Advanced International Journal for Research (AIJFR)
E-ISSN: 3048-7641 ● Website: www.aijfr.com ● Email: editor@aijfr.com

Comparative Study of Chemoport Versus Peripheral Venous Access in Breast Cancer Patients

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Abstract

Background: Reliable venous access is an important component of systemic treatment for breast cancer, particularly when patients require repeated administration of adjuvant chemotherapy or neoadjuvant chemotherapy (NACT). Totally implantable venous access devices (TIVADs), commonly referred to as chemoports, provide durable central venous access while avoiding repeated peripheral venepuncture.

Methods: A prospective comparative study was conducted over six months among patients with carcinoma breast receiving adjuvant chemotherapy or NACT. Eighty patients were included according to the study dataset specified for this manuscript: 40 received chemotherapy through a TIVAD and 40 through peripheral intravenous access. Port implantation time, early and postoperative complications, hospital discharge, and clinical experience regarding chemotherapy administration and patient compatibility were assessed.

Results: The mean duration of chemoport implantation was approximately 40 minutes. Approximately 90% of patients were discharged within 48 hours without complications. Reported complications associated with port placement or use included arterial puncture, hematoma, port blockage, catheter malposition, deep venous thrombosis, pneumothorax, hemothorax, local port-site infection, sepsis, and port blockage during chemotherapy. Compared with peripheral access, TIVAD use was associated with better practical acceptability, fewer repeated venepunctures, and improved convenience for repeated chemotherapy administration.

Conclusion: TIVADs offer a reliable and patient-compatible option for breast cancer patients requiring repeated intravenous chemotherapy. Although port insertion carries recognized mechanical, thrombotic, infectious, and procedure-related risks, these complications can be minimized by appropriate patient selection, meticulous technique, radiological guidance where appropriate, and experienced surgical practice. Prospective studies with standardized patient-reported outcomes and quantified complication rates are warranted.

Keywords: breast cancer; chemotherapy; totally implantable venous access device; chemoport; peripheral intravenous access; thrombophlebitis; venous access; complications

1. Introduction

Breast cancer treatment frequently requires repeated intravenous administration of systemic therapy over multiple cycles. Peripheral intravenous cannulation remains a simple and widely available method of access; however, repeated venepuncture may be painful, technically difficult in patients with poor venous access, and associated with local venous complications. The need for dependable access becomes particularly relevant when chemotherapy is administered over prolonged treatment courses.

Totally implantable venous access devices (TIVADs) are subcutaneous venous access systems designed to provide long-term intermittent central venous access. The port reservoir is completely implanted beneath the skin, while the catheter terminates in the central venous circulation. This design can reduce the need for repeated peripheral cannulation and avoids an external catheter between treatment sessions. Published literature describes TIVADs as valuable long-term access devices in oncology, while also emphasizing potential complications such as pneumothorax, hemothorax, arterial puncture, infection, thrombosis, catheter malposition, and occlusion. [1–3]

The present study compares the clinical use of chemoports with peripheral intravenous access among breast cancer patients receiving adjuvant chemotherapy or NACT. The study also describes the technical feasibility of port implantation, perioperative complications, early discharge, and the observed practical advantages of TIVADs from the perspective of repeated chemotherapy administration.

2. Materials and Methods

Study design and setting

This was a prospective comparative study conducted over a six-month period in the Department of General Surgery, KIMS, Hubli. The study population comprised patients diagnosed with carcinoma breast who were admitted during the study period and required systemic chemotherapy in the form of adjuvant chemotherapy or NACT.

Study population and sampling

A total of 80 patients were included. Patients were divided into two groups of 40 each according to the route of venous access used for chemotherapy: Group A, TIVAD/chemoport access (n=40), and Group B, peripheral intravenous access (n=40).

