Research Article

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The role of coagulation mechanism in the development of acute thrombosed hemorrhoidal disease

Akut tromboze hemoroidal hastalığın gelişiminde pıhtılaşma mekanizmasının rolü

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Abstract

Purpose: Hemorrhoidal disease is a common benign anorectal disease. Acute thrombosis that occurs during the course of hemorrhoidal disease is a painful complication. Factors affecting its etiopathogenesis are not known definitively. The aim of this study, therefore, was to assess predisposition to coagulation during the development of the disease.

Material and methods: 30 patients with acute thrombosed hemorrhoidal disease and 30 other patients with hemorrhoidal disease but no thromboses were included in the study. Samples collected from these patients were analyzed with thromboelastography machines. The results were compared with patients' demographic data.

Results: No statistically significant difference was found between the groups as per age, sex, diarrhea, history of a similar attack, history of surgical treatment, spicy food consumption, fibrous food consumption, and regular exercise. The results of our study revealed that the alpha angle was smaller in patients with acute thrombosed hemorrhoidal disease.

Conclusion: Hypercoagulability does not occur in patients with acute thrombosed hemorrhoidal disease.

Key words: Hypercoagulability, thrombosed hemorrhoid, thromboelastography.

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Öz

Amaç: Hemoroidal hastalık sık görülen benign anorektal bölge hastalığıdır. Hemoroidal hastalığın seyri sırasında oluşan akut tromboz ağrılı bir komplikasyondur. Etyopatogenezinde etkili etmenler tam bilinmiyor. Çalışmamızdaki amacımız hastalığın gelişiminde pıhtılaşmaya yatkınlığı değerlendirmektir.

Gereç ve yöntem: Akut tromboze hemoroidal hastalığı olan 30 hasta ile hemoroidal hastalığı olan ancak tromboz gelişmeyen 30 hasta çalışmaya dahil edildi. Bu hastalardan alınan numuneler tromboelastografi cihazında incelendi. Demografik verileri ile kıyaslandı.

Bulgular: Gruplar arasında yaş, cinsiyet, ishal, benzer atak öyküsü, cerrahi tedavi öyküsü, baharatlı gıda tüketimi, lifli gıda tüketimi ve düzenli egzersiz açısından istatistiksel olarak anlamlı bir fark bulunmamıştır. Akut tromboze hemoroidal hastalığı olan hastalarda alfa açısının daha küçük olduğunu tespit ettik.

Sonuç: Akut tromboze hemoroidal hastalığı olan hastalarda hiperkoagülabilite durumu oluşmamaktadır. Ancak kanamaya yatkınlık gelişmektedir.

Anahtar kelimeler: Hiperkoagülabilite, tromboze hemoroid, tromboelastografi.

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Introduction

About 40% of individuals with hemorrhoidal disease are asymptomatic [1]. Hemorrhage, pain, pruritus or perianal wetness are usually seen in symptomatic patients. Some of the patients present with swelling and acute pain in the perianal site [2]. Such presentation can be observed both in internal and external hemorrhoidal disease. Acute thrombosis of the external hemorrhoidal cushion is referred to as acute thrombosed external hemorrhoidal disease, while thrombosis of the external hemorrhoid is also known as “acute perianal hematoma” [3]. The strangulation of prolapsed internal hemorrhoids and conditions of thrombosis, gangrene or ulceration are called acute thrombosed internal hemorrhoidal disease. Both conditions are defined as acute hemorrhoidal disease [3-6]. Thrombosis of external hemorrhoids often accompany the thrombosed protrusion of internal hemorrhoids from the anal canal. External or internal acute hemorrhoidal disease is an extremely painful clinical condition. It significantly affects patients’ daily lives.

Researchers have put forth many theories on the pathogenic mechanism of thrombosed hemorrhoidal disease. However, the factor that extensively explains the condition is yet to be known. The most important question within this framework of theories is about the reason why all patients with the same conditions do not have thrombosis. The aim of this study was, therefore, to identify other factors causing this condition, except those laid out in these theories, along with an assessment on whether patients were more prone to coagulation since whether coagulation factors have any effect on this condition was not known either.

