables

Table 1. Staging of spontaneous rectus hematomas based on the findings of Computerized Tomography imaging (11)

Stage 1	Small hematomas that are confined within the rectus and do not cross the midline or dissect fascial planes
Stage 2	Hematoms confined within the rectus muscle but can dissect along the transversalis fascial plane or cross the mid
Stage 3	Large hematomas below the arcuate line that often present with blood and/or hemoperitoneum within the retzius

Table 2. Clinical and demographic data of the patients

Variable	Variable	(n=53)
Mean age (years)	Mean age (years)	65,7+14,68 (26-93)
Age (years)	<65	20(37.7)
	>65	33 (63.3)
Sex	Male	18(33.9)
	Female	35(66.1)
Body Mass Index	Body Mass Index	28.4+5.41(17.5-43,2)
ASA Score	1	8 (15)
	2	11(20.7)
	3	34(64.3)
Comorbidity	Comorbidity	
Hypertension	Hypertension	27(50.9)
Artheriosclerotic Heard Disase (ASHD)	Artheriosclerotic Heard Disase (ASHD)	26(49)
Heart failure	Heart failure	20(37.7)
Diabetes mellitus	Diabetes mellitus	17(32.1)
Arrythemia	Arrythemia	11(20.7)
Chronic Obstructive Pulmonary Disease (COPD)	Chronic Obstructive Pulmonary Disease (COPD)	10(18.7)
Chronic Kidney Failure (CKF)	Chronic Kidney Failure (CKF)	6(11.3)
Cerebrovascular Accident (CVA)	Cerebrovascular Accident (CVA)	6(11.3)
Cirhosis	Cirhosis	5(9.4)
Pulmonary Embolism	Pulmonary Embolism	1(1.9)
Malignancy history	Malignancy history	11(20.7)
Previous abdominal surgery	Previous abdominal surgery	19(35.8)
Anticoagulant treatment	Warfarin	16(30.1)
	Enoxaparin	4(7.5)
	Apixaban	1(1.9)
	Dabigatran	1(1.9)
Antiplatelet treatment	Acetylsalicylic acid	8(15.1)
	Clopidogrel	1(1.9)
	Acetylsalicylic acid+ Clopidogrel	4(7.5)
Anticoagulant + antiplatelet treatment	Anticoagulant + antiplatelet treatment	4(7.5)
Indications for anticoagulant or antiplatelet treatments	Cardiovascular diseases	29(54.7)
	Cerebrovascular diseases	3(5.7)
	Hematolojic diseases	2(3.8)

Variable	Variable	(n=53)
	Malignancies	1(1,9)

Values are presented as mean ± standard deviation (minimum-maximum) or numbers and percentages (%)

Table 3. Laboratory values

Variable	
International normalized ratio	1,93+1,18(0,83-5.8)
Prothrombin time (seconds)	21,7+12,7(10,4-65)
Activated partial thromboplastin time (seconds)	30,5+7,94(19,3-55.5)
White Blood Cell (WBC) count (mm^3/L)	10,9+ 7,79(4.5-58.1)
Initial Hematocrit level	34,5+ 6,20 (20.3-40.4)
Hemoglobin (gr/dl)	11,27+2.12 (6.1-16.5)
Platelet counts (mm^3/L)	266,6+117,5(87-632)
Urea (mmol/L)	25,0+ 22,84(5-141)
Creatinine (mmol/L)	0,98+0,69(0,44-4.1)

Values are presented as mean ± standard deviation (minimum-maximum) or numbers and percentages (%)

Table 4. Characteristics of the hematoma

Variable	Variable	(n=53)
Diamater (mm)	Diamater (mm)	74+36.6(12-170)
Type	1	38(75.6)
	2	12(19.5)
	3	3(4,9)
Localization	Right	21(39.7)
	Left	20(37.7)
	Bilateral	12(22.6)

Values are presented as mean ± standard deviation (minimum-maximum) or numbers and percentages (%)

Table 5.Follow-up and Treatment

Variable	Variable	(n=53)
Treatment	Medical	48(90.6)
	Surgical	4(7.5)
	Percutaneous	1(1,9)
Erythrocyte suspension replacement (n:22)	Erythrocyte suspension replacement (n:22)	4,2+3,5(1-13)
Fresh Frozen plasma replacement (n:24)	Fresh Frozen plasma replacement (n:24)	6,09+11,1(1-48)
Platelet suspension replacement (n:4)	Platelet suspension replacement (n:4)	1,66+1,15(1-3)
Length of hospital stay (day)	Length of hospital stay (day)	15,1+17,2(1-79)
Mortality during hospital stay	Mortality during hospital stay	8 (15)

Values are presented as mean ± standard deviation (minimum-maximum) or number and percentages (%)