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CASE REPORT

Basilic vein variation encountered during surgery for arm vein port: A case report

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Abstract

BACKGROUND

Venous variations are uncommon and usually hard to identify, and basilic vein variation is particularly rare. Basilic vein variation usually presents without any clinical symptoms and is often regarded as a benign alteration. This case was a patient with congenital basilic vein variation encountered during surgery for an infusion port.

CASE SUMMARY

We documented and analyzed an uncommon anatomical variation in the basilic vein encountered during arm port insertion. This peculiarity has hitherto remained undescribed in the literature. We offer remedial strategies for addressing this anomaly in the future and precautionary measures to circumvent its occurrence. We conducted a comprehensive review of analogous cases in the literature, offering pertinent therapeutic recommendations and solutions, with the aim of enhancing the efficacy and safety of future arm port implantations.

CONCLUSION

Venous variation is rare and requires detailed intraoperative and postoperative examination to ensure accuracy, so as not to affect subsequent treatment.

Key Words: Totally implantable venous access ports; Arm ports; Venous variation; Postoperative breast cancer; Systematic review; Case report

Core Tip: Venous variation refers to structural malformations caused by abnormal development of venous vessels. At present, the etiology is still unknown. In the process of implanting the arm port for a tumor postoperative patient, we found and reported a case of successful treatment of basilic vein variation encountered during the operation, which can provide a reference for such cases in the future.

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INTRODUCTION

Breast cancer is one of the most common tumors afflicting women, and chemotherapy is an essential method of treatment. Totally implantable venous access ports are the preferred method for chemotherapy infusion in breast cancer patients[1]. In recent years, a large amount of clinical data has shown that compared with chest ports, arm ports are more suitable for breast tumors and patients with long-term infusion[2,3]. The main reasons are as follows. The infusion port catheter enters through peripheral blood vessels, which can avoid the risk of pneumothorax, hemothorax, and pinch-off syndrome caused by puncture catheterization[4]. Arm infusion ports have a short subcutaneous tunnel when implanted, and infusion and blood transfusion obstacles are significantly lower than chest infusion ports. Arm infusion ports are a better choice for breast cancer radiotherapy, chest radiography, neck and upper chest recurrence with pectoralis major muscle flap tumors, radiation dermatitis, or patients with impaired respiratory function[5].

The basilic vein is one of the superficial veins of the upper limb, on the ulnar side of the forearm. After receiving blood from the ulnar side, it gradually turns from the back of the hand to the flexor side of the forearm. It receives blood from the median cubital vein in the elbow fossa and travels up along the inside of the biceps brachii muscle. It penetrates through the fascia propria at about the midpoint of the upper arm and connects to the brachial vein or accompanies it to the axillary vein. The basilic vein has characteristics such as a straight course, few valves, gradually thickening lumen, and easy external touch[6]. However, arm venous access still poses some specific challenges, because the arm venous route has a longer implantation distance. When the guidewire is inserted into the venous circulation if the basilic vein has variant branches[7], it can cause the guidewire to jam during insertion, and if it is forcibly withdrawn at this time and the guidewire tip is of poor quality, it may cause the head end of the guidewire to be embedded, which often has no obvious symptoms and requires postoperative X-ray imaging for detection. All the surgical procedures described in this case report were performed in accordance with the relevant literature and guidelines. The purpose of this report is to describe a rare case and review the relevant literature.

CASE PRESENTATION

Chief complaints

After the right breast cancer surgery, the arm port is required to be placed for further chemotherapy.

History of present illness

The patient had previously undergone surgery to confirm right-sided breast cancer (T2N0M0), and postoperative pathology indicated a tumor size of 2.5 × 2.2 × 1.3 cm, and right axillary sentinel lymph node without cancer metastasis (0/6); immunohistochemistry indicated estrogen receptor (-); progesterone receptor (-); human epidermal growth factor receptor Her-2 (0); and Ki-67 (5%+). The patient recovered well after surgery and was admitted on July 12, 2022, for left arm infusion port implantation surgery. The puncture process encountered an obstruction, but later everything went smoothly, with an intracorporeal catheter length of 41 cm. The patient did not complain of any obvious discomfort after surgery.

