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RESEARCH ARTICLE
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"SOCIODEMOGRAPHIC, CLINICAL CHARACTERISTICS & COMPLICATIONS AMONG ONCOLOGICAL PATIENTS WITH CHEMOPORTS & REASONS FOR REMOVAL OF CHEMOPORTS: AN OBSERVATIONAL STUDY IN A TERTIARY CARE CENTRE IN WESTERN RAJASTHAN"

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Abstract

Introduction: The management of a cancer patient demands stable venous access that can be utilized for giving chemotherapy, administering blood products, antibiotics and fluid replacement therapy. The use of long-term venous access devices or central venous catheters can also alleviate patient anxiety associated with repeated venipunctures. Chemo ports, also known as implantable ports or venous access devices, have become an increasingly common solution to facilitate chemotherapy administration. These devices have become the cornerstone of modern medical therapy in oncological practice.**Material and method:** This observational study was performed on 100 patients of various oncological diagnosis who underwent chemoport insertion for purpose of chemotherapy delivery in surgical departments of DR.S.N. Medical College, Jodhpur from May 2022 to October 2024.

Result: Most common age group pf patients was 40-60 years with a female predominance & breast cancer as the most common oncological diagnosis in patients who underwent chemoport insertion in our study. The mean duration of port in situ was 382.5 days. Complications are significantly varied, with septic complications being the most common, followed by thrombosis. Most of the complications were managed by removal of chemoport and some being managed conservatively. All the studied parameters were comparable with previous studies.

Conclusion: This study meticulously examines the complications associated with chemoports, including infections, thrombosis, mechanical issues, and port-related pain, documenting their incidence and severity. The study also underscores the critical role of chemoports in oncological care, highlighting their effectiveness in reducing the necessity for multiple painful venipunctures to administer chemotherapeutic agents by minimizing the pain and anxiety associated with cancer treatment & significantly enhancing the quality of life.

Keywords: Chemoport, Chemotherapy, oncological diagnosis, stable venous access, venipuncture

Introduction

Long-term venous access devices or central venous catheters in the field of Oncology has brought a fresh lease of life for our patients who for long have had to suffer multiple venipunctures during their course of chemotherapy (1). Cancer patients often require intravenous (IV) chemotherapy, which can be challenging to administer due to poor venous access or the need for frequent infusions. There are a number of long-term venous access devices currently in use in the field of Oncology:

- Peripherally inserted central catheters (PICC);
- Hickman line (cuffed or non-cuffed tunnelled);
- Subcutaneously implanted "PORT" catheters (Chemotherapy port/ Chemo port).

Peripherally inserted central catheters, Hickman line, and "PORT" devices are frequently used in oncology patients to provide chemotherapy, intravenous medications, fluid replacement, and total parenteral nutrition (3) (Figure-01). The implantable "PORT" consists of a catheter attached to a "port" that is implanted into a surgically created subcutaneous pocket on the anterior chest wall or upper arm. The central venous cannulation should ideally be done under ultrasound guidance and "PORT" insertion with the aid of C-ARM or fluoroscopy (4). A non-coring needle, sometimes referred to as a Huber needle is inserted through the septum of the "PORT" to access the reservoir, known as the access point.

Advantages of implanted ports include less interference with daily activities, monthly flushing of the port with heparin, and reduced risk of infection. Disadvantages include the need for an OT with or without general anaesthesia, increased discomfort during the procedure, and risks of central venous cannulation. These devices are also expensive and more difficult to insert.

This study was an effort to establish an objective criterion for insertion of chemotherapy ports in oncological patients. In this study, we tried to study the characteristics of patients and their demographic profiles, indications for chemoport insertion, chemoport related complications and reasons for removal of the chemoports and compared outcomes of chemoport with other chemotherapy delivery systems in previous studies.

Materials and methods

This observational study was conducted on 100 patients with various oncological diagnosis who underwent chemoport insertion for chemotherapy delivery, in the Department of General Surgery at MGH & MDMH, attached to Dr Sampurnanand Medical College, Jodhpur, Rajasthan.

