



Timing of Anticoagulation Resumption After Spontaneous Rectus Hematoma

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Abstract

Objective:Rectus sheath hematoma (RSH) is a rare condition characterized by acute abdominal pain and development of a mass on the abdominal wall. It is caused by bleeding resulting from the rupture of one of the inferior epigastric arteries or a tear in the rectus muscle. It is associated with trauma and anticoagulant usage. Although there have been no substantial advancements in the diagnosis and treatment of RSH in recent years, it is anticipated that the incidences of RSH will increase with the rising use of anticoagulants. Surgery is rarely performed, but patients are monitored in general surgery departments. Treatment requires maintaining a delicate balance between the risks of bleeding and thrombosis. This study aims to present nontraumatic RSH cases treated in our clinic, supported by a review of the literature.

Methods: This retrospective multicenter study included patients over 18 years of age who were admitted with a diagnosis of nontraumatic RSH between 2020 and 2021 at the Department of General Surgery, Kahramanmaraş Sutcu Imam University Faculty of Medicine, and the General Surgery Clinic of Kayseri City Hospital. Patients diagnosed with RSH were identified by reviewing clinical protocol records and digital databases. The demographic data of the patients, such as age and gender, physical examination findings at admission, medications used, comorbidities, complete blood count, international normalized ratio and other laboratory information, imaging methods used for diagnosis, and receipt and quantity of blood products, were recorded. Following diagnosis, patients were monitored for one month for bleeding (recurrent bleeding, gastrointestinal bleeding, and intracranial bleeding) and thrombotic complications (heart valve thrombosis, cerebrovascular events, and pulmonary embolism).

Results: Of the 32 patients included in the study, 24 were men (75%) and eight were women (25%). Abdominal pain and palpable swelling were common complaints in all patients. Patient age ranged between 27 and 92 years with a mean age of 70.6 ± 12.9 years. Mean length of hospital stay was 12.6 ± 12.0 days, and 28% of the patients stayed in the intensive care unit for a mean duration of 2.8 ± 6.3 days. Correlation analysis revealed a weak positive correlation between the size of the hematoma on imaging and length of hospital stay and a weak negative correlation between Hb value at diagnosis and length of hospital stay ($p = 0.017$ and $r = 0.426$).

Conclusion: Nontraumatic RSH is a potentially fatal condition that requires hospitalization and intensive care unit admission as well as substantial amounts of blood transfusion. There is a relationship between the imaging method used at admission and the length of hospital stay as well as the hemoglobin level of the patient.

Keywords: Anticoagulant, Rectus sheath hematoma, Initiation

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Spontan Rektus Hematomu Sonrası Antikoagülasyonun Tekrar Başlanmasında Zamanlama

Öz

Giriş: Rektus kılıfı hematomu (RKH), akut karın ağrısı ve karın duvarında kitle görünümü ile karakterize, nadir görülen bir durumdur. Epigastrik arterlerden birinin rüptürünün veya kasın kendisinin yırtılmasının neden olduğu kanamadan kaynaklanır. Travma ve antikoagülan kullanımı ile ilişkilendirilmektedir. Tanı ve tedavisinde önemli değişiklikler gözlenirse de Anti-koagülanların artan kullanımı ile daha sık karşılaşılabileceği öngörülmektedir. Cerrahi nadiren uygulanmakta ancak genel cerrahi servislerinde takip edilmekte, tedavi kanama ve tromboz riski arasında ki hassas dengeyi korumayı gerektirmektedir. Amacımız kliniğimizde tedavi ettiğimiz travma dışı RKH hastalarını literatür eşliğinde sunmaktır.

Yöntemler: Bu retrospektif çok merkezli çalışmaya, 2020-2021 yılları arasında, Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi Genel cerrahi ABD ve Kayseri Şehir Hastanesi Genel Cerrahi kliniklerinde travma dışı RKH tanısıyla yatan, 18 yaş üstü hastalar dahil edildi. RKH tanısı alan hastalar klinik protokol defterinden ve dijital ortamdan taranarak ve tespit edildi. Hastaların yaş, cinsiyet gibi demografik verileri, yatıştaki fizik muayene bulguları, kullandığı ilaçlar, ek hastalıkları, tam kan sayımı, İNR gibi laboratuvar bilgileri, tanıya esas olan görüntüleme yöntemleri, kan ürünü alıp almadıkları ve sayıları kaydedildi. Tanı sonrası ilk bir ay, kanama (nüks kanama, GİS kanama, İntrakranial kanama) ve trombotik komplikasyonlar (kalp kapak trombozu, serebrovasküler olay, pulmoneremboli) açısından takipleri incelendi.

