

# Spontaneous bleeding of thoracoacromial artery mimicking tunneled cuffed catheter-related complication

## A case report

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### Abstract

**Rationale:** The chronic complications caused by the tunneled cuffed catheter in chronic dialysis patients are infection and catheter dysfunction. While bleeding due to this access can occur occasionally.

**Patient concerns:** We present a 92-year-old woman with a 6-year history of regular hemodialysis (HD). For the past 2 years, she has been receiving HD via a tunneled cuffed catheter placed in the right internal jugular vein. She suffered from a right chest subcutaneous hematoma near the catheter without recent trauma. The increasing size of hematoma after dialysis, and the oozing from the outlet of the catheter were also observed.

**Diagnosis:** Computed tomography of chest and angiography were done and showed that the hematoma was caused by thoracoacromial artery bleeding, which was near the puncture site of the tunneled cuffed catheter.

**Interventions:** Fluid resuscitation, blood transfusion, surgical drainage, and parenteral antibiotics were prescribed.

**Outcomes:** Patient recovered fully without any further sequelae.

**Lessons:** Spontaneous bleeding of thoracoacromial artery is rare and clinicians should keep in mind as a differential diagnosis in patient with new-onset hematoma over anterior chest wall. Early diagnosis and treatment are important in such cases.

**Abbreviations:** CT = computed tomography, HD = hemodialysis.

**Keywords:** angiography, hemodialysis, spontaneous bleeding, thoracoacromial artery, tunneled cuffed catheter

## 1. Introduction

The thoracoacromial artery is a short branch that arises from the second part of the axillary artery and divides into pectoral, acromial, clavicular, and deltoid branches. The pectoral branch descends between the pectoral muscles, gives a branch to pectoralis minor, and then continues on the deep surface of pectoralis major.<sup>[1]</sup> Thoracoacromial artery injury is uncommon,

and spontaneous bleeding of one of the arterial branches is extremely rare. Most reported cases are either iatrogenic or trauma-related, both of which could cause pseudoaneurysm formation.<sup>[2–4]</sup>

We present an interesting case of a patient undergoing regular hemodialysis (HD) who developed a right chest subcutaneous hematoma, which originated from spontaneous bleeding of the pectoral branch of the thoracoacromial artery, near the tunneled cuffed catheter.

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Ethical approval was waived by the ethics committee at the Shin Kong Wu Ho-Su Memorial Hospital because our case study was based on chart review. However, the written informed consent was obtained from the patient for publishing the related images and laboratory data.

The authors have no conflicts of interest to disclose.

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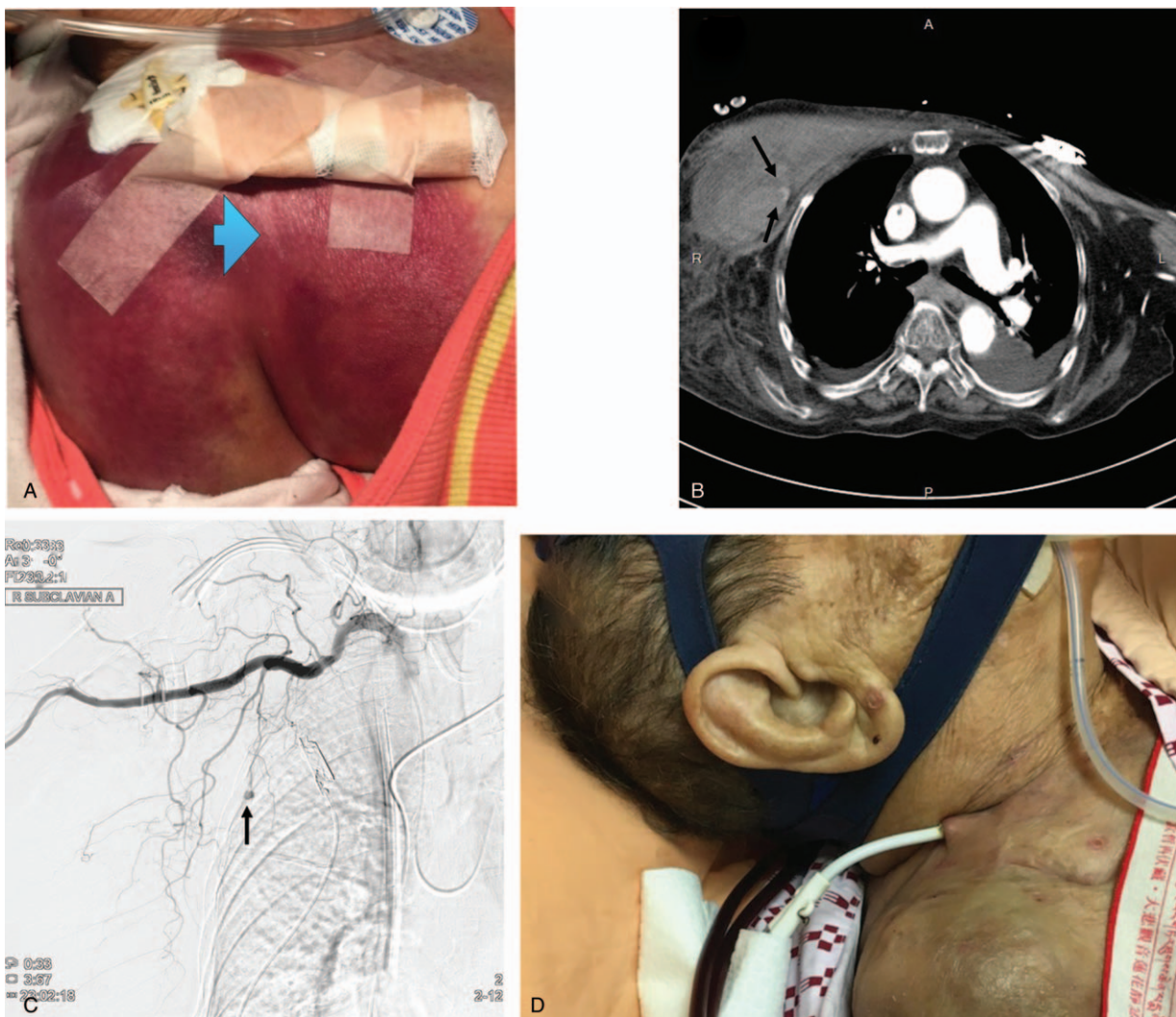
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## 2. Case report

