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Case Report / Olgu Sunumu

Deep venous thrombosis in the right upper extremity after removal of the Swan-Ganz thermodilution catheter

Swan-Ganz termodilüsyon kateterinin çıkarılmasını takiben gelişen sağ üst ekstremite derin ven trombozu

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Catheter-related central vein thrombosis is a frequently seen complication of Swan Ganz thermodilution catheterization procedure. In this article, we aimed to present a 73-year-old female case with deep venous thrombosis in the right upper extremity after removal of the Swan-Ganz thermodilution catheter in the light of current literature data.

Key words: Complication; deep venous thrombosis; Swan-Ganz thermodilution catheter; upper extremity.

Kateter ile ilişkili santral ven trombozu, Swan-Ganz termodilüsyon kateterizasyon işlemi sonrasında sıkça görülen bir komplikasyondur. Bu yazıda, Swan-Ganz termodilüsyon kateteri çıkarılmasını takiben sağ üst ekstremitede derin ven trombozu gelişen 73 yaşında bir kadın olguyu güncel literatür bilgisi ışığında sunmayı amaçladık.

Anahtar sözcükler: Komplikasyon; derin ven trombozu; Swan-Ganz termodilüsyon kateteri; üst ekstremite.

The Swan-Ganz pulmonary artery thermodilution catheter is the most frequent material used during and after cardiac surgery to monitor the patient in the early period because it gives so much information to surgical and anesthesia teams along with intensive care staff. Its placement and use carry potential risks that require immediate management.[1]

CASE REPORT

Our case involved a 73-year-old female whose past medical history was significant because of a myocardial infarction experienced a year earlier. She underwent a successful coronary bypass surgery to two vessels at our clinic. Perioperatively, a Swan-Ganz thermodilution catheter (Edwards Lifesciences, 7F 110 cm) was inserted into the right internal jugular vein for invasive hemodynamic monitorization. She was discharged on the seventh postoperative day. On the fifth day after discharge, she was readmitted to our hospital with complaints of pain and enlargement in the right arm (Figure 1). Color Doppler ultrasound revealed that the right axillary and subclavian veins were completely filled with non-compressible thrombus material which doubled the size of the accompanying arteries. The venous system located within the cubital fossa and the forearm was patent (Figures 2 and 3). Our opinion is that the major responsible factor for the thrombosis in our patient was the thrombogenic stimulus of the catheter itself. She was then rehospitalized, and antithrombotic therapy was initiated. She was heparinized, and the activated clotting time (ACT) values were kept between 200 and 250 seconds. Oral warfarin was added on the first treatment day, and an international normalized ratio (INR) level of 2-2.5 was maintained. She showed a dramatic relief in symptoms and was discharged on the sixth day of hospitalization for ambulatory therapy. Serum protein C and S levels were within normal limits while searching for a thrombophilic state. A control Doppler ultrasound examination was repeated on the 15th day after the onset of symptoms, and this showed revascularization anterior to the thrombosed subclavian vein (Figure 4) and posterior to the thrombosed axillary vein (Figure 5). Flow rates were detected to be low in the revascularization areas, and the new venous structures were thin in calibration. No thrombus was detected within the distal deep venous segments.

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Figure 1. Increase in size of the right arm of our patient due to deep vein thrombosis.

The patient was kept on warfarin sodium anticoagulation therapy for six months, and INR levels of 2.2±0.2 were targeted. Her outpatient follow-up continues free of events with only oral medication of 300 mg acetylsalicylate per day. She is asymptomatic, and there has been no recurrence or post-thrombotic sequelae.

DISCUSSION

Invasive hemodynamic monitoring has become standard, and hemodynamic monitorization through a Swan-Ganz catheter is a valuable resource in the assistance of the critically ill patient.[2] Clinical signs of central vein thrombosis as a complication of internal jugular vein cannulation are rarely seen.[3]

In the retrospective study by Rosenwasser et al.,[4] 630 Swan-Ganz catheters were placed in 184 patients. An evaluation of complications demonstrated a 1.3% incidence of subclavian vein thrombosis (8 of 630 catheters).

Forty-four patients received jugular bulb catheter monitoring in the intensive care unit (ICU) in a study by Coplin et al.[5] In 20 randomly chosen patients, an ultrasonographic evaluation was performed after removal of the catheter for an assessment of internal jugular vein thrombosis. Of these 20 patients, eight (40%) had nonobstructive, subclinical internal jugular vein thrombi after jugular bulb catheter monitoring (95% confidence interval, 19-61%). The median monitoring duration was three days (range, 1-6 days). No clinical factor was identified to be associated with thrombus formation.[5]

In the study by Timsit et al.,[6] 265 internal jugular or subclavian catheters were included in ICU patients. Veins were explored by duplex scanning performed just before catheter removel or <24 hours afterwards. Two hundred and eight catheters were analyzed, and a catheter-related internal jugular or subclavian vein thrombosis occurred in 33% of the cases. Thrombosis was limited in 8%, large in 22%, and occlusive in 3% of the cases. The internal jugular route, therapeutic heparinization, and age >64 years were independently associated with catheter-related thrombosis.[6] Our case possessed all these characteristics. The right internal jugular vein was the insertion site of the catheter in our case as well, and the thrombosis that developed was occlusive in character. Additionally, the lack of

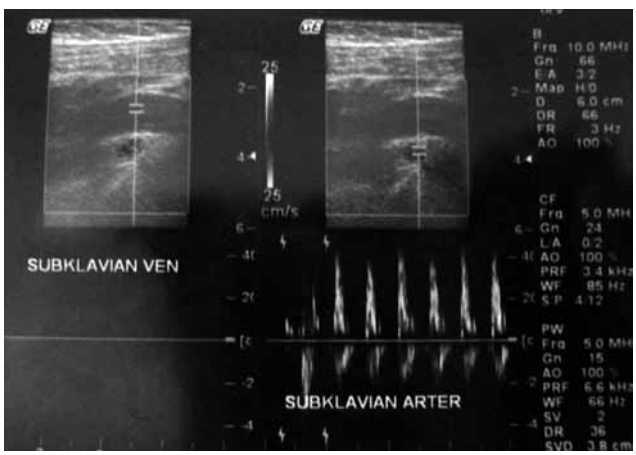

Figure 2. Acute thrombotic occlusion of the subclavian vein.

