



Use of Tunneled-Cuffed Central Catheters in Patients with Cancer: A Single-Center Experience

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Abstract

Background: Effective and reliable venous access is among the cornerstones of modern medical therapy in oncology.

Materials and Methods: This was a prospective observational study of collected data of patients with a diagnosis of any cancer, at a tertiary care oncology hospital in Ahmadabad, Gujarat, India, during a 2-year period.

Results: A Hickman catheter was inserted in 200 patients and most commonly used in solid malignancies ($n = 103$; 51.5%), followed by hematologic conditions ($n = 93$; 48.5%). Among solid malignancies, hepatoblastoma ($n = 21$; 10.5%) was the most common indication, whereas in hematologic malignancies acute lymphoblastic leukemia was the most common indication ($n = 56$; 28%) for Hickman catheter insertion. Hickman catheters were inserted most commonly in the right side ($n = 170$; 85%) of the venous system. The various complications in the Hickman study group in descending order were 28 patients (14%) developed arrhythmias, 15 patients (7.5%) developed infection, 12 patients (6%) developed bleeding, 8 patients (4%) developed pneumothorax, 7 patients (3.5%) developed catheter blockage, and 6 patients (3%) required premature catheter removal. The median time of Hickman catheter in situ was 207 days.

Conclusions: The most disturbing aspect of treatment of patients with cancer is multiple painful venipunctures made for administration of cytotoxic agents, antibiotics, blood products, and nutritional supplements. The focus of this prospective observational research was to study the various indications for Hickman catheter in different solid and hematologic malignancies as well as the various complications and outcomes in pediatric and adult cancer patients.

Keywords: Hickman catheter, malignancies, complications

Effective and reliable venous access is among the cornerstones of modern medical therapy in oncology. The management of the patient with cancer demands stable venous access that is used for a wide range of indications, including chemotherapy, blood product and antibiotic agent

administration, fluid resuscitation, and access to the bloodstream for clinical monitoring and microbial culturing. The use of central venous catheters [CVCs] can also decrease patient anxiety associated with repeated venipunctures. The number and variety of CVCs used in oncology practices are:

- Peripherally inserted central catheters (PICC),
- Hickman (cuffed) catheter, and
- Subcutaneous implanted port catheters.¹

PICC, Hickman, and implanted port catheter devices provide reliable and safe intravenous access in a variety of indications

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in oncology.² PICC, Hickman, and port catheter devices are frequently used in oncology patients to deliver chemotherapy as well as other intravenous medications, fluids, and total parenteral nutrition.³

Hickman catheter or tunneled catheters are usually made of silicone rubber, with polyethylene terephthalate anchoring cuffs; these cuffs are strongly recommended because they are more stable.⁴ These cuffs also induce an inflammatory reaction within the subcutaneous tunnel, leading to fibrosis and consequent catheter fixation, usually within 3-4 weeks after insertion. Tunneled catheters have been shown to be associated with lower infection rates than nontunneled catheters.⁵ Valved catheters have the advantage of not requiring heparin flushes, but may need pressurized infusions to administer blood products. They also tend to be more costly. Hickman catheters are appropriate for longer residence and reduce the incidence of infection by increasing the distance between the skin entry site and the venotomy. Although they provide reliable long-term access, their complications include thrombosis, occlusion, and infection.⁶ These lines are favored for patients requiring frequent and long-term venous access, particularly for infusion of blood products.

Hickman catheters have considerable potential for serious complications that are similar to complications related to CVC placement, including bleeding; cardiac arrhythmia; malposition; air embolism; pneumothorax; and rarely, injury to vessels or nerves. Late complications include infection, thrombosis, and catheter malfunction.⁷⁻⁹

Aims and Objectives

We aimed to study the various indications of Hickman catheters in different solid and hematologic malignancies in pediatric and adult cancer patients attending the Department of Medical and Pediatric Oncology at Gujarat Cancer Research Institute (GCRI), Gujarat, Ahmedabad, India, and to study the various complications and outcomes related to Hickman catheters.

Materials and Methods

This was a prospective, observational study that collected data of patients with a diagnosis of any cancer at a tertiary care oncology hospital in Ahmadabad, Gujarat, India, during a 2-year period (August 2013-August 2015). Patients of all ages and sex, presenting to the Department of Medical and Pediatric Oncology and Hematology at GCRI were included.

The data were collected from the GCRI Departments of Anesthesia, Surgical Oncology, and Institutional Website (gcrinet.com) for patients admitted to the Department of Medical and Pediatric Oncology. Patients were interviewed using a detailed questionnaire regarding their age, sex, clinical symptoms, and treatment received from outside GCRI. A particular note was made of past history of any thromboembolic disease or bleeding disorder, and whether the patient was ever treated for that condition.

Data were collected for indications of Hickman catheter in various malignancies. Data were also collected for complications related to Hickman catheter and outcomes of treatment.

In our center, Hickman catheter insertion was performed under anesthesia in the operating theatre.

The study was approved by the GCRI Ethics Committee. Written informed consent was obtained from the patients or the parent/guardian for publication of the clinical details in this report.

Inclusion Criteria

- All patients with cancer presenting to medical and pediatric oncology and hematology departments,
- All patients with histopathologically confirmed cancer, and
- All stages and performance status.

Exclusion Criteria

- Abnormal coagulation profile,
- Platelet count <15000/mm³ of blood, and
- Did not consent.

Results and Observations

Distribution of the Study Population

A total of 652 patients were enrolled as the study population for the CVCs study. Out of that group, 352 patients (53.98%) required PICC insertion, 200 patients (30.67%) required Hickman catheter insertion, and 100 patients (15.33%) required port catheter insertion as part of their comprehensive management strategy in our cancer center.

Age and Sex Distribution of the Hickman Catheter Study Group

Out of 200 patients in the Hickman catheter study group, 180 patients (90%) were younger than age 14 years (pediatric population), 20 patients were in the adult (ages 14-65 years) age group (10%), and none of the patients were in the geriatric age group (0%) because in our institute we use Hickman catheters in the pediatric and adolescent age groups and patients who require bone marrow transplant. Out of 200 patients in the Hickman study group, 133 were men (66.5%) and 67 were women (33.5%).

Diagnosis and Various Indications for Hickman Catheter

The most common indication for Hickman catheter in our study group was a solid malignant condition (n = 103; 51.5%) followed by a hematologic condition (n = 97; 48.5%) ([Figure 1](#) and [Table 1](#)).

Among the solid malignancies, hepatoblastoma (n = 21; 10.5%) was the most common indication, whereas in the hematologic malignancies group acute lymphoblastic leukemia (n = 56; 28%) was the most common indication for Hickman catheter insertion.

Hickman Catheter Insertion Site

Of 200 patients, 170 Hickman catheters were inserted on the right side (85%) with 156 placements in the right internal jugular vein, 14 placements in the right subclavian vein of the venous system, and 30 Hickman catheters were inserted on the left side (15%) in the left internal jugular vein of the venous system. We chose right internal jugular vein as the primary access site because

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