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Case Report

Aortic Dissection as an Infrequent Complication after Mahurkar-Type Central Venous Access Placement

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Abstract

A 71-year-old female patient with Guillain-Barré symptoms treated by internal medicine and referred to general surgery to place a Mahurkar-type central venous access for treatment with plasmapheresis. In the control chest X-ray, mediastinal widening is observed; it is complemented with angiotomography, visualizing an aortic dissection from the arch to the abdominal aorta. He was scheduled for placement of an aortic endoprosthesis and removal of the Mahurkar catheter. The patient evolves satisfactorily with discharge on the twelfth day. It is important to mention taking into account this type of complications in these common procedures, for its diagnosis and timely management.

Keywords: Mahurkar; Endoprosthesis; Complication

Introduction

Central venous access placement refers to the insertion of a Central Venous Catheter (CVC) in a large caliber vascular tract such as the subclavian vein [1], the jugular vein and the femoral vein [2], which aims at the safe vascular implantation of the catheter to provide treatment and endovascular monitoring without complications [3,4] through hemodynamic monitoring, intravenous administration of drugs, parenteral nutrition [2] and/or rapid hydric resuscitation [1]. In the United States, 6 million catheters are inserted each year [1] and despite their wide use, there are still unfortunate mechanical injuries and intravascular infections as a result of their placement [2] even in the most experienced physicians, who have an incidence of 5%-10% [5].

According to the expected time frame needed, a certain type of catheter is recommended [4]. Short term is considered from 7 to 10 days [6-8] and the use of non-tunneled and umbilical catheters is recommended [4]. For medium term, ranging from 4 weeks to 6 months [6,8] peripherally inserted central catheters are recommended [4]. In case of long term, considered from months to years [8,9], tunneled and fully implantable catheters are recommended [4]. The Mahurkar catheter is a temporary catheter that allows hemodialysis, apheresis, infusion, renal replacement therapy, high pressure contrast injection and central venous pressure monitoring [10] and is indicated to be used for 2 to 3 months and may cause complications such as infections, thrombosis and stenosis of the subclavian vein [11]. The most common mechanical complications are misplacement and/or migration of the catheter due to retraction into the internal jugular vein, contralateral subclavian vein or azygos vein [12] and embolism due to catheter rupture [5]. Aortic dissection is a very rare mechanical complication in CVC placement, with puncture occurring in 16 previously reported cases, resulting in 4 of them in aortic dissection [1,3,14]. One of them fatal due to hemorrhage and accumulation of blood in the pleura and mediastinum [13]. The puncture of the aortic artery is self-limiting in 70% of the cases, while in the remaining cases there are lesions in the tunica intima, hematoma, hemothorax or neurological deficits [15,16].

We present an aortic dissection by direct aortic puncture associated with the insertion of a Mahurkar type CVC and its subsequent successful endovascular surgical management. A thorough knowledge of the treatment of aortic injury is of vital importance because it can be lethal for the patient.

Case Presentation

We present the case of a 71-year-old female patient, allergic to duloxetine, with a history of type 2 diabetes mellitus of long evolution, under medical treatment, Cerebral Vascular Disease (CVD) ischemic type diagnosed 25 years ago, with no present sequelae. Guillain-Barré syndrome diagnosed 4 years ago treated with rituximab, steroids and plasmapheresis with 6 previous sessions. He started 7 days prior to his admission when he suddenly presented localized weakness in the lower extremities, without aggravating or extenuating factors. It is accompanied by asthenia, adynamia and moderate intensity stabbing lumbar pain, for which 3 doses of methylprednisolone of unspecified dosage were administered without any improvement. As symptoms persisted, he was referred to the Internal Medicine Department, which requested an interconsultation with the General Surgery Department for the placement of a Mahurkar type central venous access for treatment with plasmapheresis.