History of past illness

The patient had undergone a modified radical mastectomy with sentinel lymph node biopsy for right-sided breast cancer, and had no other significant past medical history.

Personal and family history

The patient had no previous history of venous variation or personal and family history of cancer, no smoking or alcohol consumption, no special medication or exposure to toxic substances.

Physical examination

The patient had no right breast, and a surgical scar about 15 cm long was seen on the right chest wall; no obvious mass or abnormality was seen on the left breast.

Laboratory examinations

The laboratory tests for blood, urine, stool, coagulation function, infectious diseases, *etc.* were all normal.

Imaging examinations

Postoperative X-ray showed that the end of the patient's peripherally inserted central catheter was located on the right side of the T7 intervertebral foramen (Figure 1A), and an abnormal guidewire about 1.8 cm long was seen on the upper part of the left elbow (Figure 1B).

FINAL DIAGNOSIS

After the operation, imaging showed a branch of the left upper limb basilic vein, suggesting a congenital venous variation (Figure 1B).

TREATMENT

The patient underwent emergency removal of a foreign body from the left upper arm. Before the operation, a C-arm machine was used to locate the foreign body in the left upper arm and a transverse surgical incision was made. The foreign body was freed to the location position, and a guidewire about 1.8 cm long was seen during exploration (Figure 2). The guidewire was completely removed, which was confirmed by radiography.

OUTCOME AND FOLLOW-UP

The patient was considered to have basilic vein variation, and the guidewire entered the variant branch of the basilic vein during arm port insertion. Fortunately, postoperative X-ray detected it in time and handled it properly. During subsequent adjuvant chemotherapy, the arm port continued to function normally, all indicators were normal during regular examinations, and the patient did not have any obvious discomfort. After completing eight cycles of chemotherapy, the patient successfully underwent surgery under local anesthesia on February 8, 2023, and the arm port was removed (Figure 3A and B). She did not feel any discomfort during the subsequent follow-up period.

DISCUSSION

Breast cancer has become the most common malignant tumor among women worldwide, and its incidence is increasing annually. The current treatment mainly includes multidisciplinary methods such as surgery, radiotherapy, neoadjuvant therapy, and adjuvant therapy[8]. For patients who need chemotherapy, traditional totally implantable vascular access devices are installed in the chest wall, through subclavian or internal jugular vein implantation. However, as an alternative to chest ports, arm ports have become more widespread, and they have advantages such as reducing the incidence of related complications and improving patient satisfaction compared with traditional chest ports. Especially for female breast cancer patients, the breast is the most important secondary sexual characteristic and aesthetic organ. Patients with arm ports have no extra scars on their chest, and during the placement and subsequent chemotherapy process, patients do not need to expose their chest to easily install or access the port, which has cosmetic and psychological benefits[5]. Moreover, arm ports are easy to use, do not require frequent maintenance, and can significantly improve quality of life[9].

Our patient chose an arm port after consideration. Before arm port implantation, we signed relevant informed consent forms with the patient, understood the patient's past history and drug allergy history, asked the patient to undergo blood routine and electrocardiographic examination, measured biochemical indicators and coagulation function, *etc.*, and checked the skin condition of the implantation site. Finally, according to the location of breast cancer, we chose the basilic vein on the left (healthy) side as the infusion port catheter entry route. The patient was placed on the operating table in a supine position, and the target arm was kept perpendicular to the body[10]. We checked the patient's vascular condition under ultrasound guidance, and the basilic vein looked normal. We marked the pre-puncture point and pouch site and disinfected the entire arm three times. A sterile towel was placed under the punctured side limb, and the operator wore sterile clothing and gloves. The Surgical drape was spread around the puncture point to maximize the sterile area. After preparation, the vascular ultrasound probe was coated with a coupling agent and wrapped in a sterile ultrasound protective sleeve. The upper arm was tied with a tourniquet, and the coupling agent was applied again. The vascular condition was re-examined. According to the depth of the vessel, as shown under ultrasound guidance, local anesthesia (lidocaine 1%) was performed at the desired puncture point. A guidewire needle holder was selected, and blood return was seen after the puncture. During guidewire insertion, the head end encountered resistance, and when it was pulled back, it became stuck and could not be pulled back smoothly. We adjusted the guidewire needle holder position and pulled back the guidewire again. The guidewire came out of the blood vessel under strong resistance. At that time, The head end of the guidewire got stuck in the variant branch of the basilic vein. However, due to the strong stretchability of

