

Catheter Fracture of a Totally Implantable Venous Device Due to Pinch Off Syndrome in Breast Cancer: A Case Report

Yoonseok Kim

Department of Surgery, Busan Adventist Hospital, Busan, Korea

Totally implantable venous devices are used in medical care for parenteral nutrition, vascular access, administering chemotherapeutic agents and so on. Although the large variety of catheter complications, catheter fracture is a rare but serious complication. The pinch off syndrome is caused by the compression of the catheter between the clavicle and first rib, and may lead to fracture and possible dislocation of the catheter. We report here the case history of a patient with metastatic breast cancer who developed a rare complication of subclavian catheter fracture as a consequence of pinch off syndrome.

Key Words: Complications, Incidents, Vascular access devices

Totally implantable venous devices (TIVDs) are now frequently used for the administration of chemotherapy, prolonged intravenous infusion and blood aspiration without repeated venosection in cancer patients.¹⁻³ However, the placement of TIVDs using classical subclavian vein puncture method is associated with several complications, such as infection, thrombosis, superior vena cava syndrome, cardiac arrhythmia and air embolism.^{2,4} A rare but serious complication is catheter fracture.⁵ We represent here a case of spontaneous catheter fracture and resolved by percutaneous endovascular retrieval.

A 54-year old female, initially diagnosed with primary breast cancer in 2009, was diagnosed with lung metastasis in March 2012. She subsequently commenced systemic treatment with chemotherapeutic agents. Administration of chemotherapy soon became problematical due to poor peripheral venous access. So, a TIVD was subsequently inserted percutaneously into her left subclavian vein on the 2nd April 2012. The patient continued to receive chemotherapy. Although she received chemotherapy, radiologic test results indicated that her disease had aggravated. So, chemotherapy was initiated again with different medications. 15 months after the TIVD insertion, the patient was hospitalized to receive another new chemotherapy. The port was accessed, but

CASE

Corresponding Author: Yoonseok Kim, Department of Surgery, Busan Adventisti Hospital, 170, Daeti-ro, Seo-gu, Busan 49230, Korea
Tel: +82-51-600-7707 Fax: +82-51-242-0407 E-mail: mammomaster@naver.com

Received: Mar. 06, 2015
Revised: Mar. 06, 2015
Accepted: Apr. 08, 2015

blood could not be aspirated, and the line could not be flushed. A chest X-ray demonstrated that the catheter had completely fractured at its point of passage under the clavicle (Fig. 1). In retrospective review of the patient's chest radiographs, a slight luminal narrowing of catheter was noted in the chest radiograph taken immediately after the port insertion (Fig. 2). The patient was stable and her electrocardiogram showed normal findings. The patient was referred to an interven-

tional radiologist and the fractured catheter was removed via the percutaneous approach through the right femoral vein (Fig. 3). The proximal portion of the line was subsequently removed surgically.