Bulgular: Çalışmaya dahil edilen 32 hastanın 24'ü erkek (%75) 8'i kadındı (%25). Tüm hastalar da karın ağrısı ve ele gelen şişlik ortak şikayetti. Hasta yaşları 27-92 arasında değişmekte idi ve ortalama yaş $70,6 \pm 12,9$ idi. Hastanede kalış süresi ortalaması $12,6 \pm 12,0$ idi ve hastaların %28'i ortalama $2,8 \pm 6,3$ gün yoğun bakımda kaldılar. Korelasyon analizi yapıldığında ($p=0,017$ ve $r=0,426$) hematomun görüntüleme boyutu ile yatış süresi arasında pozitif yönde zayıf bir korelasyon, tanıdaki Hb değeri ile yatış süresi arasında negatif zayıf bir korelasyon vardı.

Sonuç: Travma dışı RKH hastanede ve yoğun bakımda yatış gerektiren, önemli miktarda kan ürünü transfüzyonu gerektiren mortal seyredebilen bir durumdur. Hastada gelişte yapılan görüntüleme yöntemi ve hemoglobin değeri ile yatış süresi arasında bir ilişki mevcuttur.

Anahtar kelimeler: Antikoagülan, Rektus kılıfı hematomu, Başlama.

INTRODUCTION

Rectus sheath hematoma (RSH) is a relatively rare condition characterized by acute abdominal pain and development of a mass on the abdominal wall¹. It is caused by bleeding resulting from the rupturing of one of the epigastric arteries or a tear in the muscle itself². Patients are typically older individuals, often women using anticoagulant medications³. RSH is associated with blunt trauma, use of anticoagulants, and pregnancy in young women¹. Researchers suggest that the increasing use of anticoagulant therapy will lead to a rise in the incidence of RSH². In addition to clinical findings, cross-sectional imaging is crucial in the diagnosis. Figure 1 illustrates the computed tomography image of a patient with a left RSH in the lower abdomen.

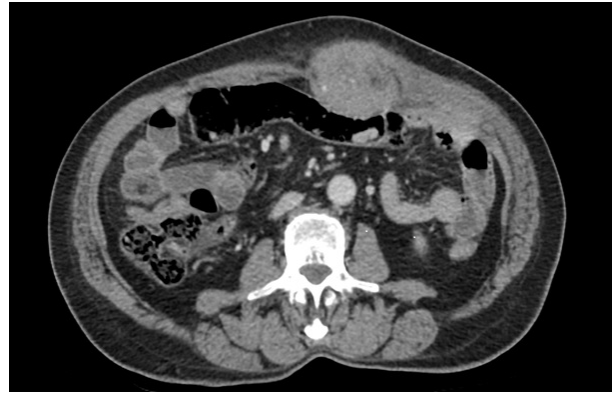


Figure 1: Computed tomography image of a patient with left rectus sheath hematoma.

RSH is generally considered a self-limiting disease; however, it can be fatal⁴. Treatment for spontaneous RSH is determined based on the patient's clinical condition. Medical treatment includes fluid replacement, use of blood products, and correction of existing bleeding diathesis⁵. Treatment success is achieved in the majority of patients through conservative treatment, but in some cases, embolization via

angiography or surgical intervention, although rare, may be necessary^{6,7}. There are no guidelines to provide clear directions on when to initiate anticoagulant therapy after the risk of bleeding has diminished⁸. These patients often have numerous comorbidities (such as pulmonary embolism, coronary artery disease, deep vein thrombosis [DVT], valve replacement, atrial fibrillation [AF]) and receive anticoagulant therapy. However, despite rarely requiring surgical intervention, they are followed up on in surgical departments⁹. Treatment of RSH requires the correction of RSH to a bleeding diathesis and establishment of a delicate balance between the underlying tendency for thrombosis and bleeding. The uncertainties regarding when to initiate anticoagulant therapy and the delicate balance required during the treatment have prompted us to share our experiences in this regard.