INCLUSION CRITERIA**:**

1. Patients diagnosed with or operated for malignancies belonging to the age group of more than 18 years of both genders with chemotherapy port insertion

EXCLUSION CRITERIA:

1. Patients who refused to participate in the study.
2. Patients with bleeding diathesis

A detailed clinical history was followed by clinical examination of the patient which included general physical examination, local examination and systemic examination. In general physical examination evidence of jaundice was looked into and vital parameters at the time of admission were recorded. In systemic examination: all other systemic findings were noted to rule out associated anomalies. Necessary laboratory investigations i.e., routine blood investigations including hemograms, liver and renal function tests, radiological investigation like USG, chest x-ray, abdominal x-ray were also done. All chemoport insertion procedures were done under local anaesthesia induced with 10 ml of lidocaine 2% in subclavian vein in our study. In supine position an oblique incision is made in deltopectoral groove (Fig-1), wound is opened in layers to access subclavian vein. Vein is then separated from surrounding structures (Fig-2) & ligated distally with nonabsorbable suture (Fig-3). A small incision is made proximally over subclavian vein & chemoport catheter is inserted into it (Fig-4). Position of chemoport is then confirmed by checking for free flow blood into syringe on aspiration (Fig-5). Chemoport chamber is attached to catheter and fixed into subcutaneous pocket

created in infraclavicular region (Fig-6) & wound is closed in layers. Post-operatively a chest radiograph (Fig-7) is obtained to confirm the position of catheter & to rule out possible pneumothorax/haemothorax during the procedure. Figure-8 is showing the post operative picture of port as a small bump under the skin.

All patients were kept in ward under observation post operatively for injectable antibiotic therapy, dressing of suture site and to look for any post operative complications.

Patients were prospectively reviewed for complications weekly for 1 month, fortnightly for 2 months, monthly for 6 months and then sos.