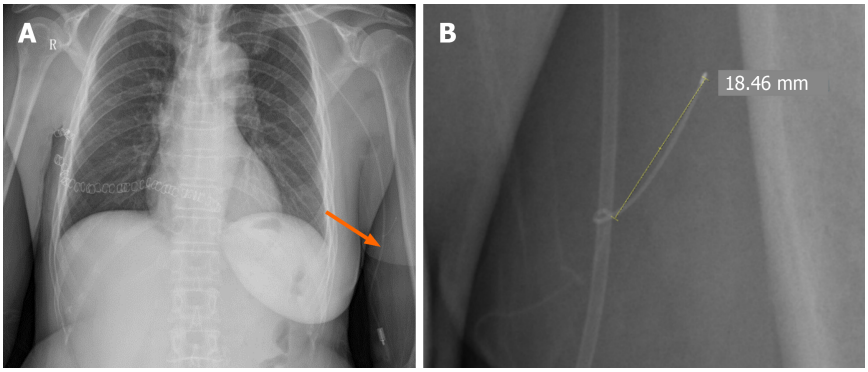

Figure 1 X-ray imaging results. A: The postoperative X-ray images indicated that the peripherally inserted central catheter was positioned correctly at the T7 cone space level on the right side; B: The postoperative X-ray images revealed that an unusual guide wire measuring around 1.8 cm in length was detectable above the left elbow.

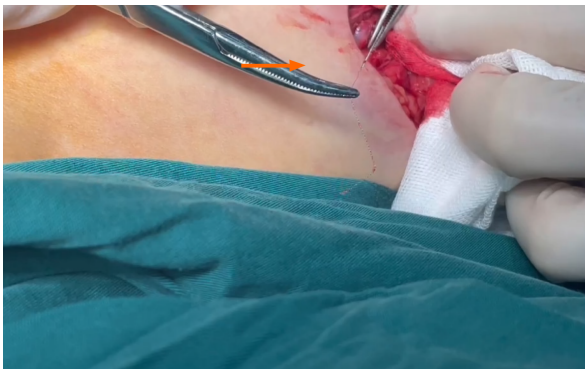

Figure 2 Abnormal guidewire about 1.8 cm long after removal.

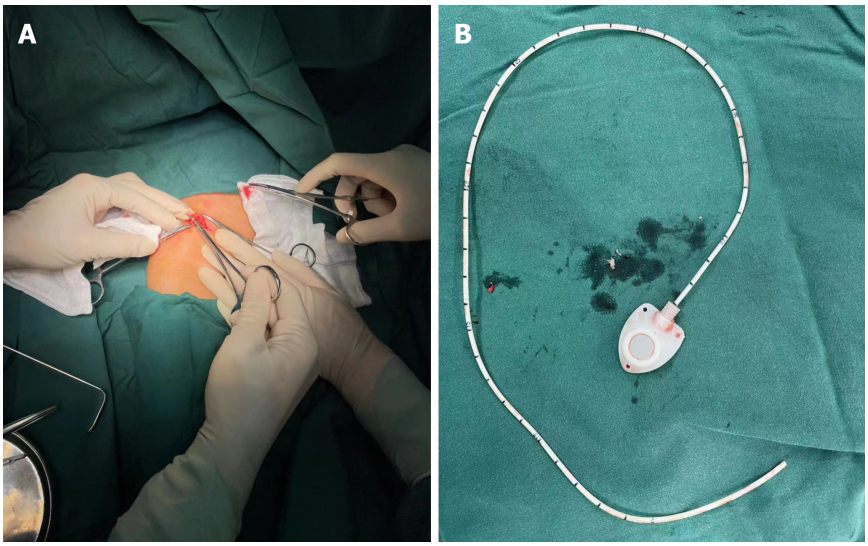

Figure 3 The patient underwent successful surgery under local anesthesia, and the arm infusion port was removed. A: Process of extracting the arm port; B: Its appearance post-extraction.

the head end, when it was pulled out, the length of the guidewire appeared to be the same as its original length. We inserted the guidewire along the needle holder again, and this time the guidewire was inserted smoothly without any resistance. All subsequent operation procedures were in accordance with relevant literature and guidelines.