Materials and methods

This prospective randomized study was conducted between 1 January 2019 and 1 January 2020. Local board of ethics approval was also obtained (Decision No: 2018/1602). The first 30 patients with acute thrombosed hemorrhoidal disease (ATHD) and the first 30 patients with hemorrhoid disease without thrombosis (HD) who applied to our clinic between these dates were included in the study. The exclusion criteria for the patients were ascertained to be the presence of a disorder affecting the coagulation system and history of medication. All the patients were evaluated by an experienced colorectal surgeon. Patients who did not exceed 72 hours from the onset of ATHD were included in the study.

The patients’ data on age, sex, pain, hemorrhaging, diarrhea, history of a similar attack, history of medical and surgical treatment, spicy food consumption, fibrous food consumption, and regular exercise routines, or lack thereof, were collected.

After we obtained written and oral consents from the patients, 1 cc citrated blood was drawn from each patient. These samples were then analyzed by thromboelastography (TEG) machines at the hematology laboratory within an average of 30 mins. TEG® analyzer (TEG 5000 Thromboelastograph® Hemostasis System, Haemonetics Corporation, Niles, USA) was used in the study (Figure 1). TEG analyzers were regularly calibrated and tested. Intrinsic pathways, extrinsic pathways, fibrinogen and hyperfibrinolysis values were analyzed in the samples. Screened parameters included prothrombin time (PT), activated partial thromboplastin time (aPTT), international normalized ratio (INR), R time (reaction time, representing the period from the beginning of the measurement to the time when the distance between the two curves reach 1 mm), K time (signifying clot formation time and representing the period during which the clot reaches an amplitude of 20 mm), alpha angle (angle deg, i.e. the angle between the tangent line drawn from the curve separating from the horizontal axis and the horizontal axis and representing the speed at which the clot gains maximum force), maximum amplitude (MA, reflecting the maximum clot amplitude or maximum clot elasticity and is rather associated with the number of thrombocytes, thrombocyte functions and fibrinogen levels] and LY30 value [representing the depression in the amplitude of the clot at 30 minutes after the maximum amplitude point).

Within the scope of statistical analyses for the study, the Kolmogorov-Simirnov and Shapiro-Wilk tests were used to control the distribution of parameters. Student’s t-test was used for the comparison of independent groups. Non-categorical data, chi-square tests were used in cross tables. In the interpretation of statistical hypothesis tests, type 1 error was set at 0.05. The collected data were analyzed by the SPSS program.