Chemoport implantation

TIVAD implantation was performed using established surgical venous access techniques. The study material included both subclavian venous access and cephalic vein cutdown approaches. In the source clinical series, the reported mean procedure duration was approximately 40 minutes. Patients were monitored for immediate procedural complications and postoperative complications, and port function was assessed during chemotherapy administration.

Outcome measures

The principal outcomes were duration of port implantation, early discharge, procedural and postoperative complications, port function during chemotherapy, and clinical acceptability compared with peripheral intravenous access. Complications considered included arterial puncture, hematoma, catheter malposition, pneumothorax, hemothorax, deep venous thrombosis, local port-site infection, sepsis, and port/catheter blockage.

Statistical analysis

The study material supplied for manuscript preparation provides descriptive clinical observations but does not provide a complete patient-level dataset, measures of variance, formal statistical tests, or validated patient-reported outcome scores. Accordingly, results are presented descriptively and no unreported inferential statistics have been added.

3. Results

Eighty patients with carcinoma breast receiving adjuvant chemotherapy or NACT were included, with 40 patients in the TIVAD group and 40 in the peripheral intravenous access group. The average duration of chemoport implantation was approximately 40 minutes. Approximately 90% of patients were discharged within 48 hours without complications.

The study recorded both intraoperative and postoperative adverse events. Intraoperative events included arterial puncture, hematoma, and port blockage. Postoperative or device-related events included catheter malposition, deep venous thrombosis, pneumothorax, hemothorax, local port-site infection, sepsis, and port blockage during chemotherapy. The clinical material also indicates that some patients required early port removal in the underlying series.

In comparison with peripheral intravenous access, TIVAD use was clinically associated with fewer repeated venepunctures and better tolerance during repeated chemotherapy sessions. Peripheral access was associated with the practical problems of repeated cannulation and venous irritation, including thrombophlebitis, and could require a second peripheral line when the initial access became unsuitable.

Table 1. Summary of study groups and assessed outcomes

Parameter	TIVAD / Chemoport	Peripheral IV access
Number of patients	40	40
Chemotherapy setting	Adjuvant / NACT	Adjuvant / NACT
Mean port implantation time	≈40 minutes	Not applicable
Early discharge	≈90% discharged within 48 h without complications	Not quantified
Repeated venepuncture	Avoided after port implantation	Required for successive sessions
Reported access-related issues	Malposition, blockage, infection, thrombosis and procedure-related events	Thrombophlebitis and need for repeat/second-line access were observed clinically