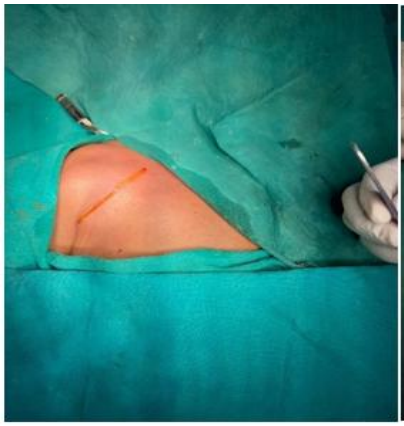


Figure 1- SITE OF INCISION (DELTOPECTORAL GROOVE) FOR CHEMOPORT INSERTION

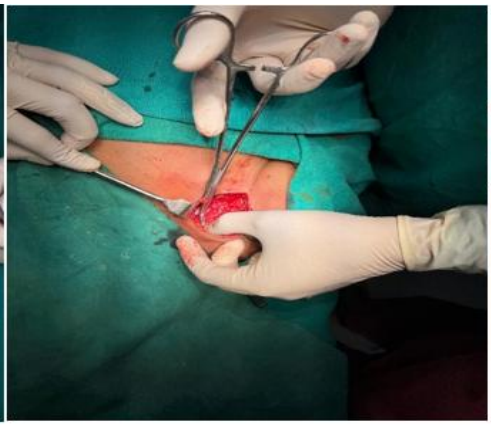


Figure 2- ISOLATION OF SUBCLAVIAN VEIN

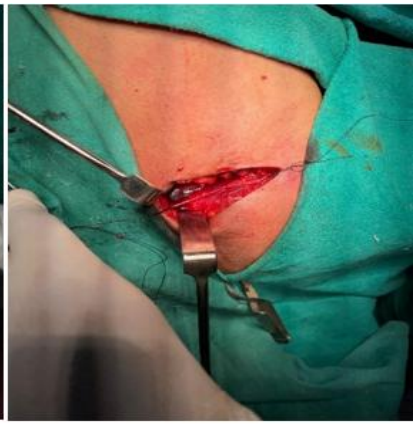


Figure 3- LIGATION OF SUBCLAVIAN VEIN

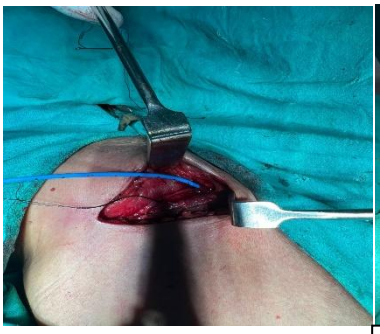


Figure 4- INSERTION OF CATHETER IN SUBCLAVIAN VEIN

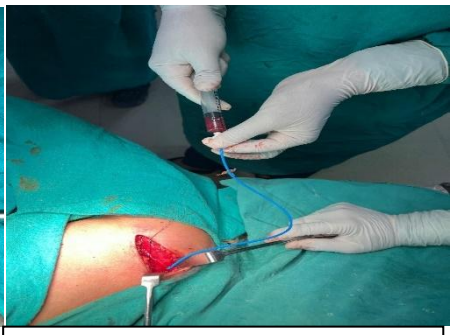


Figure 5- CONFIRMATION OF CATHETER POSITION BY ASSURING FREE FLOW OF BLOOD ON ASPIRATION

Figure 6- CREATION OF SUBCUTANEOUS POCKET FOR FIXATION OF CHEMO PORT CHAMBER

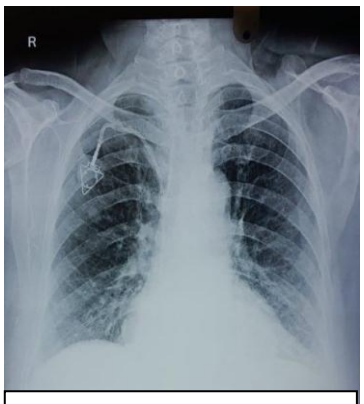


Figure 7- POST OPERATIVE X-RAY CHEST CONFIRMING THE POSITION OF CHEMO PORT

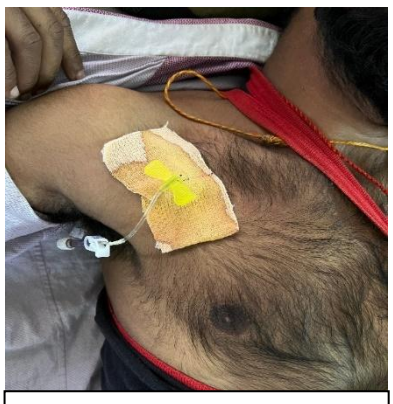


Figure 8- HEUBAR'S NEEDLE INSERTED IN CHEMO PORT CHAMBER FOR ADMINITRATION OF CHEMOTHERAPY

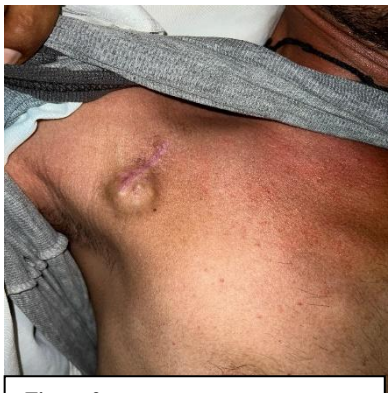
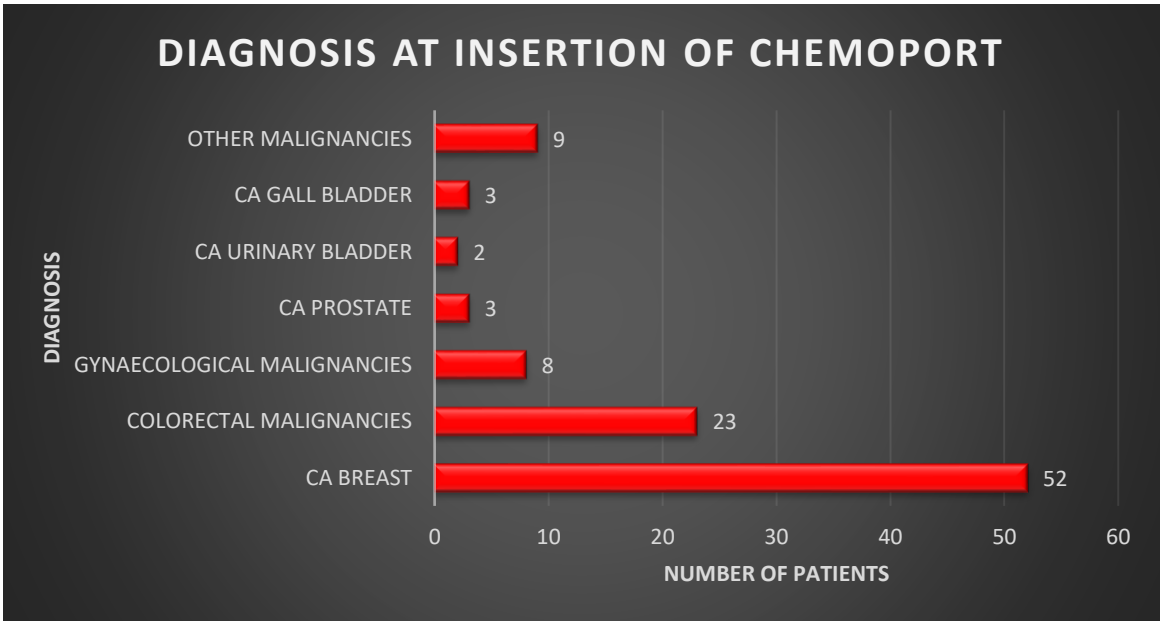
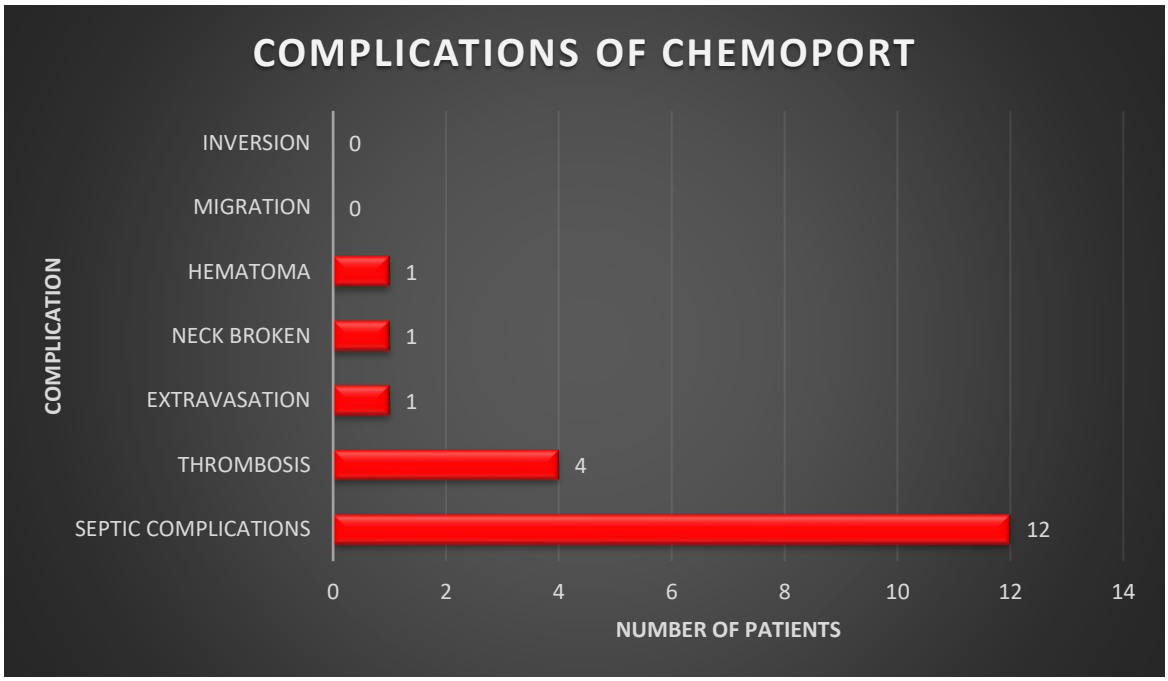


Figure 9- POST OPERATIVE PICTURE SHOWING THE PORT AS A BUMP UNDER THE SKIN

Results

- The gender distribution shows a significant difference, with 36% male and 64% female patients (p=0.005). Age distribution is also significant, with most patients aged 40-60 years (52%) (p=0.0005). The most of the patients who underwent chemoport insertion in this study were with the diagnosis of breast cancer (52%), followed by colorectal malignancies (23%), while urinary bladder cancer was the least common at 2%. (p=0.001).
- The mean duration with the port was 382.5 days. The duration of the chemoport in situ is predominantly less than 500 days (82%), and no significant association is found between duration and complications (p=0.684).
