



## Intravascular Branul Fracture İntravasküler Branül Fraktürü

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### Abstract

The peripheral vascular catheter is usually used in intensive care patients to perform medical treatment and invasive blood pressure monitoring. However, during or after this procedure, some complications can develop. One of the complications is intravascular branule fractures. The delay of the treatment process can increase the incidence and severity of complications. Radiography and ultrasonography may be useful for early diagnosis. The reliability of ultrasonography in acute cases is quite high but it can be inadequate in delayed cases or when broken components have moved to a more proximal position. Besides these complications also cause legal actions taken against physicians and health care professionals. In this case, we aim to present the case of a branule fracture in which broken part of a branule remained within the vessel until our peripheral vascular intervention.

**Keyword:** Peripheral Catheterization; Complications; Embolism.

### Özet

Yoğun bakıma yatırılan hastalara medikal tedavilerin yapılabilmesi ve invaziv kan basıncı monitorizasyonu için periferik damarlardan genellikle periferik branül yerleştirilir. Ancak bu işlemler sırasında veya sonrasında bazı komplikasyonlar gelişebilir. Bu komplikasyonlardan biri intravasküler branül fraktürleridir. Bu gibi durumlarda erken tanı konulabilmesi için radyografi ve ultrasonografi kullanılabilir. Acil durumlarda ultrasonografinin güvenilirliği oldukça yüksektir. Fakat gecikmiş vakalarda ultrasonografi yetersiz olabilir veya kırılan branül parçası daha proksimale hareket edebilir. Tedavi sürecinin gecikmesi komplikasyonların sıklığını ve önemini arttırabilmektedir. Yine bu komplikasyonlar hekimlerin ve sağlık personellerinin hukuki olarak da suçlanmasına sebep olabilecektir. Bu vakada periferik vasküler girişim sonrası damar içinde kırılan ve damar içinde kalan vakayı sunmayı amaçladık.

**Anahtar Kelimeler:** Periferik Kateterizasyon; Komplikasyon; Emboli.

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## INTRODUCTION

For the medical treatment and invasive blood pressure monitoring, patients admitted to intensive care are often applied branule placement through peripheral veins. However, complications may develop during or after the insertion process. In this report, we aim to present the case of a broken branule within the blood vessel during a peripheral vascular intervention.

## CASE REPORT

The 20G 32mm branule inserted to the left wrist of a 31-year-old female patient at the Turgut Ozal Medical Center Maternity ICU in order to treat the cephalic vein came off while removing from the neck at the distal of the injection port 3 days after its insertion. To prevent embolisation, we applied tourniquet with gauze bandage to the proximal portion of the branule's broken end (Figure 1).



**Figure 1.** Tourniquet application to prevent embolisation in the proximal portion of the branule's broken end.

The diagnosis was established by clinical examination and ultrasonography. While asking the patient to sign the surgical consent form, we informed the patient that direct radiography or ultrasonography may be insufficient due to the radiopaque structure of catheters especially in late diagnosis or in cases when the remaining piece moves up towards a more proximal position. Then, we opened the cephalic vein under local anaesthesia and detected the broken part of the branule. We removed the broken part and applied primary repair (Figure 2). The patient was discharged without any problems.



**Figure 2.** Removing the broken part of the branule from the vein.

## DISCUSSION

Peripheral venous branules are commonly applied for the treatment and follow-up of inpatients in hospitals (1). Peripheral venous branules are used to apply blood, liquid, nutritional agents, and drugs into the peripheral circulation as well as to monitor invasive blood pressure. As in many invasive procedures, the increase in the use of branules comes with complications during and after the application. These complications include local complications such as vascular insufficiency, bleeding, skin and subcutaneous lesions, phlebitis, hematoma, and branule embolisms as well as systemic complications such as sepsis and air embolisms (2). In addition, branule fracture and, thus, the presence of a foreign object within the veins bring about additional surgical procedures to the patient, extend the duration of the treatment, and increases the risk of new complications. Moreover, these complications can lead to legal indictment of physicians and medical staff.

A study on the American Anesthesiology Society database has shown that 2% of lawsuits against physicians were due to peripheral vascular catheterisation with common complications such as crusting on the the skin (28%), swelling/infection (17%), nerve damage (17%) , fasciotomy scars (16%), and air embolism (8%) (3). The incidence of broken venous branules with remains within the vein is reported to be 0.1%.

A study conducted among 11 paediatric patients with a control group has shown that the size of branule, its location, or the type of administered liquid are not influential factors on intravascular branule fractures though the length of time branule remained attached, leak around the area where branule is inserted, and branule blockage are found to be factors leading to this situation (4). In one of the studies on the complications, the risk of pulmonary embolism developing form vein thrombosis due to peripheral branule is reported as 12% (5). The clinical signs of branule embolisation are malfunctioning branule (56%), arrhythmia (13%), lung symptoms (4.7%), and septic syndromes (1.8%). But this can be asymptomatic in 24.2% of the cases; the mortality rate is 1.8% in such cases (6). It has also been shown that applying tourniquet to the region where the branule fractures has occurred reduces the risk of embolism (7). Branule-related infections, another major complication associated with branule use, constitute 7% of nosocomial infections in the literature. Besides, if the remains of the intravenous catheter stay within the vessel for more than 48 hours, this raises the risk of contamination to 52% (8-9).

Intravenous branule parts can lead to pulmonary arterial embolism through vena cava, right atrium, and right ventricle. Although they are very rare, the most serious complications can be listed as follows: myocardial perforation or necrosis due to the embolisation of the right ventricle and pulmonary artery, tricuspid or pulmonary valve defects, endocarditis, pulmonary abscesses, arrhythmia, and sudden death. The risk of

bacterial contamination in cases when intravenous catheter components remain within vessels for more than 48 hours is 52% (10).

For the effectiveness of treatment, early diagnosis is important in cases with suspected peripheral catheter fracture. Radiography and ultrasonography may be useful for early diagnosis. The reliability of ultrasonography in acute cases is quite high but it can be inadequate in delayed cases or when broken components have moved to a more proximal position. In cases when it is not for certain that broken pieces are still in the vessels, radiological examination could be misleading with false positive results. For this reason, it is important to inform patients prior to surgery.

Today, as a result of the increase in the use of intravascular branules, the incidence of complications with mortality and morbidity rates has also likewise increased. For this reason, health service staff who apply these procedures should be trained while practitioners should also intervene accurately and quickly in case of such complications. Training health personnel is important not only because it may affect the continuity of treatment but also it will prevent legal processes related to serious complications caused by branule fractures.

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