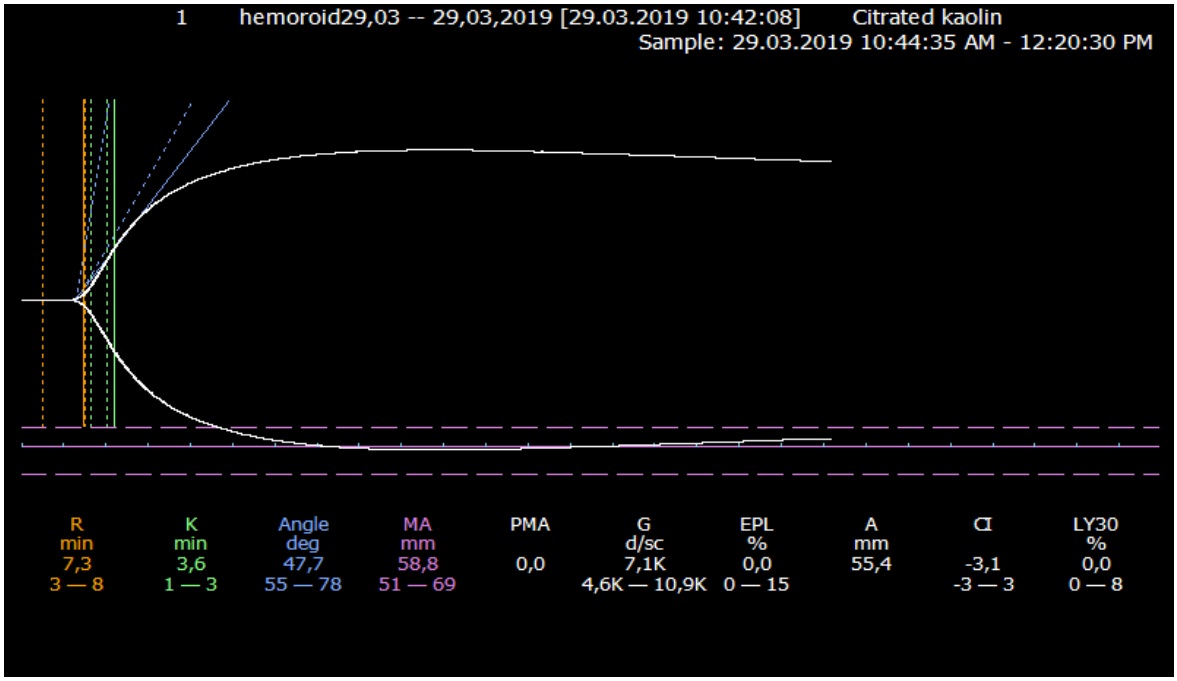

Figure 1. Thromboelastogram graphic of the patient with thrombosed hemorrhoids

Results

The study included a total of 60 patients. 30 of these patients had ATHD, while another 30 had HD. The mean ages of the patients with ATHD and HD were 35.10 (23-63) and 35.63 (20-65) respectively. No statistically significant difference was found between the groups as per age, sex, diarrhea, history of a similar attack, history of surgical treatment, spicy food consumption, fibrous food consumption, and regular exercise (Table 1). However, the results of our study revealed a statistically significant difference between patients with ATHD and HD in terms of pain, hemorrhaging and history of medical treatment. Pain and hemorrhaging rates were higher in patients with ATHD. The rate of history of medical treatment, on the other hand, was higher in patients with HD.

TEG analysis showed that the alpha angles were smaller in the ATHD group. This result indicated that patients with ATHD were more prone to hemorrhaging than those with HD. This result was statistically significant as well. No statistically significant difference was found in any of the other values (Table 2).

Discussion

Thrombosed hemorrhoidal disease is a common complication of hemorrhoidal disease. Acute thrombosed hemorrhoidal diseases can develop during the course of external and internal hemorrhoidal disease. Thrombosed external hemorrhoidal disease occurs in the inferior anal plexus structure beneath the squamous epithelium. Some of the patients have over-straining due to constipation. Yet this situation does not explain the physiopathology of all patients' clinical conditions [7]. External hemorrhoidal disease is seen more frequently in young individuals.

Thrombosis is usually formed due to over-exercise in this age group. It is suggested that over-exercise leads to the laceration of external veins by causing a sudden and extreme increase in intraluminal pressure [7, 8]. Another theory put forth to explain the physiopathology of acute thrombosis pertains to the impairment of connective tissue support that enables engorged hemorrhoidal veins to hold on to the anal canal [7]. Prolapsed varicose veins in this area are further damaged by the traumatic impact of straining or defecating. Such traumatic impact initially leads to stasis then to clotting in hemorrhoidal veins in time through the effect of triggering factors as well. Such alterations result in acute edema formation in the skin and mucosa of the anal verge [3, 7]. The results of our study, however, revealed that thrombosis was formed in some of the patients while it did not in some others although similar conditions were seen in all. These theories failed to fully explain the

Table 1. Demographic data of patients

		Groups				
		ATHD		HD		
		n	Percent (%)	n	Percent (%)	*p*
Sex	Male	24	80%	21	70%	0.37
	Female	6	20%	9	30%	
Pain	Yes	27	90%	10	33.33%	**<0.02**
	No	3	10%	20	66.67%	
Hemorrhage	Yes	20	66.67%	10	33.33%	**<0.01**
	No	10	33.33%	20	66.67%	
Constipation	Yes	21	70%	19	63.33%	0.58
	No	9	30%	11	36.67%	
Diarrhea	Yes	0	0%	1	3.33%	0.80
	No	30	100%	29	96.67%	
History of a similar attack	Yes	21	70%	23	76.67%	0.55
	No	9	30%	7	23.33%	
Medical treatment	Yes	8	26.67%	19	63.33%	**<0.01**
	No	22	33.33%	11	36.67%	
Surgical treatment	Yes	5	16.67%	24	80%	0.73
	No	25	83.33%	6	20%	
Spicy food consumption	Yes	12	40%	12	40%	0.29
	No	18	60%	18	60%	
Fibrous food consumption	Yes	12	40%	12	40%	0.30
	No	18	60%	18	60%	
Regular exercise routines	Yes	12	40%	7	23.33%	0.16
	No	18	60%	23	76.67%	