A 92-year-old bed-ridden Taiwanese woman presented to the emergency department with progressive right anterior chest wall swelling for several hours. She has a history of the end-stage renal disease under regular HD for almost 6 years. Recently, she received HD via tunneled cuffed catheter of the right internal jugular vein due to arteriovenous graft failure. Other systemic diseases including hypertension with oral bisoprolol (2.5 mg daily); sick sinus syndrome status post permanent pacemaker placement for 12 years; and diabetes mellitus with oral linagliptin (5 mg daily) are also present. No regular anticoagulant medicine was prescribed in recent 6 months before this visiting.

On physical examination, Glasgow coma scale E3V4M5, peripheral capillary oxygen saturation 95%, body temperature 35.3°C heart rate 80 beat per minute, respiratory rate 20 per minute, blood pressure 58/12 mm Hg (it became 99/38 mm Hg after fluid resuscitation with 500 mL normal saline), pale conjunctivae, and tender right chest wall swelling with



**Figure 1.** The hematoma near the tunneled cuffed catheter. (A) Swelling and ecchymosis of the right chest near the tunneled cuffed catheter (arrowhead); (B) Enhanced computed tomography, showing extravasation of the pectoral branch of thoracoacromial artery (arrow); (C) Angiography, showing acute bleeding of the pectoral branch of thoracoacromial artery (arrow); (D) Newly inserted tunneled cuffed catheter after 6 months, no ecchymosis or hematoma was noted.

subcutaneous hematoma were noted (Fig. 1A). Laboratory tests were shown in Table 1. The predominant findings were leukocytosis (white blood cell count, 13,200 per microliter) and anemia (hemoglobin 8.2 gm/dL). However, no apparent coagulopathy was noted.

Acute bleeding related to tunneled cuffed catheter was suspected due to rapid progression of the hematoma, the proximity of the lesion with the catheter, and the patient’s shock status. Computed tomography (CT) revealed a large hematoma and edema in the right anterior chest wall. A small active bleeding site was present (Fig. 1B). Thoracic angiography of right subclavian artery showed an abnormal loculated contrast collection near the pectoral branch of the thoracoacromial artery with a possible bleeding point (Fig. 1C). It was compatible with the anatomical position of the hematoma shown on CT, which was located between the pectoralis major and pectoralis minor.

Superselective cannulation of the target vessel was initiated but the procedure failed. Afterward, surgical debridement and drainage were performed. The tunneled cuffed catheter was removed due to persistent oozing from its outlet. Subsequently, a

new catheter was inserted via a different subcutaneous tunnel route (Fig. 1D). Furthermore, intravenous vancomycin (500mg twice weekly) was prescribed for 3 weeks due to the presence of methicillin-resistant *Staphylococcus aureus* in wound culture.

The hematoma over the patient’s right chest wall gradually shrank and grew softer after treatment. The patient was discharged under a stable condition with no occurrence of hematoma or bleeding episode in the next 6 months.