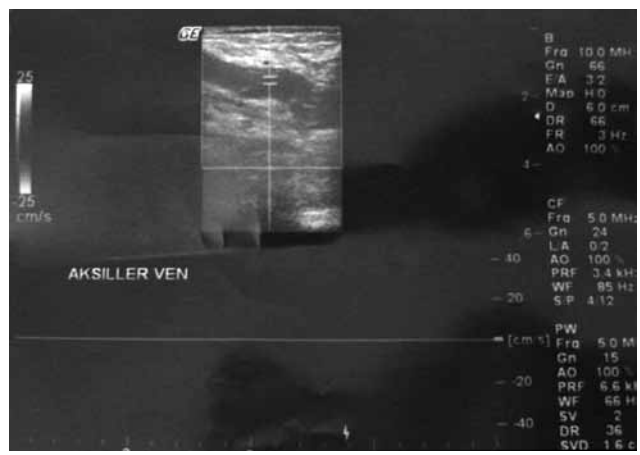

Figure 3. Acute thrombotic occlusion of the axillary vein.

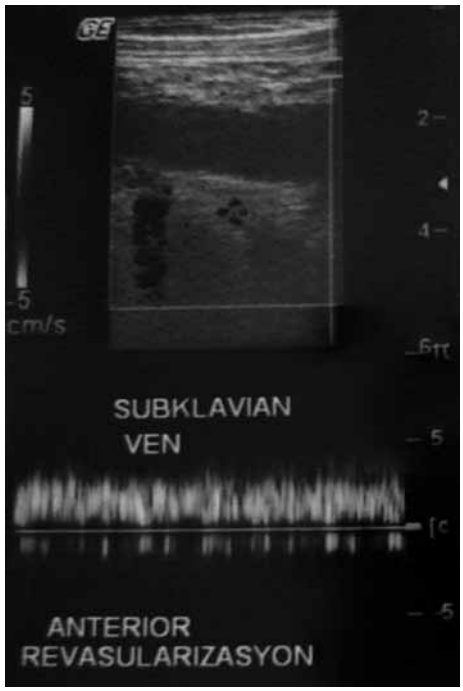

Figure 4. Revascularization anterior to the thrombosed subclavian vein.

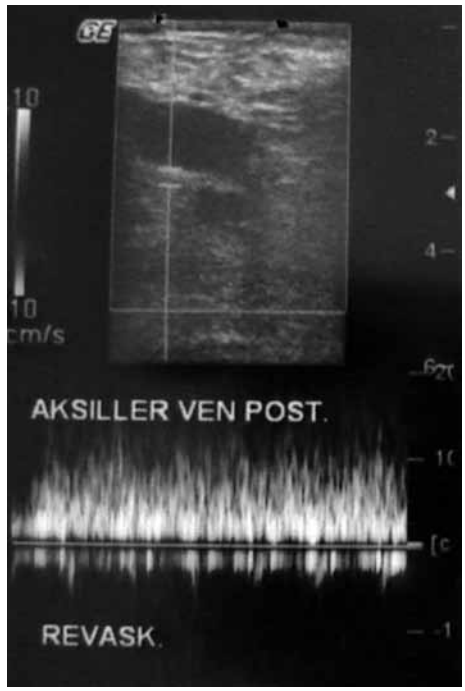

Figure 5. Revascularization posterior to the thrombosed axillary vein.

prophylactic heparin use and the patient's advanced age of 73-years-old were the other remarkable factors.

Declaration of conflicting interests

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REFERENCES

1. Karahan N, Yetkin U, Yakut N, Adanır T, Aksun M, Bayrak S, et al. Approach to Swan Ganz thermodilution catheter complications: 6 years experience with 2310 cases. Internet J Thorac Cardiovasc Surg 2008;11:20.
2. Bassi IM, Lazzari C, Zanela T. The basic ideas about the use of the Swan-Ganz catheter. Rev Gaucha Enferm 1990;11:52-7. [Abstract]
3. Ayalon A, Cohen O, Charuzi I, Schiller M. Central vein thrombosis: a complication of internal jugular vein cannulation. Infusionsther Klin Ernahr 1979;6:265-7.
4. Rosenwasser RH, Jallo JI, Getch CC, Liebman KE. Complications of Swan-Ganz catheterization for hemodynamic monitoring in patients with subarachnoid hemorrhage. Neurosurgery 1995;37:872-5.
5. Coplin WM, O'Keefe GE, Grady MS, Grant GA, March KS, Winn HR, et al. Thrombotic, infectious, and procedural complications of the jugular bulb catheter in the intensive care unit. Neurosurgery 1997;41:101-7.
6. Timsit JF, Farkas JC, Boyer JM, Martin JB, Misset B, Renaud B, et al. Central vein catheter-related thrombosis in intensive care patients: incidence, risks factors, and relationship with catheter-related sepsis. Chest 1998; 114:207-13.