METHODS

This retrospective multicenter study included patients over 18 years of age who were admitted with a diagnosis of nontraumatic RSH between 2020 and 2021 at the Department of General Surgery, Kahramanmaraş Sutcu Imam University Faculty of Medicine, and the General Surgery Clinic of Kayseri City Hospital. Approval was obtained from the local ethics committee (decision no: 01.09.2021/02). Traumatic RSH patients were excluded from the study. The study adhered to the principles of the Declaration of Helsinki. Patients diagnosed with RSH were identified by reviewing clinical protocol records and digital databases. The demographic data of patients, such as age and gender, physical examination findings upon admission, medications used, comorbidities, complete blood count data, international normalized ratio (INR), and other laboratory information as well as the imaging methods used for diagnosis, were recorded; moreover, whether they received blood products and their quantities were recorded. Following the

diagnosis, records regarding bleeding (recurrent bleeding, gastrointestinal bleeding, intracranial bleeding) and thrombotic complications (heart valve thrombosis, cerebrovascular events, pulmonary embolism) were maintained for one month.

Statistical Analysis

Statistical data were analyzed using the IBM Statistical Package for the Social Sciences, Version 20.0 software package for Windows (IBM Corp., Armonk, NY, USA). Numeric data are presented as mean \pm standard deviation and minimum–maximum, and categorical data were presented as number (n) and percentage (%). Conformity of the data to normal distribution was examined using the Kolmogorov–Smirnov test. Numeric data that met the assumptions for parametric tests were compared using the Pearson correlation analysis. Furthermore, Spearman correlation analysis was performed for variables that did not meet the assumptions for parametric test conditions. A p value of <0.05 was considered significant in all analyses.

RESULTS

Of the 32 patients included in the study, 24 were men (75%) and eight were women (25%). Abdominal pain and palpable swelling were common complaints in all patients, and patient age ranged between 27 to 92 years, with the mean age was 70.6 ± 12.9 years. The mean length of hospital stay was 12.6 ± 12.0 days (minimum:1-maximum:60) and 28% of the patients stayed in the intensive care unit for a mean duration of 2.8 ± 6.3 days (minimum:0-maximum:30).

Patients had many comorbidities, with hypertension being the most common comorbidity. The comorbidities are summarized in Graph 1. Drugs that are predisposing factors to bleeding are presented in Graph 2, and the indications for drug use are presented in Graph 3. Complete blood count, INR values, hematoma size at admission and used blood product are summarized in Table 1. Complications that

developed during follow-up are summarized in Table 2.

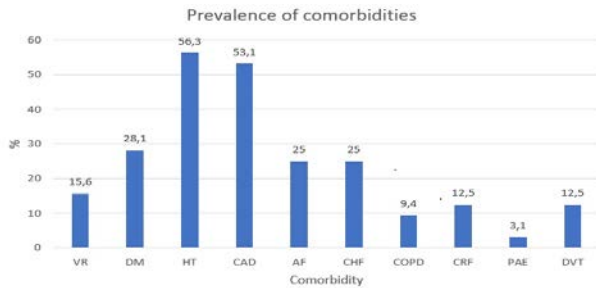
Table I: Hemoglobin, Platelet, INR values, hematoma size at admission and used blood product

		Minimum	Maximum	Mean	Std. D.
At Diagnosis	INR	0,49	4,62	1,54	0,86
	Platelet	25	767	230	125
	Hemoglobin	5,6	15,0	9,1	2,0
	Diameter (cm)	1,0	23,0	10,3	4,8
Transfusion	Erythrocyte (iu)	0	21	2,9	4,3
	FFP (iu)	0	12	1,6	2,8
	Platelet (iu)	0	35	1,2	6,2

FFP (Fresh Frozen Plasma)

