Subcutaneous Portacath Utilization in Pediatric Oncology Patients: Ramathibodi Hospital Experience

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Abstract

Subcutaneous portacaths (SQP) placement in 19 pediatric oncology patients were studied. Complications of SQP were evaluated. Two patients had premature SQP removal due to fungal infection and breakage, 1 for each. Two patients had catheter-related bacteremia which was resolved by antibiotic administration. Only 1 patient had occasional difficult blood drawing episodes, because the tip of catheter was inserted through external jugular vein instead of subclavian vein. There were no other serious complications except that some of them had clotted formations, which were resolved easily by urokinase administration. Long-term SQP utilization was possible in 17 of 19 patients, with the average time of 7.5 months. Few complications occurred in the group of patients studied. SQP improved quality of medical care and significantly lessened the anxiety of patients who need long-term chemotherapy treatment. Therefore, placement of the intravenous access device is feasible for pediatric oncology patients in Thailand. The patients are no longer suffering from repeated venipunctures. Although it is expensive, it is convenient and useful for some patients with relatively high socioeconomic status. It should be considered for every pediatric cancer patient who needs prolonged chemotherapy and who has affordable means.

Key word : Subcutaneous Portacath, Pediatric Oncology

At the present time, there has been much progress in the field of pediatric cancer treatment. Majority of cancers in pediatric age group are considered chemosensitive[1], and more aggressive chemotherapy protocols with growth factors utilization, with or without stem cell transplantation, are being used with excellent results. One of the major obstacles in utilization of the more aggressive and

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complicated protocols of chemotherapy in pediatric patients is the availability of intravenous access due to the relatively small size of the blood vessels. There is very little information regarding intravenous access device experience among pediatric cancer patients in Thailand. Therefore, the outcome of the devices placement in pediatric oncology patients was evaluated.

MATERIAL AND METHOD

The medical records of pediatric oncology patients who had subcutaneous portacaths (SQP) placement during the period from January 1997 to October 1998 were reviewed. SQP placement was performed in patients who needed several courses of chemotherapy and for whom it was difficult to find good venous accesses. With intensive chemotherapy, they were at high risk of febrile neutropenia and needed prompt management when they experienced septic shock. Pediatric surgeons performed SQP insertion in the operating room under sterile technique. The SQP as shown in Fig. 1 was inserted into the skin below clavicle at either right or left side of chest wall. The tip of catheter was inserted into superior vena cava through either side of subclavian vein. All parts of SQP were underneath the skin and needed special needle to access. Because these devices were underneath the skin, once the needle is removed, there is less chance of infection and it is not necessary to care for at home. Fig. 2 demonstrated materials to access SQP.

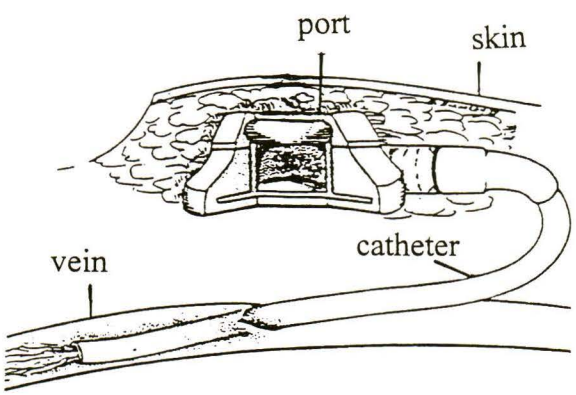

Fig. 1. Subcutaneous portacath (SQP) demonstration.

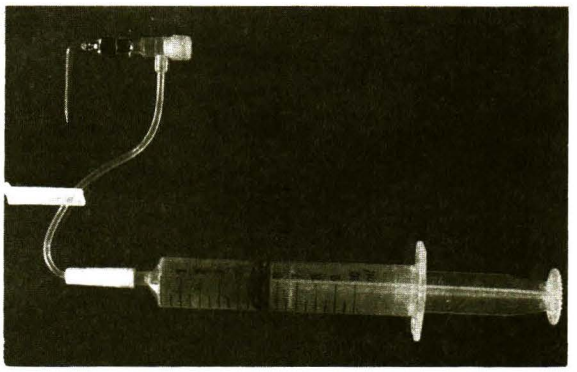

Fig. 2. Materials to access SQP which include syringe, extension with T, and non-coring needle (Huber point needle).

