



## Extra Luminal Entrapment of Guide Wire; A Rare Complication of Central Venous Catheter Placement in Right Internal Jugular Vein

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### ABSTRACT

Central venous Catheterization (CVC) is a commonly performed procedure for venous access. It is associated with several complications. We report a rare case of extra luminal entrapment of guide wire during CVC placement in right jugular vein. We report a case of 28 years old female patient presented in our emergency with history of entrapped guide wire in right side of neck during CVC. X-ray showed coiling of guide wire in neck. CT Angiography showed guide wire coursing in between common carotid artery and internal jugular vein (IJV), closely abutting the wall of both vessels. The guide wire was coiled with end coursing behind the esophageal wall. Guide wire was removed under fluoroscopic guide manipulation under local anesthesia. We want to emphasize that even though CVC placement is common and simple procedure, serious complication can occur in hands of untrained operator. The procedure should be performed under supervision, if done by trainee. Force should never be applied to advance the guide wire if resistance is encountered.

**Keywords:** Central venous catheter; Guide wire; Extra luminal entrapment; Jugular vein.

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### Introduction

Central venous catheter (CVC) placement is a commonly performed procedure in intensive care unit and operating room for drug and fluid administration and central venous pressure (CVP) monitoring. Complications associated with CVC are infection, failure to place the catheter, arterial puncture, improper catheter position, Pneumothorax, hematoma, hemothorax, asystole and inferior vena cava (IVC) trauma [1].

Guide wire related complications are few but are potentially serious. Most common guide wire related complication is cardiac arrhythmia; other complications are looping and knotting [2], vascular perforation [3], fragmentation and embolization [4], entrapment of wire in IVC filter [5] and in sternocleidomastoid muscle [3]. Most of the case reports of entrapped/retained guide wire during CVC are within lumen of IVC. We report a rare case of extra luminal entrapment of guide wire during CVC placement in right jugular vein.

## Case Report

A 28-year-old woman was transferred to our center due to entrapped guide wire in right side of neck during central venous catheterization. She underwent gut restoration surgery 10 days before for ileostomy due to tubercular intestinal perforation in other hospital. During the postoperative course she underwent venous catheterization to get a venous access. Procedure was done by a general surgery resident. Guide wire was introduced in right internal jugular vein according to the seldinger's technique and advanced despite slight resistance encountered. It was tried to remove the wire to reconfirm the back flow of blood, but failed. Guide wire was found to be stuck into the neck, as it was not possible to remove the guide wire with gentle manipulation. Bedside neck and chest radiography was performed

revealing coiling of guide wire in neck (Figure 1). The surgical team explored the neck under local anesthesia and tried to remove the guide wire but failed. Patient was then referred to our center for guide wire removal. At the time of presentation, the patient was asymptomatic except for mild pain over the neck wound. In her past history she had tubercular intestinal perforation one year back for which she underwent exploratory laparotomy with ileostomy. She has completed anti-tuberculosis treatment. On clinical examination her vital signs were within normal limit. Neck wound was infected; about 10-cm of guide wire was seen outside the right side neck wound (Figure 2). Her routine blood work-up and coagulation profile were within normal limit. Ultrasonography and Color Doppler sonography of the neck showed heterogeneous echogenic area with posterior dirty shadowing noted in right

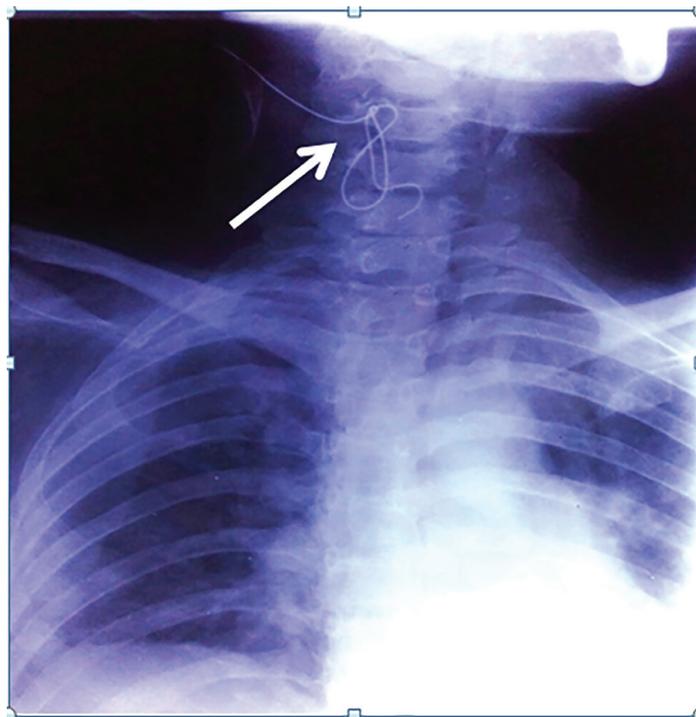


Fig. 1. Chest radiography demonstrating guide wire kinked and looped in the neck



Fig. 2. Guide wire before and after extraction.

