



Comparative Study of Porting Complications by Implantation under and on the Pectoral Muscle in Cancer Patients at Shahid beheshti and Hazrat Masoumeh Hospitals during the Years 2010-2014

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Abstract

Introduction: Porting is one of the invasive processes that is usually associated with significant complications in patients. Therefore, this study was conducted to compare the effects of porting in two ways: implanted under the muscle and on the pectoralis muscle of cancer patients.

Materials and Methods: In this retrospective cohort study, a comparison was made between patients whose ports were implanted under the muscle and patients whose ports were implanted on the pectoralis muscle. The level of significance was considered to be 0.05.

Results: The mean age of the patients was 17.83 ± 19.1 months. 51.2% (42 patients) were boys and 48.8% (40 patients) were girls. Comparison of the average success (percentage) of the ports ($P = 0.419$), the incidence of infection ($P = 0.241$), the incidence of skin necrosis ($P = 0.077$) and the rate of displacement ($P = 0.005$). P) In patients between the two groups, there was no significant statistical difference in terms of port location.

Conclusion: The present study showed that there was no statistically significant difference in the amount of successful porting and comparison of infection, skin necrosis and port displacement in the studied patients, despite the higher incidence of porting group effects on the pectoralis muscle compared to the sub muscular.

Keywords

- Porting
- Complications
- Pectoral
- Cancer

Introduction

Vascular Access Devices (VADs) are one of the important and inevitable techniques in the health care of infants, children and adults that can be used for both chronic and long-term intervention in addition to being use in acute and critical conditions.¹ Using of vascular access devices is not recent, and first been used in 1973 for transplant feeding as a long-term central venous catheter (CVC) and in 1979, a device for long-term venous access called Hickman Catheter was used for chemotherapy. The complete introduction of implantable porting systems occurred in the early 1980s.^{2,3}

Port insertion is one of the invasive procedures, which today has become a very useful procedure for patients in need of long-term vascular access due to its frequent use and lack of sequential care.⁴ Port-A-CATH catheter is used when long-term therapeutic interventions such as intravenous injection and blood sampling are required, thus limiting the need for peripheral veins and improving the quality of life of patients.^{1,3,4} Some of its uses include: chemotherapy, intravenous nutrition, sampling, blood transfusion, antibiotic therapy, coagulation factor injection, radiological and imaging studies contrast injection, etc.⁵⁻¹⁰

Generally, to minimize venous injury, a port catheter is implanted in veins with large lumen and is often used with internal or posterior abdominal vessels and brachial veins.^{3, 11} Port insertion in the brachial veins also has many advantages over abdominal veins, such as easy access to vessels and less early complications such as

pneumothorax.^{3,12} Because cancer patients require repeated intravenous injections for chemotherapy or blood transfusions³ and chemotherapy drugs can damage the peripheral vessel wall, one of the major groups requiring port placement are cancer patients; Because port implantation provides a secure, inseparable technique for easier access to central veins for injecting chemotherapy agents, liquids, drugs, blood products, etc.³⁻⁵ Nowadays, given the many benefits of port insertion, the very important issue that has oncologists concerned is the complications of prolonged port use.¹³

Port insertion has various complications that vary with the length of time the port is used. For example, the early complications of porting include accidental perforation of the arteries, hematoma, embolism, pneumothorax, or vessel perforation.⁷ Long-term complications of port insertion include infection, thrombosis, intravenous fluid leakage, and catheter fracture.¹³ Given the long-term effects of porting, physicians try to offer different ways to improve quality, prevent or reduce complications, and are always trying to choose the best method. One of the effective methods suggested is “implanting a portacath chamber under or above the pectoralis muscle”.

It should be noted that due to the different port insertion methods based on the type of device used, the technique of placement, and the nursing care, it is possible that port complications may vary.¹² Now, based on the effect of duration of portacath functionality on the course of treatment of the disease and its associated costs, evaluation of the complications and benefits of the two catheter placement methods (under the pectoral muscle

and above the pectoralis muscle) can be helpful and effective in reducing port complications. This study, therefore, was designed to compare the effects of port insertion under the pectoral and above the pectoral muscles, in cancer patients referred to Shahid Beheshti and Hazrat Masoumeh Hospitals in Qom, 2011-2015.

Materials and Methods

This study was a retrospective cohort study in which the complications of port catheter insertion under and above the pectoral muscle were compared in cancer patients in Shahid Beheshti and Hazrat Masoumeh Hospitals during 2011-2015.