Clinical and Radiological Documentation

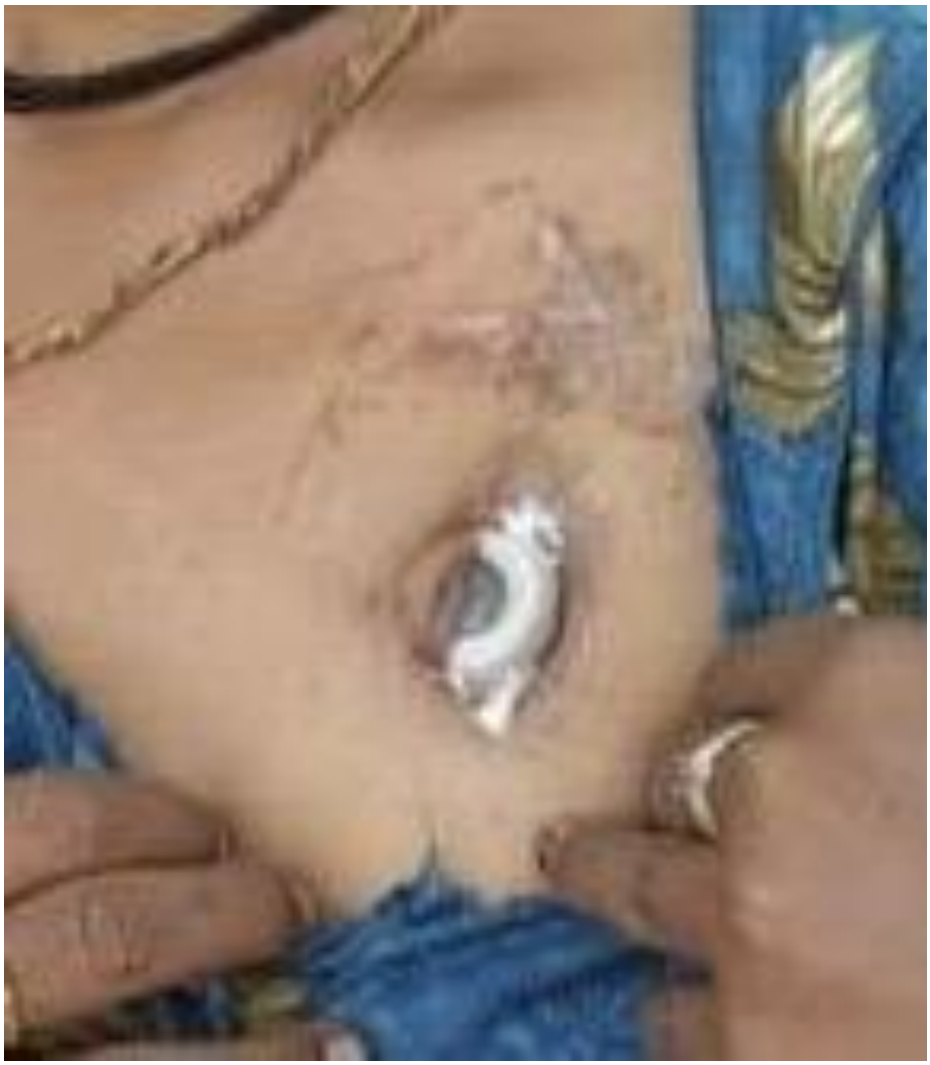

Figure 1. Clinical photograph demonstrating the dehiscence of implanted subcutaneous chemoport at the chest wall.

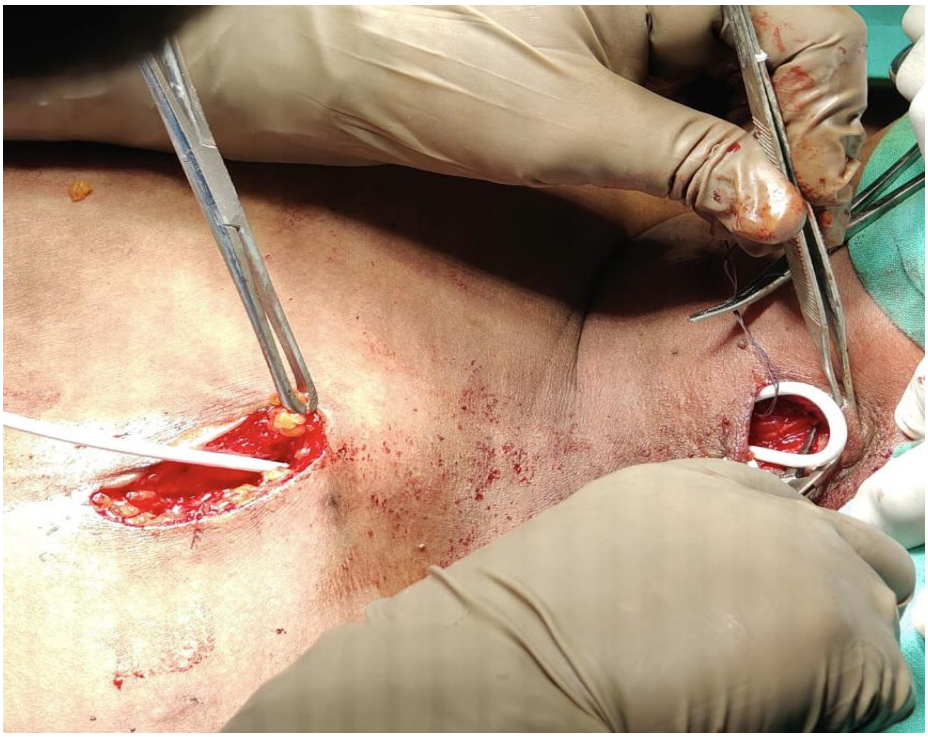

Figure 2. Intraoperative photograph during chemoport implantation demonstrating the operative field and venous access procedure.

