

## Evaluation of Central Venous Catheters Inserted in the Emergency Service

Acil Serviste Takılan Santral Venöz Kateterlerin Değerlendirilmesi

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## ABSTRACT

**Objective:** In our study, we evaluated central venous catheter procedures performed by Adnan Menderes University, Department of Emergency Medicine in the emergency room and emergency intensive care units. We planned to investigate performing central venous catheter application with ultrasound guidance and the rate of bleeding complications in patients using anticoagulants or antiplatelet.

**Material and Method:** Between 15.11.2018-15.10.2019, central venous catheter application was performed 178 cases over the age of 18 and non-pregnant were included. Research data were evaluated by using SPSS 21.0 statistics program.

**Results:** A Central venous catheter procedure was performed in 78.7% of the patients with ultrasound guidance. 36.5% of the patients had a history of anticoagulant or antiplatelet drug use. The most common complications in our patients were ventricular dysrhythmia and subcutaneous hematoma.

**Conclusion:** In conclusion, when looking at the relationship between gender, anticoagulant and/or antiplatelet drug use, preferred vein and ultrasound use during the procedure, and complication status, no statistically significant results were found.

## ÖZET

**Amaç:** Çalışmamızda Adnan Menderes Üniversitesi Acil Tıp Anabilim Dalı tarafından acil servis ve acil yoğun bakım ünitelerinde yapılan santral venöz kateter işlemlerini değerlendirdik. Antikoagülan veya antiplatelet ilaç kullanan hastalarda ultrason eşliğinde santral venöz kateter uygulaması yapmayı ve kanama komplikasyon oranlarını araştırmayı planladık.

**Gereç ve Yöntem:** 15.11.2018-15.10.2019 tarihleri arasında santral venöz kateter uygulaması yapılmış 18 yaş üstü ve gebe olmayan 178 olgu dahil edildi. Araştırma verileri SPSS 21.0 istatistik programı kullanılarak değerlendirilmiştir.

**Bulgular:** Hastaların %78,7'sine ultrason eşliğinde santral venöz kateter işlemi uygulandı. Hastaların %36,5'inde antikoagülan veya antitrombosit ilaç kullanım öyküsü vardı. Hastalarımızda en sık görülen komplikasyonlar ventriküler disritmi ve cilt altı hematomdu.

**Sonuç:** Sonuç olarak cinsiyet, antikoagülan ve/veya antitrombosit ilaç kullanımı, işlem sırasında tercih edilen damar ve ultrason kullanımı ile komplikasyon durumu arasındaki ilişkiye bakıldığında istatistiksel olarak anlamlı bir sonuç bulunamadı.

## Keywords:

Central Venous Catheter  
Emergency Medicine  
Ultrasound

## Anahtar Kelimeler:

Santral Venöz Kateter  
Acil Servis  
Ultrason

## INTRODUCTION

Central venous catheterization (CVC) is a widely used method in patients undergoing both surgical and medical treatment (1). CVC; allow for many procedures, for example, fluid maintenance, hemodynamic monitoring, intravenous drug therapy, plasmapheresis, hemodialysis and total parenteral nutrition (2). The most preferred ways of percutaneous CVC intervention are internal jugular vein (IJV), subclavian vein (SV), femoral vein (FV) or basilic vein, but can be used in other veins opening to the central circulation. Although CVC was performed by following anatomical lines without imaging for the first time, ultrasonography (USG) started in recent years (2). As with any attempt, CVC has its complications. The most deadly of these complications were pneumothorax,

hydrothorax, hemothorax and cardiac tamponade. The success and complication rates of interventions are quite different according to the experience and education levels of the practitioners (3, 4). With the visualization of subcutaneous structures in the CVC procedure performed with USG, the success rate of the procedure increases, and the complication rates are less.

In our study, we aim to evaluate the bleeding complication in catheters inserted by USG or Landmark method in patients who use anticoagulants and/or antiplatelet drugs in CVC procedure.