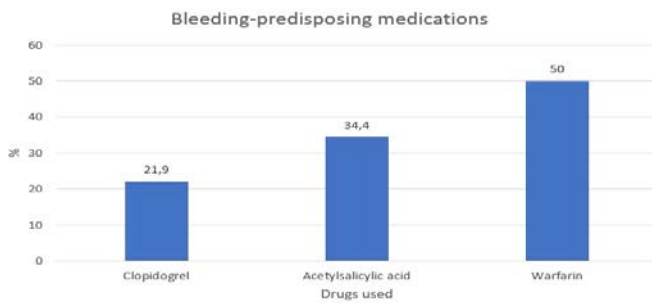
Table II: Complications.

		n	%
Thrombotic Complication	Atrial thrombus	1	3.4
	DVT	1	3.4
Bleeding Complication	Decrease in hemoglobin	12	40.0
	GI bleeding	1	3.3
	Platelet refractoriness	1	3.3
Mortality		3	9.4

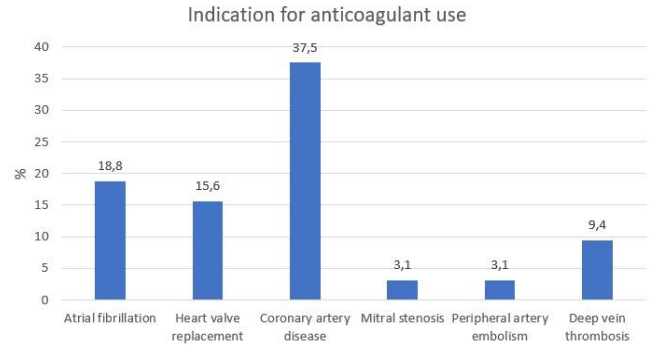


Graph 1: Comorbidities.

Valve Replacement (VR) Diabetes Mellitus (DM), Hypertension (HT), Atrial fibrillation (AF), Coronary Artery Disease (CAD), Chronic obstructive pulmonary disease (COPD), Chronic renal failure (CRF), Peripheral artery embolism (PAE), Deep vein thrombosis (DVT).



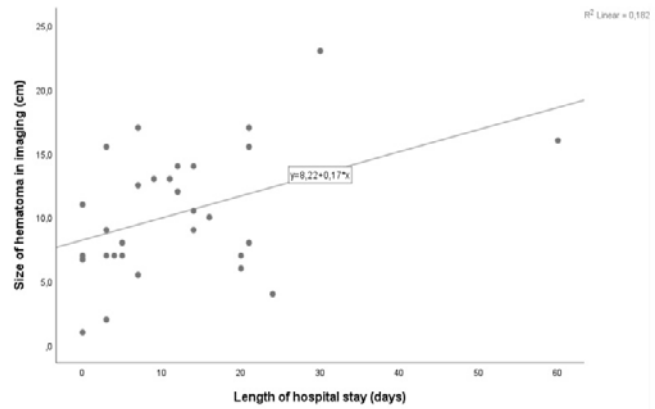
Graph 2: Drugs that are predisposing factors to bleeding.



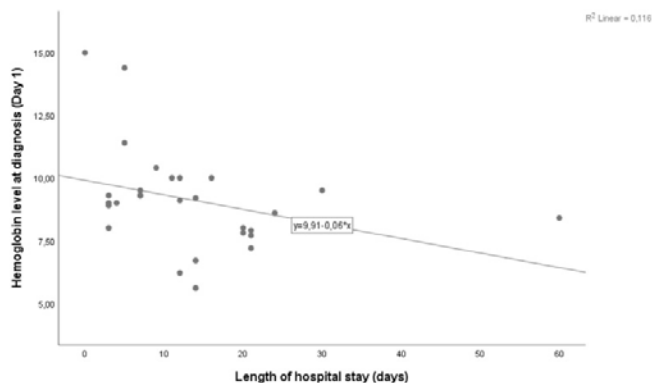
Graph 3: Indications for medication.

Out of the 10 patients for whom drug reuse information was obtained, five resumed warfarin therapy after an average of 4.4 ± 2.7 days (min: 2, max: 9), and five initiated acetyl salicylic acid therapy after an average of 5.7 ± 5.1 days (min: 1, max: 13). Table 2 presents the no bleeding or thrombotic complications in these patients.