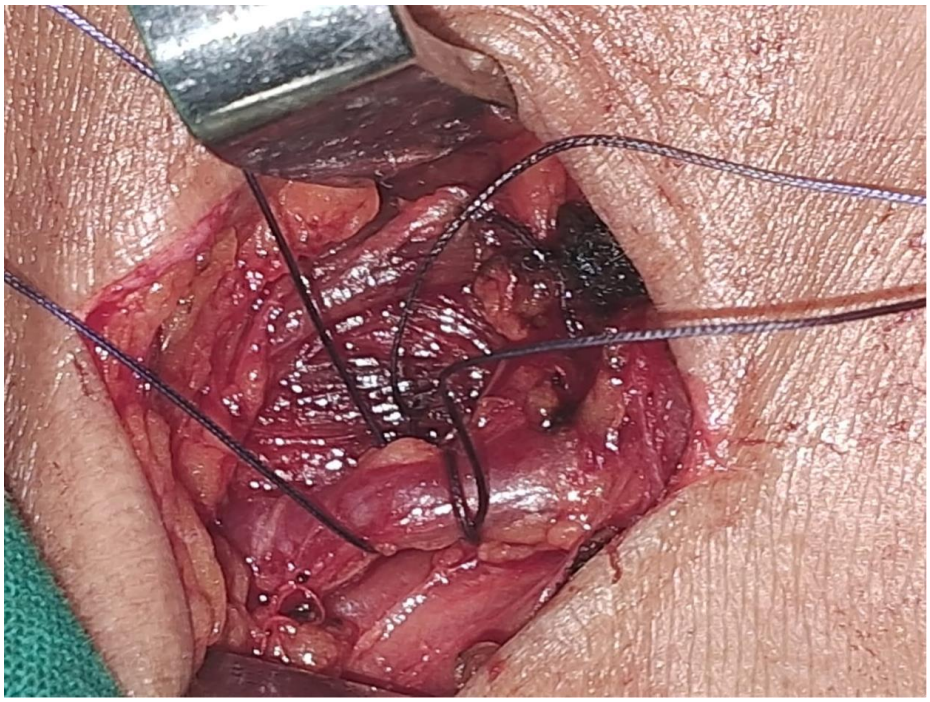

Figure 3. Intraoperative photograph demonstrating venous exposure and surgical handling during the cephalic vein access procedure.