The protocol of SQP access procedure is as follows:

1) Apply local analgesic cream to the skin at the area for needle insertion 1 hour before the procedure.
2) Patient should be in supine position when SQP needle is being inserted.
3) Just before needle insertion, the skin is cleaned by application with 70 per cent alcohol and followed by 3 administrations of povidone iodine solution. (one at a time)
4) Huber point needle (non-coring needle) is used for SQP access.
5) The SQP was fixed firmly, and then the special needle is inserted through the skin at the center of SQP at right angle until it touches the metallic bottom.
6) Check the patency and correct position of SQP.
7) Apply povidone iodine ointment at skin around needle insertion with dressing on top for prolonged usage of SQP.

The detail of needle removal from SQP device procedure is as follows:

1) Flush SQP with 5 ml NSS, followed by 5 ml of heparinized NSS, with heparin concentration of 100-200 IU/ml (not exceed 100 IU/kg/dose). Flushing must be applied slowly to prevent reflux of blood into the SQP.
2) Apply clamping at the same time of flushing end.
3) SQP must be firmly fixed when needle is being removed.

4) Apply povidone iodine ointment and pressure at punctured site after needle removal.

RESULTS

Between January 1997 and October 1998, 19 children with different types of malignancy were included in the study. Thirteen patients had acute hematologic malignancies (9 acute lymphoblastic leukemia, 2 acute nonlymphoblastic leukemia, and 2 Burkitt's lymphoma). Six patients had solid tumors (2 Ewing's sarcoma, 2 malignant germ cell tumor, 1 neuroblastoma, and 1 malignant peripheral nerve sheath tumor). Age ranged between 3 months and 16 years (median 68 months). Follow-up time ranged from 2 months to 17 months (median 5 months).

The reasons for SQP insertion are shown in Table 1. Complications related to SQP during the study period were bacteremia (n = 2), fungemia (n = 1), and SQP breakage (n = 1). Two patients had SQP removal due to breakage and fungal infection, 1 for each. One patient had difficulty in blood drawing because the tip of catheter was inserted through external jugular vein instead of subclavian vein. There was occasional difficulty of blood drawing due to blood clots in the catheters which were resolved by urokinase administration. There was no complication associated with bleeding, thrombosis, and displacement of SQP in this study.

Table 1. Reasons for SQP insertion.

Reasons	Patient (n)	Percentage
Obesity	2	10.5
Younger age	1	5.3
Thrombophlebitis	9	47.4
High dose chemotherapy	7	36.8
Total	19	100

DISCUSSION

Chemotherapy is the major collective concept of treatment in pediatric cancers. Administration of chemotherapeutic agents is primarily *via* intravenous route. Majority of cancer patients need long-term treatment, which usually last over one year. Therefore, intravenous accesses through venipuncture are usually the most painful and fearful experiences during the treatment courses, especially in infants and children. Moreover, their parents are usually frustrated from this suffering. Some chemotherapeutic agents cause extensive tissue damage if there is leakage outside the vein. Intravenous access device has been rarely used in malignant pediatric patients in Thailand. Ramathibodi Hospital is one of the first institutions in Thailand to initiate the utilization of intravenous access devices among pediatric cancer patients. There are many types of intravenous access device available in Thailand. However, we prefer to use portacath instead of others because it is inserted underneath the skin with no need for flushing as often as other types. In this study, the youngest patient was 3 months old. This patient had no complication related to SQP placement suggested. This supports that young age is not a contraindication for catheter insertion.

Two patients with catheter-related bacteremia were treated by antibiotic administration *via* SQP, and the SQP in both patients were still functioning properly afterward. Both of them had Staphylococcus epidermidis infection. In the past, treatment of catheter-related bacteremia usually involved catheter removal. Currently, many studies have demonstrated successful treatment of the catheter-related infection with the catheter *in situ* [2-4]. However, if the patient's clinical condition deteriorates during medical treatment, prompt catheter removal is indicated. In addition, if patients have persistent or recurrent evidence of catheter-related infection while on antibiotics, the catheter should be removed. Certain organisms such as *Candida*, *S. aureus*, *Mycobacterium fortuitum*, and *Bacillus* spp. have been reported as being difficult to eradicate with antimicrobials alone, and early catheter removal is indicated[5-9]. Carde et al found that 12 per cent of external catheters *versus* 2.5 per cent of ports were removed due to infectious complications[10]. Our study demonstrated that 3 of 19 patients (15%) had catheter-related infection. This rather high figure could be explained by the small number of patients in our study. However, only 1 of the 3 patients needed premature catheter removal.