All surgeries were performed by the same surgeon. Patients with cancer who required port implantation and were over 5 years old were included in this study. Patients whose records were incomplete or did not wish to participate in the study were also excluded. The sample size required for the study was 40 people in each group, according to the results of Fallon et al.¹⁴ The minimum sample size

was calculated based on the following formula in each group, taking into account the prevalence of complications equal to 17% versus 6.44%, as well as type I bias of 5% and 80% power. After obtaining the ethics code, based on the data in the patients' records, the incidence of complications such as infection and inflammation, rotation, obstruction, skin necrosis and port protrusion as well as patient characteristics were determined. And comparisons were made between patients implanted under the pectoralis muscle and patients implanted above it. Statistical analysis was performed using SPSS software (version 22); for quantitative variables mean and standard deviation, and for qualitative variables abundance and percentage abundance were calculated. Chi-square and Fisher tests were used and the significance level was considered 0.05.

Result

Of the 82 implantations, 40 were females (48.8%) and 42 males (51.2%).

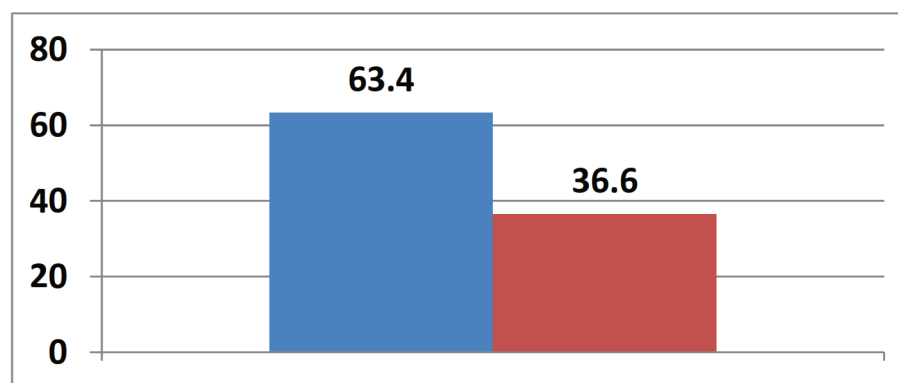


Figure 1: Duration of port operation

The duration of port function was less than 6 months in 36.6% (30 patients) **Figure 1**. months in 63.4% (52 patients) and more than six

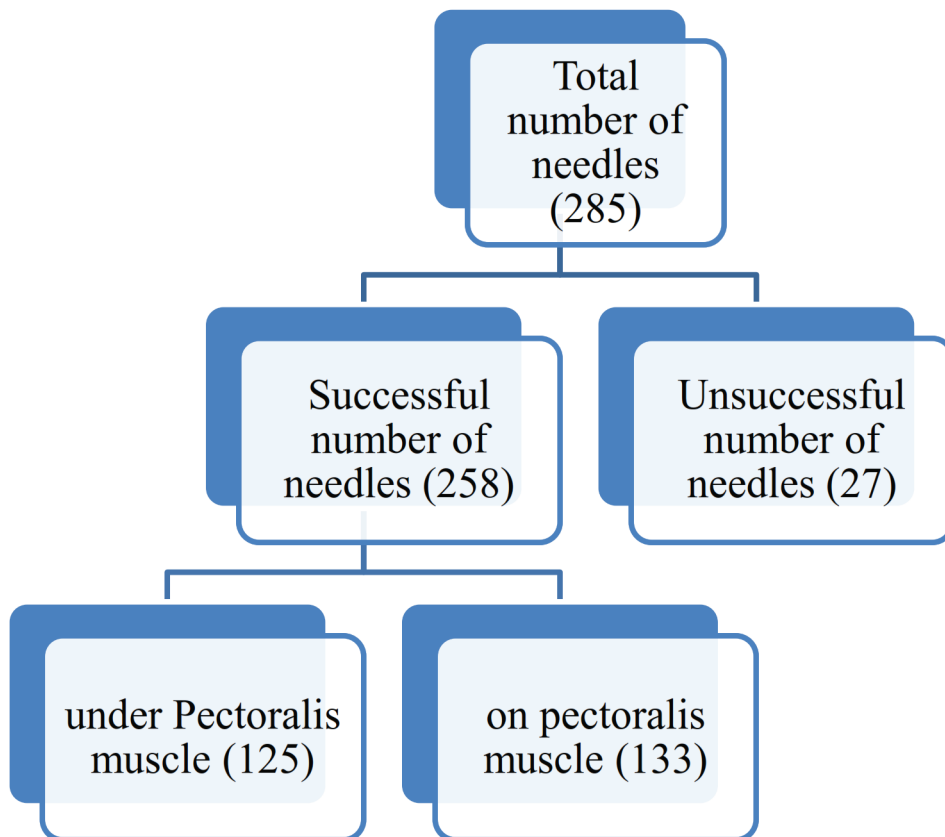


Figure 2: Success Rate(SR)