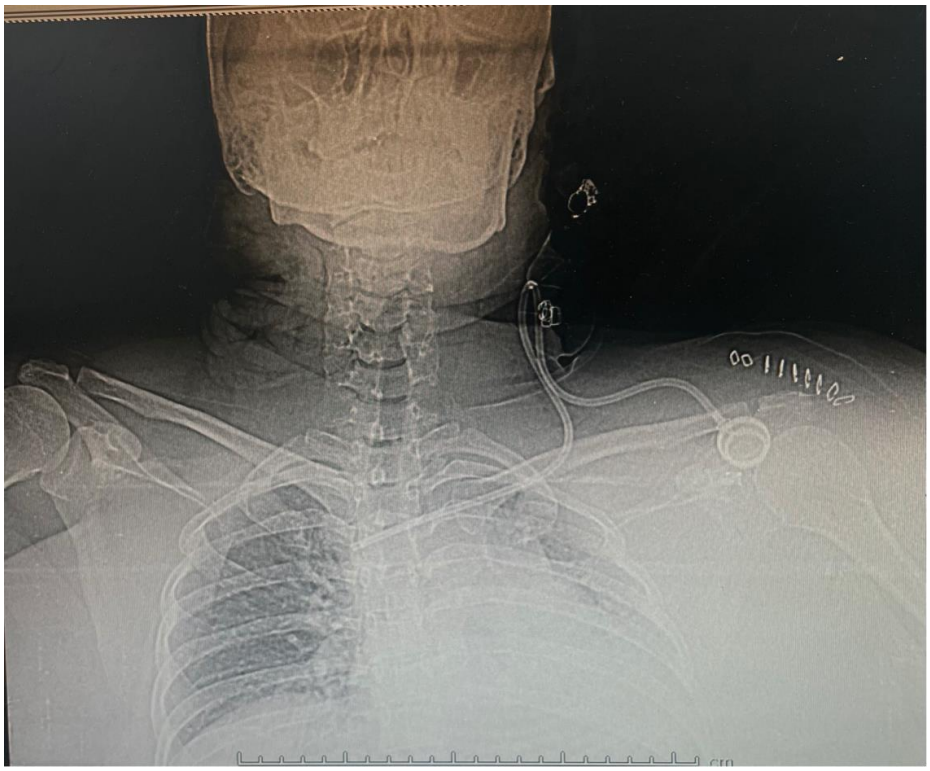

Figure 4. Chest radiograph demonstrating a kinked implanted venous access port and indwelling catheter.

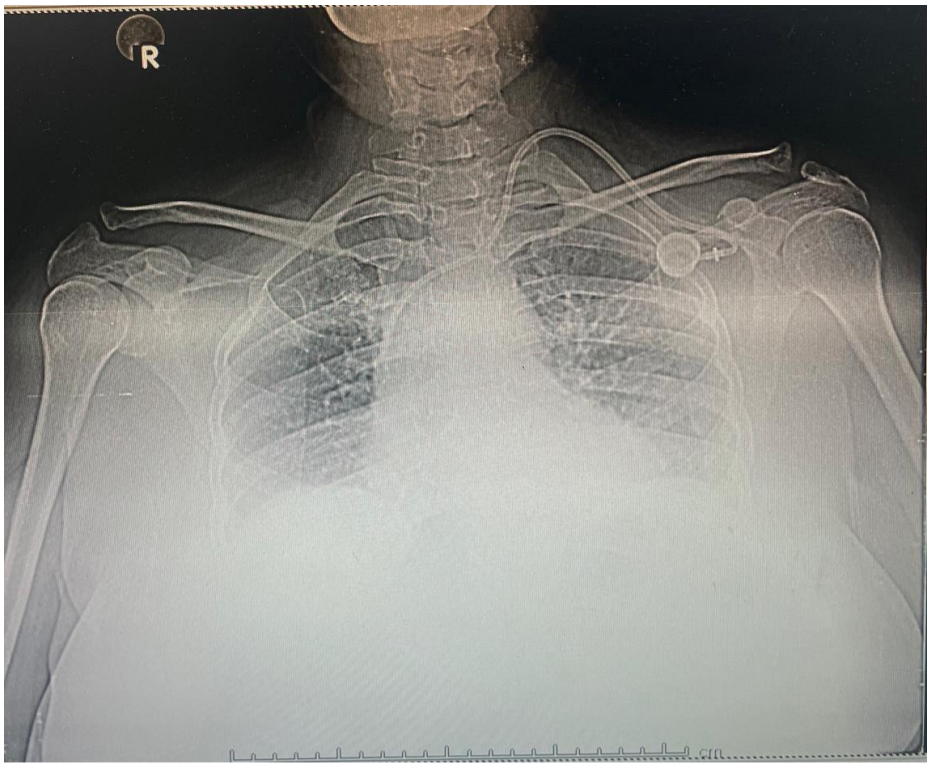

Figure 5. Chest radiograph demonstrating the implanted port system and catheter course.