Vital signs are stable, physical examination shows hypotrophic extremities, decreased distal pulses with muscle strength 2/5. The rest of the physical exam without alterations. A laboratory shows a hemoglobin figure of 13. 9 g/dL (11.6 g/dL-15 g/dL), leukocytes 12,700 k/uL (4 k/uL-10,000 k/uL) with neutrophils 75% (50%-70%),

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platelets 249,000 k/uL (150,000 k/uL-450,000 k/uL), triglycerides 290 mg/dL (<150 mg/dL).

Once the procedure is started, a needle is introduced through the right subclavian artery, between the junction of the middle third and the proximal third clavicular, obtaining blood return (dark red, not pulsatile) and a guide wire is introduced which is bent at its entrance. After 5 more attempts and one attempt through the left jugular vein, it is introduced into the superior vena cava, then the trajectory is dilated with two dilators and the catheter is placed. It is verified by fluoroscopy and its position in the superior vena cava is visualized. The catheter is fixed in its insertion site with 3-0 prolene and it is covered with a dressing. A control AP chest X-ray was requested in which the catheter was verified in the superior vena cava, and mediastinal widening was observed (Figure 1). For this reason it was complemented with chest CT angiography where aortic dissection was visualized from the aortic arch to the abdominal aorta (Figure 2).

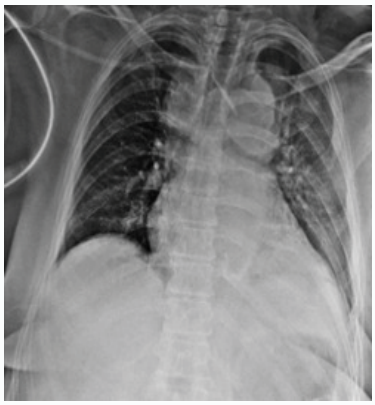

Figure 1: Control AP chest X-ray with detection of mediastinal widening.

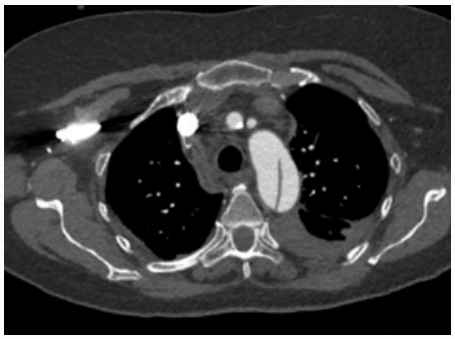

Figure 2: Chest CT angiography with presence of aortic dissection at the level of the aortic arch.

She was transferred to intermediate care for monitoring, with stable vital signs. During the course of the day, she began with moderate intensity stabbing chest pain, 2 episodes of hematochezia and vomiting in "coffee grounds" appearance, after which he presented hypovolemic shock with an average blood pressure of 52 mmHg. For this reason she was transferred to the intensive care unit where a central venous catheter was placed in the left jugular vein and 2 globular packets were requested for immediate transfusion. She was scheduled for an aortogram, placement of a thoracic aortic stent, left subclavian stent, sternotomy, removal of central venous catheter (Mahurkar), placement of pleural and mediastinal probe.

In the operating room, access is gained by catheterization *via.* bifemoral and left brachial, aortic dissection of 1 cm from the exit of the left subclavian artery to both common iliac arteries is identified by intravascular ultrasound (Figure 3), after which a stent is placed in the left subclavian artery and two more stents to follow the same without occluding the celiac trunk along with a stent at thoracic level (Figure 4). After its placement, a decrease in the false lumen of the aortic dissection is appreciated. Once this is finished, a median sternotomy is performed up to the mediastinum; innominate vein and bifurcation of the right subclavian artery with the right carotid artery are identified. The tip of the catheter (Mahurkar) was visualized in the same right subclavian artery, so it was removed and hemostasis was performed, 2 pleural probes and 1 mediastinal probe (cardio-spiral #24) were placed and the patient was transferred to intensive care.