sternocleidomastoid muscle partially obscuring the underlying structure (likely due to subcutaneous emphysema). Tip of guide wire was not seen inside the internal jugular vein (IJV) lumen. A non-occlusive echogenic clot noted in IJV. A thin echogenic linear structure forming a loop was noted. Computed Tomographic (CT) Angiography demonstrated thrombus in superior vena cava (SVC), bilateral pulmonary arteries at bifurcation and extending to subsegmental branches. Bilateral pleural effusion with subsegment collapse was also noted. Guide wire was seen coursing between common carotid arteries anteriorly and IJV posteriorly, closely abutting the wall of both vessels. Multiple coiling of guide wire was seen with end coursing behind the esophageal wall. No active contrast extravasation was seen, and no free air was seen in muscle plane.

We planned to remove the guide wire under fluoroscopic guide in Operation Theater. Written informed consent was taken from patient. After excluding knotting, guide wire was removed under fluoroscopic guide manipulation under local anesthesia. Patient tolerated the procedure well. Minor bleeding through the wound was controlled with mild pressure. Post procedure ultrasonography of the neck did not show any neck hematoma. Cardiology opinion was taken for thrombus in SVC and Pulmonary arteries. Cardiologist advised conservative management in view of non-obstructive thrombus. Patient was monitored for 24 hours and referred back to primary hospital on patient's request.

## Discussion

Central venous catheterization is commonly done blindly by anatomical surface marking method; Although National Institute of Clinical Excellence (NICE) has recommended the use of ultrasonography locating devices for Central venous access [6]. Complications still occur related to guide wire, dilator and catheter insertion even in hands of experienced clinicians [7]. Guide wire related complications are very few but are potentially dangerous. These complications include cardiac arrhythmia, perforation of vessel or heart chamber, kinking, looping, and knotting of guide wire resulting into entrapment and breakage of distal tip of guide wire [2-4]. It has been related to operator fatigue, inexperience, inattention and inadequate training and supervision of residents [8].

Most common guide wire related complications include entrapment of guide wire due to looping,

kinking, and knotting in sternocleidomastoid muscle [3] and in IVC filters [5]. Both intravascular and extra vascular knotting have been reported [9]. Intravascular entrapment of guide wire in IVC filter is a known complication, when the guide wire is over advanced resulting into hooking of J tip of guide wire in IVC filter [10]. Jae Jun Lee *et al.* reported a case of extra vascular kinking, knotting and entrapment of guide wire during subclavian vein catheterization [11]. Knotting and entrapment is almost exclusively described in subclavian approach, which may be due to the curved path; the vein takes as it loops over the first rib to descend into SVC [9].

To the best of our knowledge, extra vascular entrapment of the guide wire during CVC placement through right internal jugular approach has not been described. In our case minimal resistance was encountered by resident during guide wire advancement through aspiration niddle after placing the aspiration niddle in right IJV. He did not follow the instructions originally pointed out by Seldinger [12] which says the guide wire should not be advanced if any resistance is encountered, but probably he kept on advancing the guide wire.

Applying force to thread a guide wire through the introducer needle despite significant resistance is likely to cause looping, kinking and knotting resulting into entrapment, if it is not in correct path [9]. There is a potential for cutting through the vein with possible fatal complication [13] if clinician does not recognize the scenario. To avoid this complication procedure should be stopped if resistance is encountered during guide wire threading; guide wire and aspiration needle should be removed as a single unit. Force should never be used to withdraw the guide wire when unexpected resistance is encountered as this may result in knotting of already kinked wire, fracture of the wire, and damage to internal structure [14].

By presenting our case we want to emphasize that even though CVC placement is a common and simple procedure, serious complications can occur in hands of untrained operator. We should be aware of potential entrapment of guide wire during central venous catheterization. We want to emphasize the need of proper training of residents. The procedure should be performed under supervision, if it is being performed by trainee, preferably under radiological guide. Force should never be applied to advance the guide wire if resistance is encountered.

**Conflict of Interest:** None declared.

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