

Brachial Plexus Injury After Internal Jugular Vein Catheterization

Internal Jugüler Ven Kateterizasyonu Sonrası Brakiyal Pleksus Yaralanması

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Özet

Santral venöz kateterler genellikle hem akut hem de kronik böbrek yetmezliği hastalığında hemodiyalize ihtiyaç duyan üremik hastalar için bir vasküler erişim olarak kullanılır. Farklı lokasyonlar arasında, kateter için en çok tercih edilen erişim, daha az yan etkisinden dolayı internal juguler vendir (IJV). Burada perkütan IJV kateterizasyonunun bir komplikasyonu olarak brakiyal pleksus yaralanması olgusunu sunuyoruz. 25 yaşındaki gebe bir kadında lupus nefritine bağlı akut böbrek yetmezliği gelişikten sonra; lupus alevlenmesi ve hastadaki komplikasyonlar nedeniyle gebelik sonlandırıldı ve hemodiyaliz tedavisi uygulandı. IJV kateterinin yerleştirilmesinden sonra brakiyal pleksus hasarı meydana geldi. Yeterli deneyime sahip olduğunda, IJV kanülasyonu güvenli bir prosedürdür. Kateterizasyon sonrası ipsilateral üst ekstremitte hareketlerinde güçsüzlük gelişirse, klinisyenlerin brakiyal pleksus yaralanmasından şüphelenmesi gerekir.

Anahtar Kelimeler: Brakiyal pleksus zedelenmesi, İnternal juguler ven, Sistemik lupus eritematozus

Abstract

Central venous catheters are often used as a vascular access for uremic patients who need hemodialysis in both acute and chronic renal failure disease. Among different locations, the most preferable access for catheter is internal jugular vein (IJV) due to its less adverse effects. Herein, we present case of brachial plexus injuries (BPI) as a complication of percutaneous IJV catheterization. After the development of acute renal failure due to lupus nephritis in a 25-years-old pregnant woman; lupus exacerbation and pregnancy terminated due to complications in the patient and hemodialysis treatment was applied. BPI occurred after the insertion of IJV catheter. IJV catheterization is safe procedure, when have enough experience. If weakness develops in ipsilateral upper extremity movements after catheterization, clinicians should be suspected of BPI.

Keywords: Brachial plexus injury, Internal jugular vein, Systemic lupus erythematosus,

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INTRODUCTION

Critically ill patients often require renal replacement therapy (RRT) presence of severe electrolyte derangements, uremia, acidemia, and hypervolemia. Urgent vascular access for acute dialysis indication requires the placement of a dual lumen temporary hemodialysis (HD) catheter in a large central vein. The cannulation of the vascular access was originally described by English et al. and they suggested IJV safer than subclavian, femoral, or antecubital veins in 1969 (1). IJV cannulation is also attempted to obtain central venous access for hemodynamic monitoring (such as central venous pressure), long-term administration of fluids, total parenteral nutrition, antibiotics, chemotherapy medications commonly (2). The success rate of IJV cannulation procedure is about 90% in literature (3). Safe puncture of the IJV is achieved by using anatomical landmarks on the skin's surface and thus passing the needle along the anticipated line of the vein (4). Complications for IJV cannulation include carotid artery perforation, hematoma, BPI, pneumothorax, and hemothorax (5). Perforation of the IJV for placement of a central venous catheter carries the risk of complications in approximately 5–10% of patients (6).

In this case report, we described a case of BPI after the IJV cannulation in patients.

