

Clinical practice guidelines for breast cancer implantable intravenous infusion ports: Chinese Society of Breast Surgery practice guidelines 2021

Li Ma¹, Zhi-Cheng Ge², Ling Xin³, Ying-Xin Wang³, Yan-Shou Zhang¹, Tian-Tian Tang¹, Guo-Xuan Gao², Qian Liu³, Xuan Zhao³, Yun-Jiang Liu¹, Xiang Qu², Chinese Society of Breast Surgery

¹Department of Breast Center, The Fourth Hospital of Hebei Medical University, Shijiazhuang, Hebei 050035, China;

²Department of General Surgery I, Beijing Friendship Hospital of Capital Medical University, Beijing 100050, China;

³Department of Center for Breast Diseases, Peking University First Hospital, Beijing 100034, China.

To standardize the clinical application of implantable intravenous (IV) ports, the Chinese Society of Breast Surgery (CSBrS) of the Chinese Medical Association has identified the key clinical issues through literature research and expert discussion and evaluated the relevant evidence with reference to the grading of recommendations assessment, development, and evaluation. The CSBrS formulated the clinical practice guidelines to provide a reference for physicians specializing in breast cancer and other fields.

Level of Evidence and Recommendation Strength

Level of evidence standard^[1]

Recommendation strength standard^[1]

Recommendation strength review committee

A total of 84 members of the voting committee of this guideline, including 71 breast surgeons (84.52%), four oncologists (4.76%), four radiologists (4.76%), two pathologist (2.38%), two radiation therapist (2.38%), and one epidemiologist (1.19%).

Target Audience

Chinese breast disease specialists.

Recommendations

Recommendation 1: Indications.

Indications	Level of evidence	Recommendation strength
1.1 Breast cancer patients requiring chemotherapy drugs, highly osmotic or viscous fluids such as intravenous nutrition, or blood or long-term infusions ^[2]	I	Class A

Recommendation 2: Channel selection.

Channel selection	Level of evidence	Recommendation strength
2.1 Subclavian vein, internal jugular vein, noble vein ^[3]	I	Class A
2.2 Femoral vein ^[4]	II	Class A

Recommendation 3: Catheter tip position in infusion port.

Catheter tip position	Level of evidence	Recommendation strength
3.1 Lower 1/3 of the superior vena cava ^[5-7]	I	Class A
3.2 Junction of the superior vena cava and right atrium ^[6,8]	I	Class A

Li Ma and Zhi-Cheng Ge contributed equally to this work.

Corresponding to: Dr. Yun-Jiang Liu, Department of Breast Center, the Fourth Hospital of Hebei Medical University, Shijiazhuang, Hebei 050035, China

E-Mail: wylj123456@163.com

Dr. Xiang Qu, Department of General Surgery I, Beijing Friendship Hospital of Capital Medical University, Beijing 100050, China

E-Mail: cqx3968@sina.com

Copyright © 2021 The Chinese Medical Association, produced by Wolters Kluwer, Inc. under the CC-BY-NC-ND license. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 3.0 License, where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially.

Chinese Medical Journal 2021;134(16)

Received: 19-02-2021 Edited by: Yan-Jie Yin and Xiu-Yuan Hao

Access this article online

Quick Response Code:



Website:
www.cmj.org

DOI:
10.1097/CM9.0000000000001522

Recommendation 4: Catheter tip positioning method.

Catheter tip positioning method	Level of evidence	Recommendation strength
4.1 Intra-operative X-ray or post-operative chest radiograph ^[9,10]	I	Class A
4.2 Intra-operative electrocardiogram (ECG) localization ^[11,12]	I	Class A

Recommendation 5: Prevention and management of common complications.

Complications	Prevention and treatment	Level of evidence	Recommendation strength
5.1 Pneumothorax, hemothorax, air embolism, misdirected artery, etc	Ultrasound localization or intra-operative use of ultrasound-guided venipuncture ^[13,14]	I	Class A
5.2 Catheter-associated bloodstream infections	Strict asepsis; empirical use of antibiotics until drug sensitivity test results are available, and selection of drugs based on drug sensitivity after clarification of the infecting agent; removal of intravenous ports when treatment is ineffective ^[8,14]	II	Class A
5.3 Catheter-associated thrombosis	Avoid repeated punctures; position the catheter tip correctly. Once catheter-associated thrombosis occurs, anticoagulation is preferred ^[14]	II	Class A

Recommendation 6: Infusion port maintenance.