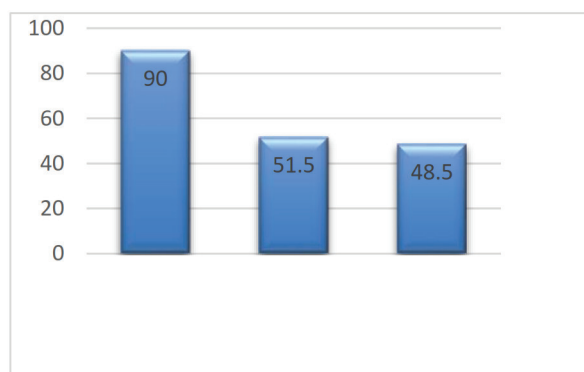


Figure 3: SR comparison (percentage): total number of successful ports in needling and number of successful cases in each method in the studied patients

The chart above shows the higher relative success of porting on the pectoralis muscle group (51.5%) than the under-muscle group (48.5%), but this

difference was not seen to be significant by independent t-test (P value= 0.73) **Figure 2, 3.**

Table 1: Comparison of overall incidence of complications in studied patients (Based on port location)

complications	Above pectoral muscle		under pectoral muscle		P Value
	number	percentage	number	percentage	
infection	6	14.6	3	7.3	0.241
skin necrosis	7	17.1	2	4.9	0.077
displacement	0	0	1	2.4	0.500

Post-operative complications occurred in 19 patients. The incidence of infection and skin necrosis was 11% and the detected rate of Port displacement was 1.2%. The duration of the port function was less than 6 months in 63.4% (52 patients) and more than six months in 36.6% (30 patients). As can be seen from the **Table 1** the above pectoral muscle group reported more complications than the under pectoral muscle group but this difference was not significant with the chi-square test.

Discussion

This study designed with the aim of comparing the effects of port implantation above the pectoral and under pectoral muscles in cancer patients in Shahid Beheshti and Masoumeh hospitals. the results showed that the success rate of port implantation in the patients was about 89%. the success rate of port implantation was higher in the above pectoral muscle group than under the pectoral muscle group. However, the observed difference between

the two port implantation methods in this study was not significant.

In this study, the port complications were evaluated. Overall, complications occurred in 19 patients. Comparison of infection, skin necrosis and port displacement in the studied patients showed that although the incidence of port complications was higher in the group above the pectoral muscle than under the muscle, this difference was not statistically significant.

These results are consistent with those of Dano and Jones (2015) who revealed that the port location had no effect on the complication rate.¹⁵ However, the overall complication rate in that study was slightly higher than in our study. They examined 171 cancer patients with a port catheter, 20.5% of whom had treatment complications, including 14% infectious complications, 1.2% port wound ulceration, 3.5% occlusion 0.6 thrombosis and 1.2% structural defects in the port.

Similarly, in the study by Schenck et al (2012,

published In Germany), 316 patients were studied, of whom 28 (8.6%) reported complications (1.9% infectious, 2.5% obstruction, 2.2% displacement, 1.9% thrombosis and 0.3% clots). There was no difference between complication in the groups.¹⁶ As can be seen, although the overall complication rate was lower than our study, the results still indicated that port location had no effect on complications. In another study (2012, Turkey) by Aribas et al., 347 patients underwent port placement, with complications in 15 cases. Complications observed in ports implantation were not related to their anatomical location.¹⁷ Dehkhoda et al (2011, Tehran) described the complications of catheterization in patients undergoing subclavian vein chemotherapy in patients referred to Imam Reza Hospital (Tehran) from 2008 to 2009. The most common complication was port function failure (15%). Other complications were bleeding (3%), infection (2%), displacement (1%) and catheter embolization (1%) and no cases of pneumothorax and hemothorax were observed.¹⁸ Although the incidence rate of infection in this study was lower than our study there was no significant difference in port displacement.

Of course, some studies have shown an effect of port location on the complications. For example, Schutz et al. (2014, us) studied 62 patients and the results showed that the anatomic location of the port affects the rate of complications.¹⁹ Also in the Fallon et al. (2013, USA) study on 166 patients undergoing port implantation, the incidence of complications varied by anatomic location of the port.¹⁴ Finally, it can be pointed out that due to the contradictory results in the studies, there is still no

valid guideline in this field, and further studies can be performed by clinical trials with higher sample sizes or a meta-analysis can be helpful.

Conclusion

The present study showed that despite the higher incidence of port complications in the group above the pectoral muscle than in under-muscle, there was no statistically significant difference in the success rate of port implantation, infection, skin necrosis, and port displacement in the studied patients. Considering to the contradictory results of the present study and the lack of studies in this field in our country, it is recommended that future studies be conducted in a multi-center clinical trial with a larger sample size in order to provide more accurate information that would certainly have significant effects on the treatment process and reduce complications and costs for the patients and the health system.

Ethical Consideration

This study was approved by Organizational Committee of Ethics in Biomedical Research of Qom University of Medical Sciences with code number IR.MUQ.REC.1396.70.

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Conflict of interests

There is no conflict of interest.

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