DISCUSSION

In 1990, Hinke et al. first described the term

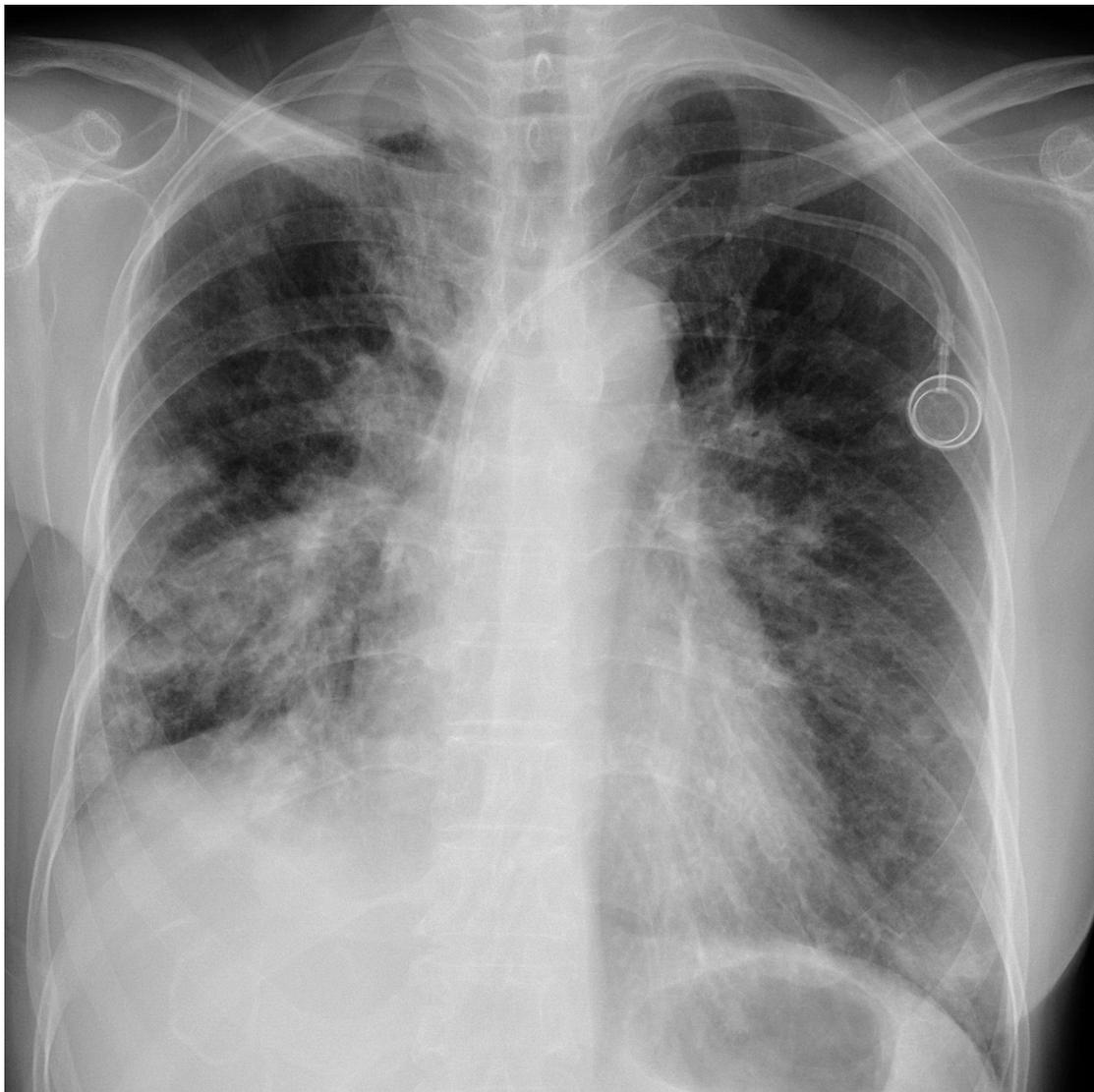


Fig. 1. Chest X-ray on admission. This examination showed a complete fracture of catheter.

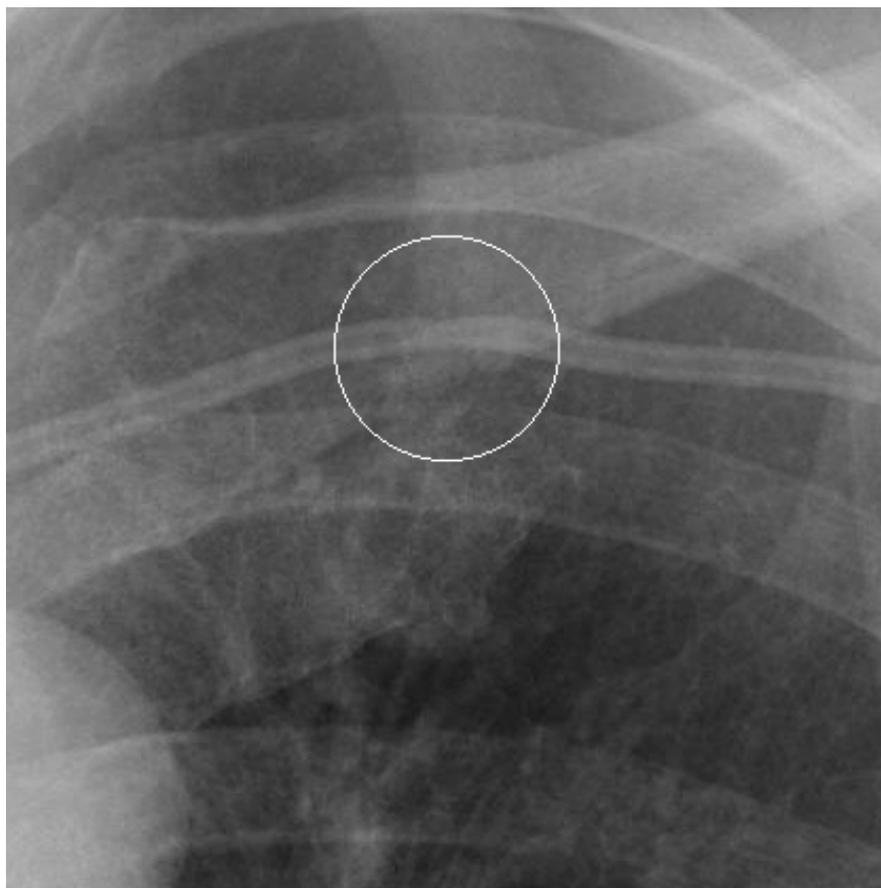


Fig. 2. Chest X-ray after port insertion. A close-up of the left clavicle area (circled area) showed a slight compression of the catheter (Hinke's Grade 2).

