Catheter Fracture of Subclavian Venous Chemoport Device at Costoclavicular Junction: Pinch-off Syndrome

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Abstract

Chemoport is most commonly used venous access devices for instillation of chemotherapeutic drugs in cancer care. Mechanical complications like catheter fracture can lead to serious morbidity, albeit occurring rarely. We present a case of a 35-year-old lady, a case of carcinoma breast, who had spontaneous fracture of chemoport access device in subclavian vein at the level of clavicle after four successful cycles of chemotherapy. The fracture was suspected on chest x-ray and was subsequently confirmed on contrast linogram. The patient was successfully managed with endovascular interventional technique without suffering any ill effects. It is a rare presentation of pinch-off syndrome.

Keywords Chemoport · Contrast linogram · Pinch-off syndrome

Introduction

In the field of medicine, long venous access devices have played a defining role and they have been used for various indications like fluid administration, blood transfusions and the instillation of toxic chemotherapeutic drugs in oncology. [1] Totally implantable venous access devices (TIAVD), also known as chemoport are commonly inserted through subclavian or internal jugular vein in cancer care. With the greater understanding of the fact that subclavian venous access devices are associated with greater and life-threatening complications, this route of access has gradually fallen out of favor. Hence, pinch-off syndrome is even rarer to witness in present era [2]. We report here one of the presentations of pinch-off syndrome encountered in our practice, successfully managed by minimally invasive technique.

Case Report

A 35-year-old lady was diagnosed as a case of carcinoma breast after evaluation. In view of locally advanced disease, she was planned for neoadjuvant chemotherapy. She underwent chemoport insertion in left subclavian vein under ultrasound and fluoroscopic guidance (Bard X-port, silicon single lumen, 9.6 Fr). Postoperative chest x-ray revealed port to be in a desired position. Subsequently, she was started on chemotherapy as per protocol. Initial four cycles went uneventful and without any catheter-related complication. During admission for the fifth cycle of chemotherapy, patency of chemoport device was checked before instillation of pre-chemo medications. On attempted flushing of chemoport by heparinized saline, no forward flow of saline or backflow of blood was seen despite repeat attempts. During one attempt, patient reported pain at the chemoport site after which no further attempts were made. With a provisional diagnosis of probable catheter dislodgment or venous thrombosis, initially, chest x-ray postero-anterior view was taken (Fig. 1). The radiograph revealed catheter in two halves widely separated, at the level of inferior border of left clavicle. With a high index of suspicion for catheter fracture, a contrast linogram was performed, which clearly showed non passage of contrast from proximal to distal half of tubing (Fig. 2). The diagnosis of catheter fracture was confirmed. The chemoport was removed from the chest wall which had fragmented proximal half of catheter attached to the hub securely. Patient was immediately

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Fig. 1 Chest Radiograph showing catheter in two halves below left clavicle

taken to cardiac catheterization laboratory for endovascular removal of distal end of tubing under general anesthesia. Right femoral vein was punctured and catheterized by Seldinger technique. On angiogram, fragmented catheter was found to be embolized and lying partially inside the right atrium. It was successfully located and removed by loop without any complication. Patient remained asymptomatic throughout the course of illness and was discharged the next day with uneventful recovery.

Discussion

The current generation of TIAVDs has found their origin in the 1980s when Niederhuber et al. first demonstrated excellent patient acceptance rates with introduction of implantable venous port for chemotherapeutic drug infusion [3]. Subsequently, chemoport devices got accepted as a

new standard of care in oncology over the next few decades, being widely used in day to day practice.

In the literature, studies over the last two decades have highlighted numerous complications due to chemoport devices, classified into early and late complications. Usual complications associated with chemoport procedures are broadly infections (skin erosions/bacteremia), mechanical complications (catheter dislodgment/kinking/fracture/embolization), venous thrombosis, and pneumothorax occurring at varying frequencies, albeit at lower rate which is in acceptable limits [1, 4].

Mechanical complications like catheter fracture are uncommon. In the initial report by Biffi et al. [5], only 3 out of 175 patients developed catheter rupture (1.68%). Similarly, a recent study of Indian population also revealed low overall rate of mechanical complications (9/209 patients) with only 5 patients developing catheter fracture [4].

In 1990, Hinke et al. published a report of a classical presentation of compression of subclavian venous catheter when it passes between the clavicle and first rib causing obstruction of flow of fluids and radiographic evidence of catheter distortion. They described it as a pinch-off syndrome (POS). An objective grading of POS was also proposed: grade 0, smooth catheter course; grade 1, abrupt bend beneath clavicle without narrowing; grade 2, luminal narrowing as the catheter passes under the clavicle (true pinch-off sign); grade 3, complete catheter fracture at costochondral junction [2, 6]. In our case, radiographic and contrast linogram images suggest that probably it represents a grade 3 type of POS, which is a rarest type of POS [6].

It is important to emphasize that initial technique of catheter insertion may have a bearing on eventual outcome. Medial positioning of subclavian catheter where costoclavicular space is narrower anatomically can cause compression followed by wear and tear and eventual transection of catheter. Alternative methods suggested by authors like cephalic vein cannulation

Fig. 2 **a** Fluoroscopic image before injection of contrast. **b** Contrast linogram showing non passage of contrast from proximal to distal half of catheter

or ultrasound-guided procedure may reduce inadvertent complications [7].

Since the 1970s, endovascular techniques via trans-venous access have been employed for the removal of embolized foreign bodies [8]. Hence, with all the present-day advancements in interventional medicine, the results are expected to get better only without any use of invasive surgical approaches.

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