### 3. Discussion

Spontaneous arterial bleeding is rare regardless of its origin. Coagulopathies caused by diseases or medications, and conditions that result in arterial wall weakening and aneurysmal formation such as neurofibromatosis type I, Ehlers–Danlos syndrome, and Marfan syndrome are known to contribute to the etiologies of spontaneous bleeding.<sup>[5]</sup> The usual incidence of arterial or venous injuries are <1% and hematoma formation has been reported in approximately 0% to 4.7% of all catheter placements.<sup>[6,7]</sup>

**Table 1**  
**Laboratory test results during admission.**

Variable (reference range)	Value
Blood urea nitrogen (7–25 mg/dL)	33
Creatinine (0.5–1.3 mg/dL)	5.2
Sodium (133–145 mEq/L)	136
Potassium (3.3–5.1 meq/L)	3.3
Ionized calcium (3.68–5.6 mg/dL)	3.8
Phosphate (2.5–5.0 mg/dL)	2.4
Hemoglobin (11.0–16.0 g/dL)	8.2
Mean corpuscular volume (81–98 fL)	93.1
White-blood cells (3800–10,000/ $\mu$ L)	13,200
Segmented neutrophil (37–75%)	85.6
Lymphocyte (20–5%)	7.9
Platelet (140–450 $\times 10^3$ / $\mu$ L)	150
PT (9.4–12.5 s)	12.6
INR (0.8–1.2)	1.1
aPTT (26–38 s)	32.4
Aspartate transaminase (5–35 U/L)	16
Alanine aminotransferase (10–50 U/L)	4
Albumin (3.5–5.7 gm/dL)	3.1
Iron (50–212 ug/dL)	45
TIBC (240–450 ug/dL)	180
Ferritin (11–306.8 ng/mL)	468.6

aPTT = activated partial-thromboplastin time, INR = international normalized ratio, PT = prothrombin time.

Nevertheless, there was a case report describing spontaneous intercostal arterial rupture found in a chronic renal failure patient and proposed that it could be caused by uremic thrombocytopenia or the direct injury to the vascular intimal layer.<sup>[8]</sup> In another case report, the author suggested that heparinization therapy administered during HD and uremia might play a role in spontaneous bleeding.<sup>[9]</sup>

To the best of our knowledge, there is only 1 case of spontaneous hemorrhage of the thoracoacromial artery reported by Tombesi et al.<sup>[10]</sup> Due to the relative obscurity of this type of spontaneous hemorrhage and its close proximity to a catheter, a misdiagnosis as tunneled cuffed catheter-related bleeding is very likely. Complications caused by tunneled cuffed catheter can be roughly divided into acute and chronic types. Acute complications, such as bleeding, hematoma formation, and pneumothorax, are usually related to the procedure itself. In contrast, the most common chronic complication is infection, followed by catheter dysfunction due to thrombosis, mechanical dysfunction, and or fibrin sheath formation.<sup>[11,12]</sup> Although bleeding from dialysis vascular access is uncommon, it should not be overlooked as it could lead to mortality.<sup>[13]</sup> Moreover, some unusual bleeding sources near the vascular access might further complicate their situation. In our case, the vascular access-related bleeding was impressed initially due to the above reasons and the definite diagnosis was made after angiography.

In addition to the direct consequences of bleeding such as the hypovolemic shock caused by severe blood loss, hematomas can also be significant sources of infection, which could lead to abscess formation or bacteremia.<sup>[11]</sup> Thus, precautions and further investigation should be indicated if subcutaneous hematoma formation is observed in patients with a catheter

inserted for a long period of time. Even though the definite cause of bleeding in this patient could not be determined, it is imperative that clinicians encountering new onset of subcutaneous anterior chest hematoma with unknown and obscure etiology should at least consider thoracoacromial arterial bleeding as a differential. Early diagnosis and intervention, including CT, angiography, broad-spectrum antibiotics, and surgical drainage, can be life-saving, as shown in this patient. Although the reason for spontaneous bleeding in this patient was unclear, we thought that the most probable reason is uremic platelets dysfunction, atherosclerotic change of patient’s vessel and instillation of anticoagulants (heparin) within tunneled cuffed catheter after each session of HD.

In conclusion, we report a rare case with undergoing maintenance HD presenting the spontaneous bleeding of thoracoacromial artery that mimics tunneled cuffed catheter-related complication. Unless emergent CT angiography is available, the making of definitive diagnosis can be difficult. Other imaging modalities such as ultrasonography can also be diagnosed but it depends upon operator skills.

**Author contributions**

**Conceptualization:** Yu-Wei Fang, Mi-Chu Lin.  
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**Validation:** Ming-Hsien Tsai, Yu-Wei Fang, Mi-Chu Lin.  
**Writing – original draft:** Mann Hua Nam, Mi-Chu Lin.  
**Writing – review and editing:** Ming-Hsien Tsai, Mi-Chu Lin.

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