“pinch off syndrome”, which referred to compression of a central venous catheter inserted into a subclavian vein between the clavicle and first rib.¹ When a subclavian venous catheter is compressed between the clavicle and the first rib, it can cause permanent or intermittent obstruction, and as a result, tearing, transection, and catheter embolization can occur.⁶ The interval between insertion and diagnosis of pinch off syndrome ranged from the time of insertion to months of years later with an average time interval of 5.3 months and a median time interval of 5 months.^{7,8} Hinke et al. devised the following radiographic scale of catheter distortion: Grade 0, catheters run

a smooth curved courses in the region of the clavicle and first rib with no narrowing. Grade 1, catheters show any degree of bending or deviation from a single curved course but no luminal narrowing. Grade 2, catheters show some degree of luminal narrowing while passing beneath the clavicle. Grade 3, catheters have been transected between the first rib and clavicle and have subsequently become embolized.¹ Mirza et al. described that the most common clinical presentation was pain and/or swelling in the chest or shoulder on the side of the catheterization.⁸ The other signs were dysfunctional catheter, catheter embolization, cardiac palpitations, bilateral chest pain, abdomi-



Fig. 3. Flourosopic guided foreign body removal through right femoral vein.

nal pain, nausea, new S3 heart sound and paresis of the ipsilateral arm. Pinch off syndrome can occur without any unusual symptoms: therefore, it is necessary to closely observe with repeated chest X-rays of those patients who undergo subclavian venous port insertion: if problems occur with blood aspiration and heparin flushing, the possibility of pinch off syndrome should be suspected. Catheter fracture is a rare (0.1-1.1%) complication of subclavian venous catheters with TIVDs.^{1,5} In

the present case, a grade 2 pinch off sign was observed in the chest radiograph taken immediately after port insertion. Approximately 15 months after insertion of the TIVD, the port became dysfunctional. A chest X-ray showed the distal part of catheter to have fractured. Therefore, regular chest radiographic in follow up should generally be performed routinely to detect any evidence of pinch off syndrome. Additionally, pinch off syndrome should be suspected whenever blood can-

not be aspirated from the TIVD, the TIVD cannot be flushed easily, or the patient has any pain, swelling or other abnormal symptoms upon flushing or infusion of fluids through the TIVD. If any of these situations occur, a chest X-ray should be performed to document that the venous catheter is properly positioned without compression, transection or embolization. If the chest X-ray is normal and pinch off syndrome is still suspected, then fluoroscopy with injection of IV contrast through the TIVD can be performed if the TIVD is not completely occluded. There are some strategies for reducing the occurrence of pinch off syndrome. Where appropriate, the internal jugular vein is preferred to the subclavian vein, because the POS should be almost completely eliminated using this approach. If the subclavian vein is used, a more lateral insertion of the catheter into the subclavian vein should minimize compression of the catheter. Careful insertion of the catheter will help prevent catheter damage and subsequent fracture. In addition, cut-down technique through the external jugular, cephalic or basilic veins may decrease the incidence of pinch off syndrome.^{5,8}

Conclusion

Catheter fracture is a rare complication of TIVDs with dangerous potential, such as thromboembolic event. Strategic placement of the puncture site is important to prevent the likelihood fractures and prompt removal of the catheter should be consid-

ered for signs in which fracture is imminent. Additionally, it is necessary to closely observe with repeated chest X-rays of those patients who undergo subclavian venous port insertion.

REFERENCES

1. Hinke DH, Zandt-Stastny DA, Goodman LR, Quebbeman EJ, Krzywda EA, Andris DA. Pinch-off syndrome: a complication of implantable subclavian venous access devices. *Radiology* 1990;177:353-6.
2. Osawa H, Hasegawa J, Yamakawa K, Matsunami N, Mikata S, Shimizu J, et al. Ultrasound-guided infraclavicular axillary vein puncture is effective to avoid pinch-off syndrome: a long-term follow-up study. *Surg Today* 2013;43:745-50.
3. Maisey NR, Sacks N, Johnston SR. Catheter fracture: a rare complication of totally implantable venous devices. *Breast* 2003;12:287-9.
4. Gowraiah V, Culham G, Chilvers MA, Yang CL. Embolization of a central venous catheter due to pinch-off syndrome. *Acta Paediatr* 2013;102:e49-50.
5. Fazeny-Dörner B, Wenzel C, Berzlanovich A, Sunder-Plassmann G, Greinix H, Marosi C, et al. Central venous catheter pinch-off and fracture: recognition, prevention and management. *Bone Marrow Transplant* 2003;31:927-30.
6. Cho JB, Park IY, Sung KY, Baek JM, Lee JH, Lee DS. Pinch-off syndrome. *J Korean Surg Soc* 2013;85:139-44.

7. Clay TD. Pinch-off syndrome: a simple test is the best. *Intern Emerg Med* 2012;7:S141-3.
8. Mirza B, Vanek VW, Kupensky DT. Pinch-off syndrome: case report and collective review of the literature. *Am Surg* 2004;70:635-44.