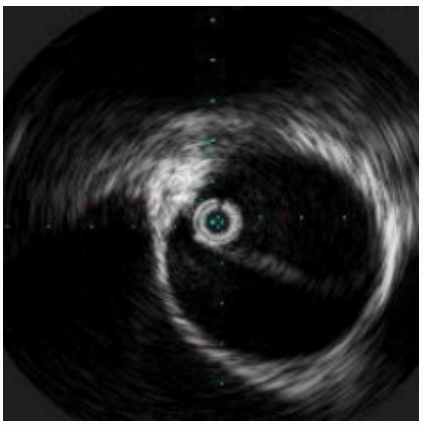

Figure 3: Intravascular ultrasound with presence of a 1 cm aortic dissection.

Figure 4: Adequate placement of the thoracic aortic endoprosthesis is verified by fluoroscopy.

This patient evolved satisfactorily, presented stable vital signs, sedation was withdrawn and extubated on the 3rd postoperative day and started a clear liquid diet which he tolerated adequately and progressed. She presented Glasgow 15, the drains decreased significantly until their removal on the 7th postoperative day; there was no presence of data of systemic inflammatory response. She was discharged on the 12th postoperative day.

Discussion

CVC implanted through the subclavian, jugular or femoral vein remain a convenient vascular access route with several advantages. However, different complications may occur during placement or subsequent evolution that should be considered before, during and

after the intervention. Complications during Mahurkar type CVC placement include pneumothorax, hemothorax, brachial plexus injury and superior vena cava dissection, while the most frequent post-placement complications are infection, coagulation in the CVC and thrombosis or occlusion of the subclavian vein [2]. The best way to prevent puncture is by using ultrasound guidance and a pressure monitor to avoid arterial puncture and dissection [14], as the change in vascular pressure can be recognized [17]. Due to the absence of intravascular ultrasound guidance, pressure monitor and lack of pulsatile reflux, the intervention was misinterpreted as an adequate venous puncture.

Performing a needle pass is directly proportional to the failure rate, placing it at 4.3%, with 2 passes it increases to 10.9% [18]. In the present case, the rate turned out to be higher than 50% due to the 5 needle passes [19,20]. Management will always depend on the type of dissection performed, varying from hemostasis by compression (traction/pressure technique) to surgical/endovascular compensation [21,22]. Considering the existence of obesity, radiotherapy or history of surgical intervention in the area, recurrence of catheterization in the same site, failed cannulation attempts and the experience of the operator [23]. These risk factors will determine the success of the intervention, in addition to the essential anatomical mastery of the relevant vascular structures during CVC placement. Once the CVC is placed just above the superior vena cava [19], it is very convenient to evaluate the outcome by blood gas, transduction and/or chest radiography [16]. If the CVC is just to the left of the trachea, the risk of malposition is increased; it is imperative immediate correction [16].

Conclusion

Endovascular interventions should be developed and evaluated to reduce CVC-associated complications, especially when the blind landmark insertion technique is used. This complication could have been avoided by using intravascular ultrasound guidance and pressure monitor. Once the complication is identified, it is safe and feasible to choose endovascular surgical management as an alternative to the open surgical procedure.