Featured content	Level of evidence	Recommendation strength
6.1 Maintenance of IV ports by professionally trained health care professionals ^[15]	I	Class A
6.2 Non-invasive needles should be used for puncture, with replacement of non-invasive needles every 7 days ^[7]	I	Class A
6.3 Catheter return and flow smoothness should be assessed after puncture ^[15]	I	Class A
6.4 Sterile dressings are required to cover the puncture point and sterile clear dressings should be changed at least every 7 days, with sterile gauze dressings changed at least every 2 days ^[7]	I	Class A
6.5 With syringes of 10 mL and above, the tube was flushed using a pulsatile maneuver and sealed by a positive-pressure maneuver ^[15]	II	Class A
6.6 Tubes were flushed and sealed with saline or 100 U/mL heparin saline ^[7,15]	I	Class A
6.7 Maintenance at least every 4 weeks between treatments ^[7]	I	Class A

Discussion

Implantable IV port indications and choice of access

IV ports have changed the paradigm of care for patients receiving long-term infusions of cytotoxic or hyperosmolar, viscous drugs. In the literature, the long-term use of internal jugular vein implantation for the infusion port is more effective and safer than that for the subclavian vein.^[3] Femoral vein placement may be appropriate in cases of obstructed compression of the superior vena cava or other special circumstances.^[4] The arm port provides a better patient experience than the chest wall port because the placement site is hidden and there are no problems with changing the patient’s dressing habits and exposing the implanted port site.

Rational positioning of implantable IV port catheter tips

The American Society for Intravenous Infusion Nursing recommended that the tip of the central venous catheter be placed in the lower third of the superior vena cava, adjacent to the junction of the superior vena cava and the right atrium.^[5] The European Society for Medical Oncology guidelines recommended the ideal location of the tip at the junction of the superior vena cava and the right atrium.^[8]

Guidelines for the implantation and management of central venous access require imaging equipment.^[9] Randomized controlled trial studies have shown that intra-operative X-ray fluoroscopy significantly reduces the rate of central venous catheter tip ectasia and the need to adjust catheter tip position compared to blind penetration.^[10] Prospective controlled studies have shown that the application of ECG positioning significantly reduces the risk of tip ectasia and is efficient and economical.^[11,12]

Prevention and management of common complications of implantable IV ports

Ultrasound-guided internal jugular vein puncture is relatively easy to perform, has fewer complications, and is a safer procedure compared to that in other veins.^[8]

The main cause of catheter-associated bloodstream infection pathogenesis is bacterial colonization of intravascular catheters. The typical presentation is chills and hyperthermia with elevated leukocyte counts. When infection is suspected, the use of the IV port should be suspended and intra-port and peripheral blood samples should be drawn for blood culture and drug sensitivity testing. Sensitive antibiotics should be selected for systemic treatment based on these test results. The IV port should be removed immediately upon anti-infective therapy failure.^[8,14] IV port catheter-associated thrombosis is primarily guided by the formation of blood clots in the external wall of the tube or intra-catheter access. Once thrombosis is established, anticoagulation is preferred^[8,14]; furthermore, thrombolytic therapy is generally not recommended.

Maintenance of implantable IV ports

The implantation and maintenance of IV ports should be performed by individuals and/or teams with educational

backgrounds in infusion therapy. The use of non-invasive needles can protect against the puncturing of the silicone septum of the injection seat. Health industry standards state that non-invasive needles should be changed every 7 days.

The non-invasive needle wing must be fixed and protected using sterile dressings. Sterile transparent dressings should be changed at least every 7 days and sterile gauze excipients should be changed at least every 2 days. The 10-mL syringe is recommended to assess the function of the device, as larger-diameter syringes produce lower injection pressure and help to protect the catheter. Pulsatile maneuvers can create a vortex in the lumen and increase the flushing effect and positive-pressure sealing can prevent blood reflux from the catheter tip. Our health industry standards state that IV ports should be maintained at least every 4 weeks between treatments.

Removal of implantable IV port

Infusion ports that do not need to be retained or are not suitable for continued retention may be removed. After the removal, the device should be checked for integrity.

Appendix

Practice Video (Supplementary file), <http://links.lww.com/CM9/A599>, <http://links.lww.com/CM9/A600>.

Conflicts of interest

The Expert Committee for this guideline declares no conflict of interest. This guideline is intended to serve as a reference for the clinical work of physicians specializing in breast disease. It does not serve as a basis for medical evaluation, nor does it arbitrate on any medical disputes or controversies, nor does it serve as a reference for patients or non-breast specialists. The Chinese Society of Breast Surgery of the Chinese Medical Association does not assume any responsibility for any results involving the inappropriate application of this guideline and reserves the right to interpret and revise this guideline.

List of compiling committees (in alphabetical order by last name)

Zhong-Wei Cao, De-Dian Chen, Xue-Ning Duan, Zhi-Min Fan, Pei-Fen Fu, Guo-Xuan Gao, Zhi-Cheng Ge, Jian Huang, Jun Jiang, Hong-Chuan Jiang, Feng Jin, Hua Kang, Rui Ling, Jin-Ping Liu, Ke Liu, Qian Liu, Yin-Hua Liu, Yun-Jiang Liu, Zhen-Zhen Liu, Yong-Hui Luo, Li Ma, Rong Ma, Da-Hua Mao, Jiang-Hua Mao, Xiang Qu, Guo-Sheng Ren, Ai-Lin Song, Er-Wei Song, Li-Li Tang, Tian-Tian Tang, Xing-Song Tian, Chuan Wang, Jian-Dong Wang, Shu Wang, Shui Wang, Xiang Wang, Ying-Xin Wang, Gui Wu, Ke-Jin Wu, Fei Wu, Ling Xin, Zhigang Yu, Jian-Guo Zhang, Jin Zhang, Jing-Hua

Zhang, Yan-Hui Zhang, Xuan Zhao, Yi Zhao, Zuo-Wei Zhao, Wei Zhu, Ang Zheng, and Qiang Zou.