When correlation analysis was conducted between the size of the hematoma on imaging and the length of hospital stay, a weak positive correlation was observed ($p = 0.017$ and $r = 0.426$) (Graph 4). Correlation analysis also revealed a weak negative correlation between hemoglobin level at diagnosis and length of hospital stay ($p = 0.019$ and $r = -0.440$) (Graph 5).



Graph 4: Relationship between imaging and length of hospital stay (Pearson correlation analysis).



Graph 5: Relationship between hemoglobin level at diagnosis and length of hospital stay (Spearman correlation analysis).

DISCUSSION

RSH rarely requires surgical intervention, and these patients often have multiple comorbid conditions. Majority of treatments comprise fluid replacement, blood product transfusion, and management of bleeding diathesis. These patients are followed up in general surgery clinics⁹. Typically, patients are elderly, and the disease tends to occur more frequently in women³. In the present study, the mean age was 70.6 ± 12.9 years, with a notable predominance of male patients. However, there are studies in the literature reporting a predominance of male patients⁶. Patients with RSH require intensive care follow-up due to the disease itself and the high number of comorbid conditions, and the disease can have a fatal course. In the present study, approximately one-third of the patients were followed up in the intensive care unit (28%) and multiple blood product transfusions were administered (mean 2.9 ± 4.3 units of erythrocyte transfusion). The mortality rate is reported to be approximately 4%, with an increased mortality being observed in patients using anticoagulants¹⁰. In the present study, mortality occurred in two patients. One of these patients died as a result of hypotensive shock and cardiac arrest at diagnosis. The other patient also had compartment syndrome and underwent surgery. He died due to refractory thrombocytopenia following platelet

transfusion, subsequently developing pancytopenia (the patient was diagnosed with hemophagocytic syndrome). One of the leading risk factors is anticoagulant therapy³. In the present study, among the drugs predisposing to bleeding, warfarin usage was the most common, followed by acetylsalicylic acid and clopidogrel usage, respectively. The most common indication for use of these drugs was coronary artery disease.

RSH patients may present with complaints such as abdominal pain, ecchymosis on the abdominal wall, mass, hypotension, or shock³. Abdominal mass and pain were common symptoms in all of our patients. Additionally, two patients experienced hypotensive shock and one patient had abdominal compartment syndrome. For the diagnosis and evaluation of treatment, the patients' bleeding profiles and complete blood counts are important, and imaging methods such as abdominal ultrasonography and computed tomography can be used¹¹. In contrast to the existing literature, the relationship between the largest size of the hematoma in imaging methods (ultrasonography and computed tomography) and the length of hospital stay was evaluated in the present study and a weak positive correlation was identified. Furthermore, a weak negative correlation was observed between the hemoglobin level at diagnosis and the length of hospital stay. These data may be helpful in predicting patients' lengths of hospital stay.

Treatment can be approached conservatively based on the patient's clinical condition. These patients should be hemodynamically stable and have non-expanding hematomas. In patients where conservative treatment is not suitable, angiographic embolization and surgery are alternatives^{3,12}. In a study published in 2006, Cherry et al. performed surgery in two and embolization in eight of 126 patients³. In the present study, angiographic embolization was attempted in a patient in hypotensive shock but

was unsuccessful and the patient was taken to surgery. The other patient who underwent surgery presented with abdominal compartment syndrome, a rare indication for surgery. Both patients underwent drainage of the hematoma and ligation of the bilateral inferior epigastric artery. All other patients were treated conservatively.

Conservative treatment consists of fluid resuscitation, serial laboratory evaluations, management of predisposing factors, reversal of anticoagulation when necessary, and blood transfusion^{11,12}. Approximately one-third of our patients were using warfarin due to valve replacement or AF. All of our patients had their medications predisposing to bleeding discontinued. The elimination of the predisposing factor for bleeding or reversal of anticoagulation in these patients may create a tendency for thrombosis. Foreign material in the systemic circulation increases the risk of thrombosis, necessitating antithrombotic therapy. Insufficient anticoagulant therapy is the most common cause of thrombosis in mechanical heart valves¹³. Therefore, patients with RSH should be treated by maintaining a delicate balance between bleeding and thrombosis.