There were also no catheter-related thrombosis among these patients. However, there were several episodes of difficulty in blood drawing due to blood clots or chemical precipitation in the catheters. Blood clots in the catheters were solved by administration of urokinase. Chemical precipitation in the catheters such as drugs, electrolyte solutions in parenteral nutrition were resolved by warm

compression at the port site. Several reports demonstrated that thrombosis occurs commonly among leukemia patients during induction phase of chemotherapy administration[11,12]. Those studies demonstrated that L-asparaginase and corticosteroid are major contributors of thrombosis. Therefore, we decided to insert SQP after finishing induction chemotherapy. This could explain why there was no complication with thrombosis among our patients.

Seventeen of 19 SQP could be utilized for a long period. Even though portacath is safe and has less complication, the major drawback is its high cost, as well as the expense during the usage. Each non-coring needle used to access SQP costs over 200 baht.

In conclusion, placement of the SQP improves quality of life in pediatric cancer patients. It may also improve the treatment compliance. Few complications occurred in the patients, and none had long-term sequelae. So, SQP placement is safe and can be used for pediatric patients in Thailand. It is convenient and useful for some pediatric cancer patients or the patients who need prolonged parenteral treatments.

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ประสบการณ์การใช้ Subcutaneous Portacath ในผู้ป่วยเด็กโรคมะเร็งในโรงพยาบาลรามาธิบดี

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ศึกษาผู้ป่วยเด็กไทยโรคมะเร็งจำนวน 19 รายที่ใช้ subcutaneous portacath (SQP) พบมีการติดเชื้อราเพียง 1 ราย และ SQP รั่วอีก 1 รายซึ่งต้องผ่าตัดเอาออก ผู้ป่วย 2 รายมีการติดเชื้อแบคทีเรียในเลือดสามารถให้การรักษาได้ด้วยยาปฏิชีวนะ มีเพียง 1 รายที่มีปัญหาดูดเลือดออกจาก SQP ลำบาก ในการศึกษานี้ไม่พบภาวะแทรกซ้อนที่เป็นอันตรายอื่น ๆ ยกเว้นมีการอุดตันจากลิ่มเลือดบ้างเป็นบางครั้ง ซึ่งแก้ไขได้โดยง่ายด้วยการใช้ยาละลายลิ่มเลือด urokinase ผู้ป่วย 17 ราย สามารถใช้ SQP ได้ดีเฉลี่ยนาน 7.5 เดือน การศึกษานี้แสดงให้เห็นว่าเครื่องมือนี้ช่วยทำให้คุณภาพการดูแลรักษาผู้ป่วยดียิ่งขึ้นและลดความวิตกกังวลของผู้ป่วยได้อย่างมาก และสามารถนำมาใช้ได้อย่างปลอดภัยสำหรับผู้ป่วยโรคมะเร็งในประเทศไทยที่ต้องการฉีดยาเข้าหลอดเลือดดำบ่อย ผู้ป่วยไม่ต้องทนทุกข์ในการถูกเจาะหลอดเลือดดำหลาย ๆ ครั้งในการรับการรักษาแต่ละครั้ง

แม้ว่าเครื่องมือนี้จะมีราคาแพงสำหรับผู้ป่วยที่มีเศรษฐฐานะดีสามารถนำมาใช้ได้ทำให้เกิดความสะดวกสบายต่อผู้ป่วยอย่างมากตลอดจนผู้รักษา ดังนั้นจึงสมควรนำ SQP มาใช้ในผู้ป่วยเด็กโรคมะเร็งทุกรายที่จำเป็นต้องให้ยาเคมีบำบัดระยะยาว โดยพิจารณาตามความเหมาะสมและเศรษฐฐานะของผู้ป่วยด้วย

คำสำคัญ : Subcutaneous Portacath, โรคมะเร็งในเด็ก

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