We routinely performed chest X-rays after surgery, to confirm the position of the catheter. The ideal position of the catheter should be at the T5-7 level[5]. The catheter was located at the right side of the T7 intervertebral foramen level, which met the placement requirements. According to the chest X-ray, we could see an abnormal guidewire about 1.8 cm long on the upper part of the left elbow (Figure 1). We immediately consulted a hand microsurgeon, who performed

Figure 4 Guidewire removed, about 1.8 cm long, with a bent head end.

emergency removal of the foreign body from the left upper arm. The hand microsurgery procedure involved making a transverse incision of approximately 7 cm in length, according to the preoperative positioning of the C-arm machine. The incision was made through the skin and subcutaneous tissue, and the flap was then freed up to the C-arm machine positioning position. During the procedure, an abnormal guidewire measuring approximately 1.8 cm was discovered and explored (Figure 2). After removing the guidewire (Figure 4), another radiograph was taken to confirm its complete removal, and hemostasis was performed on the wound surface, and the subcutaneous tissue and skin were sutured layer by layer. During the operation, no adjustment was made that affected the infusion catheter position and the patient also underwent adjuvant chemotherapy as planned. The chemotherapy side effects were not significantly different from those in other arm port patients. The possible reason was that the basilic vein variation occurred at a place that did not affect the normal infusion catheter position, and there was no obvious impact on the absorption, distribution, metabolism, and excretion of drugs in the subsequent period. No common intraoperative complications such as air embolism or arterial injury, occurred during surgery. There was no skin soft tissue damage, catheter-related infection, catheter-related thrombosis, or other common postoperative complications. During the subsequent adjuvant chemotherapy period, the arm port continued to function normally, all indicators were normal during regular examinations, and the patient did not have any obvious discomfort. After completing eight cycles of chemotherapy, the patient successfully underwent arm port removal under local anesthesia on February 8, 2023. All indicators were normal during regular re-examination. Subsequent intermittent follow-ups showed that health status and quality of life improved significantly.

We conducted a literature search on PubMed, Web of Science and China National Knowledge Infrastructure (CNKI), and retrieved all studies published before July 2022. In many clinical case reports, the venous variations encountered had an impact on diagnosis and treatment, and the problems encountered during the treatment process, such as the impact of central venous anatomical variation on venous access, *etc*[11]. However, regarding basilic vein a variation, only one case was found in CNKI. The patient was an adult male, and variation of the left basilic vein was found during dissection. The report and discovery of this case had some significance for our operation[12].

CONCLUSION

Many studies have shown that an arm port is a feasible long-term chemotherapy option, with a high level of patient satisfaction and minimal negative impact on quality of life. These findings are important for the treatment of breast cancer, because long-term chemotherapy may have a negative impact on quality of life. The use of arm catheters can reduce pain and discomfort for patients, and improve patient satisfaction, thereby improving treatment outcomes[13]. This case report has some implications for breast cancer patients who are undergoing arm port implantation. Before clinical arm port implantation, a vascular ultrasound must be performed to confirm whether there is any abnormality in the basilic vein, whether the blood vessels have sufficient volume and whether they meet the relevant implantation conditions. Ensuring a safe vascular passage is crucial for whether the port can be successfully implanted. At the same time, it is recommended that a chest X-ray should also be taken after surgery to confirm whether the head end of the catheter is at the T5–T7 level and whether there is any residual abnormal guidewire caused by basilic vein variation at the arm port site. This rare case report aims to reduce the occurrence of postoperative complications in arm port patients, improve the safety of subsequent adjuvant chemotherapy, and achieve a safer, lower-risk, and less complicated chemotherapy process.

FOOTNOTES

Co-first authors: Cheng-Da Hu and Rui Lv.

Author contributions: Hu CD and Lv R contributed equally to this work; Hu CD and Lv R contributed to manuscript writing editing, and

data collection; Zhang MH and Mao YW validated the images and case data; Zeng HD conducted the follow-up; Zhao YX contributed to conceptualization and supervision. All authors have read and approved the final manuscript.

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