- At the time of completion of study, 70% of chemoports remain in situ (or patient might have got it removed somewhere else), while 30% have been removed. Of the 81 patients who completed their treatment, 66 had the chemoport still in place (or patient might have got it removed somewhere else), and 15 had it removed. In contrast, 19 patients with complications had 4 retaining their port and 15 had it removed, indicating a significant difference based on treatment completion (p=0.001).
- Complications are significantly varied, with septic complications being the most common (63.15%) (p=0.001), followed by thrombosis at 04% & catheter fracture, hematoma & extravasation 1% each. There were no reported cases of migration or inversion.
- The management of these complications predominantly involves the removal of the chemoport (79%) (p=0.012). However, no significant relationship is observed between the type of complication and the management strategy (p=0.10). Infection types leading to chemoport removal do not show significant differences (p=0.417).
- A total of 4 (21%) of patients were managed conservatively, while 15 (79%) required removal of their chemoport, in patients who developed complications. Local infection was the primary reason for removal.
- Complications were most commonly observed in patients with total leucocyte counts between 4000-11000 cells/cumm. Complications were also noted in patients with counts <4000 (1 patient) and >11000 (6 patients). Total leucocyte counts at the time of removal reveal a significant relationship with outcomes, with most patients having counts between 4000-11000 cells/cumm (p=0.005). A significant relationship is also found between TLC and the type of complications (p<0.001).