Table 2. TEG values of patients

	Groups				
	ATHD		HD		
	Average value	Min/Max	Average value	Min/Max	*p*
INR	1.12	0.9/1.38	1.10	0.9/1.3	0.5
PTsec	14.66	12/18	13.93	12/18	0.13
aPTT	83.86	62/110	84.26	65/110	0.91
R	7.82	6/9.9	7.98	6.7/9.9	0.61
K	3.9	2.3/5.5	3.45	1.5/5.4	0.06
Alpha value	43.21	34.5/58.5	54.71	38/70	**<0.01**
MA	52.73	44/62.5	52.86	44/61	0.93
CL	-4.53	-7/-1	-3.86	-6/-1	0.12

event that occurred in all patients. We believe that there are other factors affecting the etiology of the disease which we do not know as of now. We, therefore, investigated whether coagulation factors had an impact on thrombosis formation within the scope of our study. Further, studies in literature have reported no data on this subject which proves to be a dark spot that has not been studied before. Should this theory be accurate, one could have discussed the administration and efficacy of medication in treatment that altered the coagulation system.

Edema develops in the anal area due to a cause that increases anal tonus in prolapsed internal hemorrhoids [particularly grades 3 and 4]. Initially strangulation, then subsequent thrombosis occurs in the cushions through further increase in the anal canal pressure. Ulceration and necrosis may develop in advanced stages. Reduction of prolapsed internal hemorrhoids is challenging because of edema and increased anal sphincter pressure. Severe pain caused by edema and thrombosis increases internal anal sphincter spasms as a reflex. Sphincter spasm, in turn, leads to an increase in the severity of pain. Spasm and pain result in a vicious circle exacerbating each other [7, 9]. Edematous mucosa over thrombosed veins also causes edema in the skin and subcutaneous tissues. This edema increases in time. External hemorrhoidal cushions are usually involved in the event in these patients. The most important clinical complaint of patients is severe pain. Urinary retention may develop secondary to pain in some patients [4-7]. Such clinical presentation generally occurs after the onset of the event, in other words, it does not set off the event. We suggest that this theory or process is not a beginning but a result. The formation of clot in engorged veins is usually the beginning and booster of this clinical condition. The reason why venous clots do not form in all patients with hemorrhoidal disease, who happen to have the same clinical presentation, is not known. Patients with grade 3-4 hemorrhoidal disease suffer from this condition at certain times in their lives but the life styles of these patients are usually the same except for essential deviations. Constipation and over-straining trigger or facilitate this event but the reason why patients have problems at certain times is not known either.

The aim of this study was to reveal whether there was a hematologic condition that increased coagulation but our results did not reveal any difference between the groups except for the alpha value. The fact that the alpha value was smaller in patients with ATHD indicates that such patients are prone to hemorrhaging. We, however, were not able to identify the clinical significance of this result. The hypothesis we established at the planning stage of this study was that patients were prone to coagulation but our results did not support this hypothesis. We encountered the exact opposite of our hypothesis, in other words, patients were more prone to hemorrhaging.

Consequently, the results of our study revealed no hypercoagulability in the development of ATHD. Blood drawn from patients immediately before thrombosis may prove to be more significant but we do not know at which time. We believe that one of the possible ways to clarify this situation can be a comparison of the course of hemorrhoidal disease and its complications in patients on anticoagulants and those who are not.

Conflict of interest: No conflict of interest was declared by the authors.

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Authors' contributions to the article

S.A. and M.Ç. have constructed the main idea and hypothesis of the study. S.A., M.Ç., A.T., M.Ş. developed the theory and arranged/edited the material and method section. A.V., Ö.K. S.A. M.Ş. have done the evaluation of the data in the Results section. Discussion section of the article written by S.A., M.Ç., A.T.; Ö.K., M.Ş., A.V. reviewed, corrected and approved. In addition, all authors discussed the entire study and approved the final version.