CASE

A 25-years-old woman was hospitalized at the 14th week of her pregnancy due to hyperemesis gravidarum. She had a history of deep vein thrombosis 14 years ago and cerebrovascular occlusive disease 12 years ago. She was also diagnosed with antiphospholipid antibody syndrome and systemic lupus erythematosus (SLE). The patient had a history of twice spontaneous abortion. In physical examination; she was dyspneic, tachycardic (heart rate 121 pm), her blood pressure was 100/60 mmHg, breath sounds were normal, no pretibial edema. Her nausea improved after intravenous hydration. Acute renal failure and dyspnea developed in the patient's during follow-up. Laboratory results showed that patient had C3: 67 mg/dL (RR 79-152), C4: 8 mg/dL (RR 16-38), ANA:1/100 positive (cytoplasmic staining was positive with a homogeneous and granular pattern), Anti-ds DNA: 23.18 IU/mL (negative) (RR 0-100), ANCA: negative, Anticardiolipin IgM: 2 U/ml (RR 0-12) Anticardiolipin IgG: 4U/ml (RR 0-12), antiphosphatidylserine IgM <2RU/ml (RR 0-12), antiphosphatidylserine IgA <2RU/ml (RR 0-12), antiphosphatidylserine IgG <2 RU/ml (RR 0-12), anti-beta 2-glycoprotein IgA: 14 RU/ml (RR 0-20), anti-beta 2-glycoprotein IgG: 3 RU/ml (RR 0-20), anti-beta 2-glycoprotein IgM: 9 RU/ml (RR 0-20), lupus anticoagulant (ratio):2.62 (RR 0.8-1.2), vitamin B12: 402 pg/mL (RR 197-771), folic acid > 20 ng/mL (RR 3.89-26.8), Creatinine: 3.67 mg/dL (basal creatini-

ne value: 0.68) (RR 0.5-0.9), BUN: 45 mg/dL (Previous level of BUN was 6,9) (RR 6-20), Ca: 8.95 mg/dL (RR 8.6-10.2), Phosphorus: 7.23 mg/dL (RR 2.5-4.5), Mg: 0.93 mmol/L (RR 0.66-1.07), Na: 136 mmol/L (RR 136-145), Cl: 99 mmol/L (RR 98-107), K: 4.96 mmol/L (RR 3.5-5.1), Hemoglobin: 9 g/dL (RR 12-16), Platelet: 55.000/ μ L (RR 130.000-400.000), WBC: 6.52/ μ L (RR 4.8-10.7), APTT: 25.1 s (25–36), PT: 10.6 s (8.8–14), INR: 0.86 (0.8–1.2).

After clinical deterioration, pregnancy was terminated considering SLE exacerbation. After uremic symptoms, hemoptysis and hypervolemia, hemodialysis was started through right femoral venous catheter. Pulse intravenous cyclophosphamide and 1gram daily intravenous pulse metilprednisolone treatment was given for 3 days to the patient after considering SLE exacerbation.

Computerized tomography (CT) of thorax was revealed alveolar hemorrhage. Pulse oxygen saturation levels decreased and she was transferred to intensive care unit (ICU). In ICU, metabolic acidosis was developed and the patient has been intubated for mechanical ventilation. Her femoral venous catheter removed and right temporary IJV cannulation was inserted. After the insertion of the right IJV cannulation, the patient was developed weakness in the right upper limb. Cranial CT and cranial magnetic resonance imaging (MRI) were performed. In cranial CT: No acute pathology, Diffusion Cranial MRI: No acute pathology and Cervical vertebra MRI: No pathology. No pathology was detected in the right upper extremity Doppler ultrasonography (USG). After the observation of alveolar hemorrhage regression, the patient was extubated and patient has been transferred to nephrology department. In nephrology department, physical examination showed that right arm and front arm had 4/5 muscle power, right hand had 0/5 muscle power (**Figure 1**).

Electromyography (EMG) was performed with the suspicion of brachial plexus damage during jugular insertion in intensive care. EMG results was compatible with right brachial plexopathy interpretation (**Figure 2**).

In this EMG; in the sensory study, the right median and ulnar sensory nerve action potential (SNAP) amplitudes were obtained significantly lower than the left. In sensory study, right median and ulnar motor low compound muscle action potential (CMAP) amplitudes were obtained, radial motor response could not be obtained. In motor conduction study, musculocutaneous nerve with Erb point stimulation CMAP amplitude are extremely low on the left and normal limits on the right. In needle EMG, denervation potentials were obtained in the muscles examined in the upper right and diffuse neurogenic lesion findings were obtained. Conclusion: These findings were evaluated to be compatible with right brachial plexopathy