Discussion

The 100 patients enrolled for the study with various oncological diagnosis and chemoport insertion were followed up over the course of time and observed for successful performance of chemoport for administration of chemotherapy and development of complications and their management.

TABLE 12: Gender distribution of patients compared with previous studies.

	Jain et al (2013) (7)	Abraham et al (2012) (8)	Aparna et al (2015) (9)	MSKCC study (1998) (10)	Present Study (2024)
Female	**37**	**15**	**78**	**59**	**64**
Male	**63**	**66**	**122**	**41**	**36**

TABLE 13: DURATION OF CHEMOPORT

	Jain et al (2013) (7)	Abraham et al (2012) (8)	Aparna et al (2015) (9)	MSKCC study (1998) (10)	Present Study (2024)
Mean Duration (days)	**280**	**246**	**270**	**361**	**382**

TABLE 14: COMPLICATIONS OF CHEMOPORT

	Jain et al (2013) (7)	Abraham et al (2012) (8)	Aparna et al (2015) (9)	MSKCC study (1998) (10)	Present Study (2024)
Infection	**7%**	**10%**	**12.5%**	**8%**	**12.00%**
Thrombosis	**0.4%**	**6%**	**0.50%**	**2%**	**04.00%**
Catheter displacement	**NA**	**2%**	**0.5%**	**3%**	**NA**
Catheter fracture	**NA**	**2.4%**	**0.5%**	**NA**	**1%**
Hematoma	**NA**	**NA**	**NA**	**NA**	**1%**
Extravasation	**NA**	**NA**	**NA**	**NA**	**1%**
Total	**7.4%**	**20.4%**	**14 %**	**13 %**	**19 %**

In terms of the status of chemoports at present, out of 100 patients in the present study, 81 completed their treatment, with 66 having their chemoport still in place and 15 having it removed. Nineteen patients experienced complications without completing their treatment, with four retaining their

chemoport and 15 having it removed. Overall, 70 patients currently have their chemoport in situ, while 30 have had it removed.

In a study conducted by Fang et al (11) in 2016 comparing complication rates among various drug delivery systems, the rate of complications with chemoports was lowest (2.2%) as compared to PICC (40%) & Central line (27.5%). In our study the complication rate was 19% which was also significantly lower than PICC & Central line in previous study along with overall better outcomes in terms of procedure compliance, cost, patients' quality of life and comfort, highlighting the importance of increasing use of chemoports for drug delivery.

In summary, the present study showed a higher female proportion who underwent chemoport insertion compared to most other studies and the longest mean duration of chemoport usage. The infection and thrombosis rates are within the range observed in other studies, suggesting that the management of chemoport complications in the present study is consistent with existing literature.

Conclusion

The research conducted at a tertiary care centre in Western Rajasthan provides a comprehensive analysis of the sociodemographic and clinical characteristics of patients using chemoports, offering insights into the diverse profiles of individuals benefiting from this technology, underscores the critical role of chemoports in oncological care, highlighting their effectiveness in reducing the necessity for multiple painful venipunctures to administer chemotherapeutic agents, antibiotics, blood products, and nutritional supplements. By minimizing the pain and anxiety associated with cancer treatment, chemoports significantly enhance the quality of life.

The study meticulously examines the complications associated with chemoports, including infections, thrombosis, mechanical issues, and port-related pain, documenting their incidence and severity. Importantly, this study fills a significant knowledge gap in South Asian contexts, where comprehensive data on chemoport is scarce. By providing robust evidence and analysis, the research lays the groundwork for future large scale studies and helps establish guidelines for the effective use and management of chemoports in oncological care. The findings not only contribute to the existing body of knowledge but also have practical implications for improving the standard of care for cancer patients. Ultimately, this research highlights the transformative potential of chemoports in enhancing the quality of life and clinical outcomes for individuals undergoing cancer treatment, offering a vital resource for healthcare providers and researchers in the region.

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