## MATERIAL AND METHOD

This study was carried out prospectively Aydın Adnan Menderes University Hospital, Emergency Medicine Department. Our ethics committee number is given as

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**Table 1:** Central venous catheter indications

Indication	n	%
Hemodialysis	97	54.5
Need for vascular access	53	29.8
Central venous pressure measurement	21	11.8
Plasmapheresis	5	2.8
Other	2	1.1

2018/1514. The study included 178 patients aged 18 years and over who applied to our emergency service between 15.11.2018 and 15.10.2019 and had CVC procedure performed by emergency physicians. Patients requiring a second CVC application were included in the study as two separate cases. The average age of the patients included in our study was 67 (18-96 years).

Research data were evaluated using the SPSS 21.0 statistical program. The compatibility of continuous variables to normal distribution was investigated using visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov / Shapiro-Wilk tests). For the descriptive statistics of the study, mean and standard deviation were used for data conforming to the normal distribution, and the median, minimum and maximum for data that did not fit the normal distribution. Chi-Square Test was used to show whether there is a difference between categorical variables in the study. For statistical significance, the condition of determining the p-value less than 0.05 was sought.

**RESULTS**

The average age of the patients included in our study was 67 years (18-96 years). Of all patients, 79 (44.4%) were female. According to CVC indications, hemodialysis was the first reason (Table 1). Hemoglobin level, platelet count, prothrombin time (PT) and activated partial thromboplastin

time (APTT) analysis of the patients are given in Table 2. When the anticoagulant or antiplatelet drugs used by the patients regularly or given during their follow-up in the emergency department or emergency intensive care are examined, 63.5% of the patients included in our study did not use any anticoagulant or antiplatelet drug. The drug use of the patients that may cause bleeding is shown in Table 3.

When the catheterization area of the patients is examined; It was observed that IJV was preferred in 90 (50.6%) patients, FV in 78 (43.8%) patients, and SV in 10 (5.6%) patients. When the catheterization procedures are examined in general, it is seen that 79.2% of the procedures are done from the right side and 20.8% from the left side. When the complication conditions of the patients were examined during and after the CVC procedure, it was observed that complications developed in 19.1% of the patients. When the complications were examined, it was seen that the most common complication situation was bleeding (Table 4).

When it was evaluated whether CVC was performed with USG, it was seen that USG-guided CVC was implanted in 140 patients (78.7%). When the CVC procedure performed with USG and complications were compared, it was observed that the use of USG did not affect the development of complications (p=0.095) (table 5).

Considering the relationship between anticoagulant or antiplatelet drug use and complications, complications were observed in 21.5% of patients with drug use and 17.7% of patients without drug use. When the statistical analysis was performed, it was not significant (p=0.530). Analysis results are given in Table 5.

When looking at the relationship between anticoagulant or antiplatelet drug use and bleeding status, bleeding complications were observed in 7.7% of patients with drug use and 7.1% of patients without drug use. When

**Table 2:** Blood values analysis

	n	Mean	Median	Minimum	Maximum	SD
Hemoglobin (gr/dL)	178	10.2	9,9	2.6	17.5	2.6
Platelets (10 <sup>3</sup> / mcrl)	178	217	193	9	612	126
APTT (sec)	168	31.84	28,30	11,00	112.70	13.96
PT (sec)	171	20.26	14,20	0.95	122.80	17.28
INR	171	1.46	1,17	0.80	6.07	0.88

PT: prothrombin time, APTT: activated partial thromboplastin time, INR: international normalized ratio, SD: standard deviation

**Table 3:** Drug use that may cause bleeding

Active ingredient	n	%
Acetylsalicylic acid	12	6.7
Heparin and its derivatives	30	16.9
Warfarin	10	5.6
New generation anticoagulant	6	3.4
Clopidogrel	7	3.9
Not using medication that can cause bleeding	113	63.5