Figure 1. Right dropped hand of the patient due to brachial plexus injury

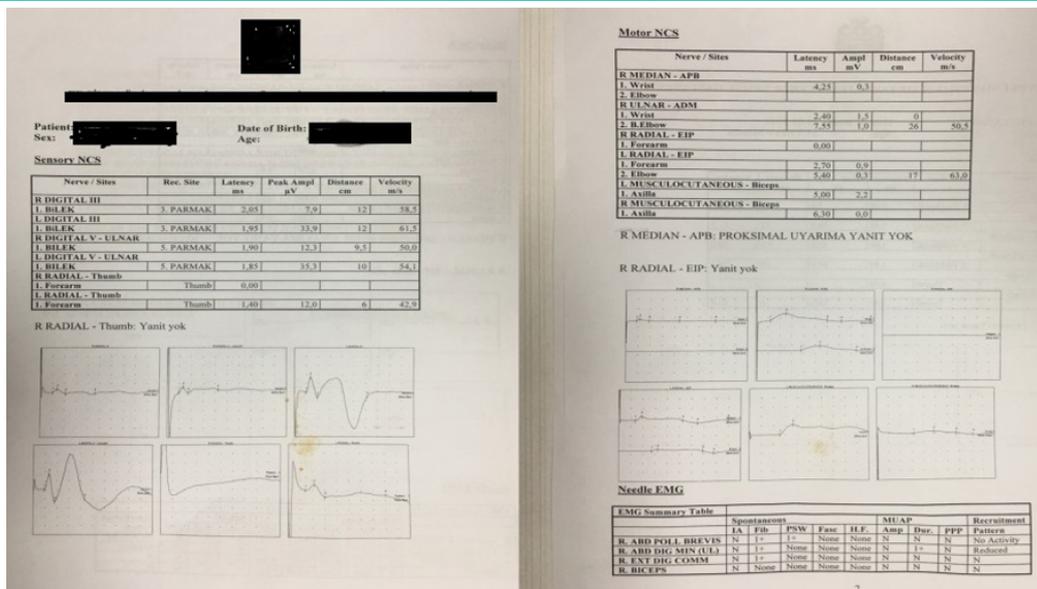


Figure 2: In this EMG; In the sensory study, the right median and ulnar sensory nerve action potential (SNAP) amplitudes were obtained significantly lower than the left. In sensory study, right median and ulnar motor low compound muscle action potential (CMAP) amplitudes were obtained, radial motor response could not be obtained. In motor conduction study, musculocutaneous nerve with Erb point stimulation CMAP amplitude are extremely low on the left and normal limits on the right. In needle EMG, denervation potentials were obtained in the muscles examined in the upper right and diffuse neurogenic lesion findings were obtained. Conclusion: These findings were evaluated to be compatible with right brachial plexopathy.

DISCUSSION

The use of doppler ultrasonography to assist cannulation of the IJV was reported as early as 1984, after that the ultrasound method has compared favorably with the landmark technique in all studies (7). It has been shown that performing catheterization through the IJV under ultrasonographic guidance may cause a decrease in complication rates (4,6,8-12). Carotid artery puncture is the most common complication associated with landmark-guided IJV catheterization. IJV

has located in proximity to several nerves in the neck. This location may explain why the majority of neurological complications have been associated with IJV cannulation in literature (13). The list of neurological damage after IJV cannulation has been reported; lesions of the cervical sympathetic chain, brachial plexopathies, phrenic or recurrent nerve palsies, cerebral damage following venous air embolism, carotid artery embolism or obstruction, lesions of the IX, X, XI, and XII cranial nerves by local hematoma compression (13-15).

BPI is a severe nerve injury of the extremities, resulting in functional dysfunction of the upper limb (16). Etiologies of BPI including; severe traumatic neck injury, vehicular accident accounts for >90% of cases, industrial trauma deliberate as in tumor surgery involving nerve roots (17-19). Diagnosis of BPI consist of; physical examination, EMG Myelography, CT-myelography and MRI (17,20,21).

There is no specific treatment for BPI. Improvement in treatment may take up to 6 months in some patients, whereas in some patients may be resistant to treatment (22-24).

Delayed diagnosis may lead to a worsened prognosis in patients with brachial plexus palsy, physicians should exercise vigilance to detect and manage early the potentially serious and fatal complications of brachial nerve injury.

CONCLUSION

IJV without USG guidance may lead to complications in patients who need acute dialysis. Therefore, in patients requiring emergency vascular access, it should be performed by experienced staff, as much as possible, with imaging. If there are weakness, numbness, loss of sensation, pain, loss of movement in the upper extremity after catheterization; should take into consideration for BPI.

Informed Consent: Written informed consent was obtained from the patient who participated in this case.

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