References

- Ye JM, Guo BL, Liu Q, Ma F, Liu HJ, Wu Q, *et al*. Clinical practice guidelines for sentinel lymph node biopsy in patients with early-stage breast cancer: Chinese Society of Breast Surgery (CSBrS) practice guidelines 2021. *Chin Med J* 2021;134:886–894. doi: 10.1097/CM9.00000000000001410.
- Zhang P, Du J, Fan C, Mo X, Dong J, Fan Z, *et al*. Utility of totally implantable venous access ports in patients with breast cancer. *Breast J* 2020;26:333–334. doi: 10.1111/tbj.13595.
- Xu H, Chen R, Jiang C, You S, Zhu Q, Li Y, *et al*. Implanting totally implantable venous access ports in the upper arm is feasible and safe for patients with early breast cancer. *J Vasc Access* 2019;21:609–614. doi: 10.1177/1129729819894461.
- Kato K, Iwasaki Y, Onodera K, Higuchi M, Kato K, Kato Y, *et al*. Totally implantable venous access port via the femoral vein in a femoral port position with CT-venography. *J Surg Oncol* 2016;114:1024–1028. doi: 10.1002/jso.24441.
- Infusion Nurses Society. Standards of practice. *J Intrav Nurs* 2000;23:6S.
- 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;28:365–377. doi: 10.1016/j.clnu.2009.03.015.
- National Health Commission of the People's Republic of China. Nursing practice standards for intravenous therapy (Chinese) (WS/T 433-2013 [EB/OL]). Available from: <http://www.nhc.gov.cn/ewebeditor/uploadfile/2014/12/20141212142815390.PDF>. Accessed November 14, 2013.
- Sousa B, Furlanetto J, Hutka M, Gouveia P, Wuerstlein R, Mariz JM, *et al*. Central venous access in oncology: ESMO clinical practice guidelines. *Ann Oncol* 2015;26 (Suppl 5):v152–v168. doi: 10.1093/annonc/mdv296.
- Bishop L, Dougherty L, Bodenham A, Mansi J, Crowe P, Kibbler C, *et al*. Guidelines on the insertion and management of central venous access devices in adults. *Int J Lab Hematol* 2007;29:261–278. doi: 10.1111/j.1751-555X.2007.00931.x.
- Glauer F, Breault S, Rigamonti F, Sotiriadis C, Jouannic AM, Qanadli SD, *et al*. Tip malposition of peripherally inserted central catheters: a prospective randomized controlled trial to compare bedside insertion to fluoroscopically guided placement. *Eur Radiol* 2017;27:2843–2849. doi: 10.1007/s00330-016-4666-y.
- Gebhard RE, Szmuk P, Pivalizza EG, Melnikov V, Vogt C, Warters RD. The accuracy of electrocardiogram-controlled central line placement. *Anesth Analg* 2007;104:65–70. doi: 10.1213/01.ane.0000250224.02440.fe.
- McGee WT, Ackerman BL, Rouben LR, Prasad VM, Bandi V, Mallory DL, *et al*. Accurate placement of central venous catheters: a prospective, randomized, multicenter trial. *Crit Care Med* 1993;21:1118–1123. doi: 10.1097/00003246-199308000-00008.
- Wu SY, Ling Q, Cao LH, Wang J, Xu MX, Zeng WA. Real-time two-dimensional ultrasound guidance for central venous cannulation: a meta-analysis. *Anesthesiology* 2013;118:361–375. doi: 10.1097/ALN.0b013e31827bd172.
- Liu YJ, Qu X, Ge ZC, Ma L. Expert consensus and technical operation guidelines for implantable IV ports in Chinese Breast Cancer Patients (2017) (Chinese). *Chin J Pract Surg* 2017;37:1377–1382. doi: 10.19538/j.cjps.issn1005-2208.2017.12.16.
- Gorski LA, Hadaway L, Hagle ME, McGoldrick M, Orr M, Doellman D, *et al*. Infusion therapy standards of practice. *J Infus Nurs* 2016;39:S1–S159. doi: 10.1097/NHH.0000000000000481.

How to cite this article: Ma L, Ge ZC, Xin L, Wang YX, Zhang YS, Tang TT, Gao GX, Liu Q, Zhao X, Liu YJ, Qu X, Chinese Society of Breast Surgery. Clinical practice guidelines for breast cancer implantable intravenous infusion ports: Chinese Society of Breast Surgery practice guidelines 2021. *Chin Med J* 2021;134:1894–1896. doi: 10.1097/CM9.0000000000001522