**Table 4:** Distribution of complications by patients

Complication	n	%
Bleeding	10	5.6
Ventricular dysrhythmia	9	5.1
Catheter infection	4	2.2
Artery puncture	5	2.8
Dysrhythmia and bleeding	3	1.7
Catheter malposition	2	1.1
Other	1	0.6
No complications occurred	144	80.9

**Table 5:** USG usage / medication use - complication status comparison

		Complication status				p
		Yes		No		
		n	%	n	%	
<b>USG use</b>	Yes	30	21.4	110	78.6	0.095
	No	4	10.5	34	89.5	
<b>Medication Use</b>	Yes	14	21.5	51	78.5	0.530
	No	20	17.7	93	82.3	

the patients with and without bleeding were examined, no difference was found between the two patient groups in terms of anticoagulant/platelet use (p=0.549).

### DISCUSSION

Our study has stated that both of anticoagulant/antiplatelet drug use and USG application are not associated with increased risk of complication in CVC placement in the emergency department.

CVC is a method widely used in patients undergoing both surgical and medical treatment. CVC; enables many procedures such as fluid maintenance, hemodynamic monitoring, intravenous drug therapy, plasmapheresis, hemodialysis and total parenteral nutrition. Although the most preferred routes are IJV, SV or FV in percutaneous CVC intervention, other veins opening to central circulation can also be used. Although CVC was performed by following anatomical lines without imaging in the first years, it started to be performed with USG in recent years (2).

In the study of Mumtaz et al. 2010 CVC procedures were applied to 1825 patients. 330 of the patients have bleeding disorders, and 4 of them have bleeding complications. As a result, it was emphasized that CVC could be safely placed in patients with underlying bleeding disorders, and care should be taken in terms of thrombocytopenia (5). A bleeding complication was observed in 6.5% of the application of 110 CVCs by Doerfler et al. to 76 patients with hemostasis disorder. It was found that there were no signs of serious bleeding in the patients. It was observed that the patients with the highest probability of bleeding were those with thrombocytopenia (6). Of 14 patients with platelet values of 50,000 / mL or less, bleeding was observed in only 3 cases in our study. The bleeding in the patients remained in the form of subcutaneous hematoma and did not progress to a life-threatening or surgical intervention. When analyzed statistically, no meaningful result was found. When we compare our study with other studies in the literature, we think that the CVC procedure

can be performed by an experienced physician in patients who use anticoagulants or antiplatelet drugs in the absence of thrombocytopenia.

In the study conducted by Balls et al., it was shown that USG was not effective in the development of complications. In the same study, it was shown that the use of USG decreases the number of punctures performed for a patient (7). In a study conducted by Milling et al. Using USG and comparing the traditional Landmark method, it was shown that the attempts performed with USG were superior in the first puncture attempt in terms of successful catheterization, the number of attempts, duration of intervention, and arterial puncture (8). In the study of Leung et al. 130 patients, CVC was implanted in half of the patients with USG and half with the traditional method. When the procedures were evaluated in terms of the number of attempts, duration of intervention and complications, it was observed that the procedures performed under USG were more successful than the procedures performed by the traditional method (9). USG was used in 37% of CVC procedures in the study of Martin et al. While the complication rate was 11% in patients using USG, it was found to be 9% in patients who were not used, and it was statistically shown that the use of USG did not affect the development of complications (10). In our study, although there were more complications in USG guided procedures, it was not found to be statistically significant. Since we are a training clinic, we think that the complication rates are high because resident doctors who have just started training perform catheter application with USG.

In conclusion; CVC can be applied to patients with coagulopathy by a physician who is knowledgeable and experienced in CVC. Although there are contradictions between USG and its complications in the literature and our study, we think that the complication rates will decrease with the increase in USG training and usage. More comprehensive studies are needed on this subject.

**Conflict of interests:** The authors declare that there are no conflicts of interest.

**Ethic:** Clinical Research Ethics Committee of Aydın Adnan Menderes University Medical Faculty Number: 2018/1514

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