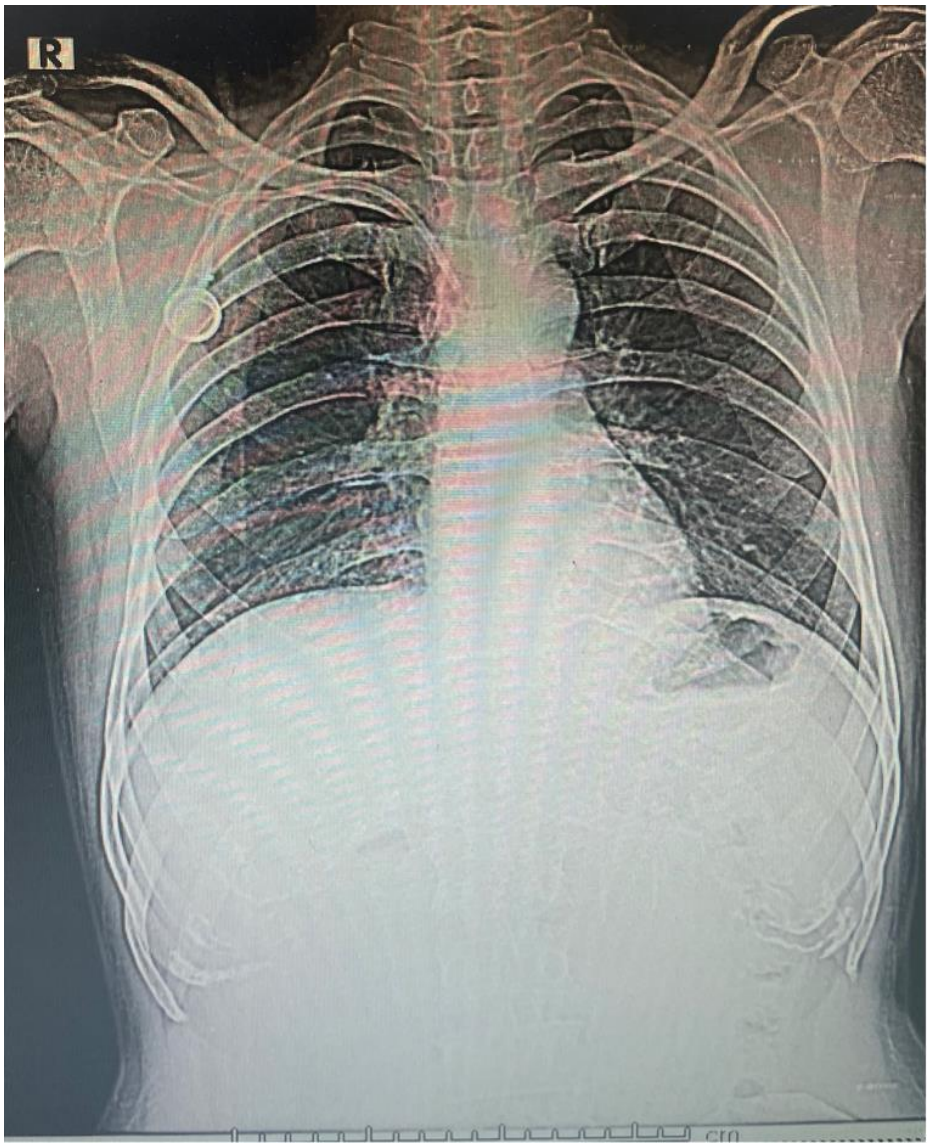

Figure 6. Chest radiograph demonstrating an implanted subclavian venous access device and catheter.

4. Discussion

Long-term venous access is an important supportive component of contemporary chemotherapy. Peripheral intravenous access is readily available and avoids a surgical implantation procedure, but repeated cannulation can become increasingly difficult and uncomfortable over the course of multi-cycle treatment. In contrast, a TIVAD provides a stable access point that can be accessed when chemotherapy is required and remains completely implanted between treatment sessions.