References

1. Shrikhande GV, Khan SZ, Meltzer AJ, Gallagher K, Morrissey NJ. Endovascular management of type B aortic dissection after attempted central venous catheterization. Ann Vasc Surg. 2011;25(7):979.e13-5.
2. Arenas-Marquez H, Anaya-Prado R, Barrera-Zepeda LM, Gonzalez-Ojeda A. Complications of central venous catheters. Curr Opin Clin Nutr Metab Care. 2001;4(3):207-10.
3. Bas A, Goksedef D, Kandemirli SG, Gulsen F, Numan F. Central venous catheter insertion into the false lumen of a complicated aortic dissection. Scott Med J. 2017;62(3):115-8.
4. Ullman AJ, Marsh N, Mihala G, Cooke M, Rickard CM. Complications of Central Venous Access Devices: A Systematic Review. Pediatrics. 2015;136(5):e1331-44.
5. Desruennes E. Complications mecániques des sites implantés. Pathologie Biologie. 1999;46(3):269-72.
6. Pittiruti M, Hamilton H, Biffi R, MacFie J, Pertkiewicz M. ESPEN Guidelines on Parenteral Nutrition: central venous catheters (access, care, diagnosis and therapy of complications). Clin Nutr. 2009;28(4):365-77.
7. O'Grady NP, Alexander M, Burns LA, Dellinger EP, Garland J, Heard SO, et al. Guidelines for the prevention of intravascular catheter-related infections. Clin Infect Dis. 2011;52(9):e162-93.
8. Loveday HP, Wilson JA, Pratt RJ, Golsorkhi M, Tingle A, Bak A, et al. epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. J Hosp Infect. 2014;86 Suppl 1:S1-70.
9. Ruebner R, Keren R, Coffin S, Chu J, Horn D, Zaoutis TE. Complications of central venous catheters used for the treatment of acute hematogenous osteomyelitis. Pediatrics. 2006;117(4):1210-5.
10. Medtronic. Catéteres De Hemodiálisis Mahurkar TM*. 2022.
11. González-Ramos OL, Hernández-Martínez M, Domínguez-Polo JM, Estrada-Oros J. Costo beneficio en utilización de catéter Costo beneficio en utilización de catéter Mahurkar versus fístula. Rev Enferm Inst Mex Seguro Soc. 2000;8(2):95-9.
12. Inoue Y, Miyazaki N, Shimizu Y, Soh H, Fujita S, Takao T. Indwelling catheter retraction because of pendulous breast. JPEN J Parenter Enteral Nutr. 2000;24(4):251-3.
13. McDaniel MM, Grossman M. Aortic dissection complicating percutaneous jugular-vein catheterization. Anesthesiology. 1978;49(3):213-4.
14. Tsukashita M, Deanda A, Balsam L. Type A aortic dissection: a rare complication of central venous catheter placement. J Card Surg. 2014;29(3):368-70.
15. Kusminsky RE. Complications of central venous catheterization. J Am Coll Surg. 2007;204(4):681-96.
16. Alon MH. Inadvertent arterial puncture involving the subclavian artery and the aorta during central venous catheterization: a case report. J Med Case Rep. 2021;15(1):303.
17. Ezaru CS, Mangione MP, Oravitz TM, Ibinson JW, Bjerke RJ. Eliminating arterial injury during central venous catheterization using manometry. Anesth Analg. 2009;109(1):130-4.
18. Mansfield PF, Hohn DC, Fornage BD, Gregurich MA, Ota DM. Complications and failures of subclavian-vein catheterization. N Engl J Med. 1994;331(26):1735-8.
19. Lefrant JY, Muller L, De La Coussaye JE, Prudhomme M, Ripart J, Gouzes C, et al. Risk factors of failure and immediate complication of subclavian vein catheterization in critically ill patients. Intensive Care Med. 2002;28(8):1036-41.
20. Sznajder JI, Zveibil FR, Bitterman H, Weiner P, Bursztein S. Central vein catheterization. Failure and complication rates by three percutaneous approaches. Arch Intern Med. 1986;146(2):259-61.
21. Guilbert MC, Elkouri S, Bracco D, Corriveau MM, Beaudoin N, Dubois MJ, et al. Arterial trauma during central venous catheter insertion: Case series, review and proposed algorithm. J Vasc Surg. 2008;48(4):918-25;discussion 925.
22. Bowdle A. Vascular complications of central venous catheter placement: evidence-based methods for prevention and treatment. J Cardiothorac Vasc Anesth. 2014;28(2):358-68.
23. Deogaonkar K, Shokrollahi K, Dickson WA. Haemothorax: A potentially fatal complication of subclavian cannulation--A case report. Resuscitation. 2007;72(1):161-3.