The second issue concerns the duration of anticoagulation cessation, that is, the timing of resumption. There are no guidelines in the literature regarding when anticoagulation should be resumed, and this may be related to the variability in the duration of action of many drugs associated with the disease⁸. Neither the series of 126 cases published by Cherry et al. nor the meta-analysis of 177 cases published by Linhares et al. clarified when anticoagulation therapy should be resumed^{3,14}. Kunkula et al. stated that anticoagulant therapy was safely initiated on the 4th day, but they observed that thrombotic complications were more common than bleeding. Therefore, they suggested that the interval before starting anticoagulation

therapy in their study could be longer⁸. In the present study, after cessation of anticoagulation, all patients received low molecular weight heparin (LMWH) prophylactic dose the day after diagnosis. The drugs used for anticoagulation were available at the bedside, so there were individuals who were verbally informed about the necessity of starting or not starting the medication. Therefore, the information about when oral treatment was resumed could not be obtained for every patient. Out of the 10 patients for whom drug usage information was obtained, five resumed warfarin therapy on average on the 4th day, and five started using acetylsalicylic acid on average on the 5th day. One patient developed peptic ulcer bleeding and was treated endoscopically. In 12 patients, the ongoing decrease in hemoglobin was treated conservatively. In the present study, bleeding complications were more frequent than thrombosis, which may be attributed to the use of LMWH after the diagnosis. The patient who experienced valve thrombosis was started on LMWH at prophylactic doses immediately after diagnosis. The information on when the patient resumed warfarin could not be obtained; however, during hospitalization, subtherapeutic INR values were observed, and the patient was lost. The patient who experienced DVT was using aspirin, and LMWH treatment was initiated. Despite this, DVT still developed. These complications suggest that the treatment of RSH needs to be delicately balanced. Resumption of anticoagulation will be the clinician's decision due to lack of guidelines and data. It seems logical to start anticoagulant therapy after hemodynamic stabilization is achieved and bleeding is controlled. The absence of a decrease in hemoglobin values, the end of the need for blood products, the absence of growth in the hematoma and the absence of any additional surgery will help to decide to start the drug again. In patients with an indication for anticoagulation, anticoagulation

should be restarted before hospital discharge to prevent thrombotic complications^{15,16}.

When our patients are evaluated, the first of the two mortal cases is the cases that present with shock symptoms and the other with abdominal compartment syndrome. The presence of these findings should trigger the physician and move away from the conservative method. Patients with hypovolemic shock that is refractory to aggressive resuscitation, ongoing transfusion requirement, expanding hematoma, or active contrast extravasation on CT imaging should be promptly referred for angiography with possible embolization of the bleeding source or surgery^{7,17}. In our study, a correlation was found between the length of hospitalization and hemoglobin and hematoma size. It can enable the physician to evaluate the prognosis and may be useful in determining a predictive value for outpatient treatment or intensive care in the future. In addition, DMAH was given to all patients, and DMAH is associated with complications of bleeding that can be corrected conservatively. This data can positively affect the physician's use of DMAH in rectus hematoma.

The retrospective nature of our study and the inability to obtain information on the resumption of drug use in some patients were considered as limitations of the study.

CONCLUSION

RSH is a disease that requires intensive care follow-up and multiple blood transfusions, and complications may develop both in terms of bleeding and thrombosis. Therefore, a delicate balance should be sought during treatment. There is a correlation between the size of the hematoma and hemoglobin levels at admission and the length of hospital stay. There is a need for further evidence regarding when anticoagulation therapy should be resumed.

Ethics Committee Approval: Kahramanmaras Sutcu Imam University Faculty of Medicine, and the

General Surgery Clinic of Kayseri City Hospital. Approval was obtained from the local ethics committee (decision no: 01.09.2021/02). Traumatic RSH patients were excluded from the study. The study adhered to the principles of the Declaration of Helsinki.

Conflict of Interest: The authors declared no conflicts of interest.

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