The present study found an average implantation time of approximately 40 minutes and an early discharge pattern in which about 90% of patients were discharged within 48 hours without complications. These findings support the practical feasibility of chemoport placement as a planned procedure in breast cancer patients requiring repeated chemotherapy. The observed benefits of TIVADs in this series included reduced need for repeated needle pricks, improved convenience during chemotherapy administration, and better overall clinical acceptability.

The advantages of TIVADs must be balanced against their potential complications. Immediate complications described in the literature include arterial puncture, pneumothorax, hemothorax and catheter malposition, while delayed complications include infection, thrombosis, occlusion, catheter migration or fracture, and port-pocket problems. [1–3] The complications observed or considered in the present study were consistent with this established spectrum.

Technique is an important determinant of safety. A large retrospective series of oncology patients found fewer early complications with ultrasound-guided placement than with blind percutaneous access, with pneumothorax occurring only in the blind percutaneous group in that series. [4] This supports the study conclusion that appropriate radiological guidance, when indicated and available, together with surgical expertise may reduce procedure-related morbidity.

The choice between cephalic vein cutdown and percutaneous central venous access should be individualized. Cephalic vein cutdown can provide direct surgical access without the need for percutaneous vascular kits or intraoperative ultrasonography, although it requires adequate venous anatomy and surgical exposure. Subclavian access is familiar and efficient but carries recognized risks of pleural injury and other mechanical complications. The present study included both approaches, but the available dataset does not provide sufficient numbers to statistically compare their complication rates.

Evidence from broader oncology literature supports the clinical value of totally implantable ports for prolonged chemotherapy. A systematic review and network meta-analysis of randomized trials found that TIVAPs were associated with lower odds of overall, thrombotic, and mechanical complications compared with PICCs, while maintaining favorable quality-of-life and cost-effectiveness profiles. [5] Importantly, this evidence compares TIVAPs with other central venous devices rather than directly with peripheral IV cannulation; therefore, it should be interpreted as supportive background evidence rather than direct validation of the present comparison.

The present study's conclusion that patient compatibility was better with TIVADs is clinically plausible, but this outcome was not measured using a validated pain, satisfaction, or quality-of-life instrument. Similarly, the statement that chemotherapy sessions were faster was based on clinical experience rather than a prospectively recorded administration-time endpoint. Future prospective studies should therefore quantify venepuncture attempts, time to successful access, chemotherapy administration time, pain scores, patient satisfaction, treatment delays, device dwell time, and cost.

Overall, the findings suggest that TIVADs are a practical and patient-compatible option for breast cancer patients requiring repeated intravenous chemotherapy. Their benefits are most meaningful when the anticipated treatment course is sufficiently prolonged to justify an implantation procedure and when the device can be inserted and maintained using standardized infection-prevention and catheter-care protocols.

5. Conclusion

TIVADs provide reliable long-term venous access for breast cancer patients undergoing adjuvant chemotherapy or NACT. In this prospective series, chemoport implantation required approximately 40

minutes on average, and approximately 90% of patients were discharged within 48 hours without complications. Compared with peripheral intravenous access, TIVADs offered practical advantages including avoidance of repeated painful venepuncture, reduced risk of peripheral thrombophlebitis from repeated cannulation, and improved patient compatibility during repeated chemotherapy sessions. Port-related complications, although potentially serious, can be minimized through careful patient selection, appropriate access technique, radiological guidance where appropriate, meticulous asepsis, and experienced surgical practice. Larger studies with standardized outcome measures are required to quantify the comparative benefits and risks more rigorously.

Limitations

The principal limitation is the relatively small sample size.

Ethics and consent

Institutional ethical clearance Obtained and Consent obtained from the patients participated in the study.

Declarations

Conflict of interest: Authors declare No Conflict of Interest.

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