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Olgu Sunumu

"Single Incision, Double Pocket Technique" to Facilitate Implantable Chest Port Placement- Case Series

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ABSTRACT

Introduction: *Implantable chest ports (ICP) are implanted for central venous access to infuse mostly chemotherapy drugs and other medications. Here, we describe a new modification for single incision technique that facilitates the catheter–reservoir connection despite limited manipulation area. Additionally this modification decreases the possibility of catheter kinking rates.*

Material and Method: *In this retrospective study we investigated patients who underwent ICP implantation for chemotherapy. Two pockets were made over and under a single incision. Catheter was cut into appropriate length and connected with reservoir at outside. Intravenous catheter placement was accomplished via peel- away sheath when reservoir was positioned at the upper pocket. Then reservoir was moved to lower pocket and fixated with previously placed sutures. This report describes an easy method of catheter-port connection and reservoir implantation with the upper pocket which we combined with the single incision technique.*

Results: *Two hundred and fifty- six patients who underwent ICP placement were evaluated. All procedures were uneventful and no procedure related complications like hematoma, pneumothorax, or primary malposition were observed. We didn't observe kinking or port migration with this modification including ICP's followed up for at least 6 months or longer except a 'pinch-off' and a port dysfunction due to an incorrect use. Seven of our patients were suffered from port infection and ICP's were removed.*

Discussion and Conclusion: *This double pocket technique facilitates manipulations and has no kinking at the puncture and reservoir connection sites during implantation and minimal port dysfunction rates in long-term follow- up. Further studies needed to evaluate the advantages of this technique.*

Keywords: *implantable venous access, devices, tecniques*

ÖZ

Venöz Port Yerleştirilmesinde Kolaylaştırıcı "Tek İnsizyon, Çift Cep Tekniği"- Olgu Serisi

Amaç: *İmplante edilebilir venöz port (ICP) uygulamaları günümüzde yaygın olarak kemoterapi uygulama amacıyla yerleştirilse de, santral venöz yoldan parenteral nütrisyon, antibiyotik ve kan ürünü verilmesi ya da laboratuvar testleri için kan örneği almak amacıyla da kullanılmaktadır. Tanımlamış olduğumuz bu yeni teknik ile kısıtlı manipülasyon alanına rağmen, sıkı kateter-rezervuar bağlantısı kolaylıkla sağlanabilmekte, aynı zamanda kateterde katlanma olasılığı da asgari düzeye indirilebilmektedir. Bu olgu serimizde, klasik yönteme adapte ettiğimiz üst cep uygulaması ile port rezervuar bağlantısını, portun cebe yerleştirilmesi işlemini daha kolay yapabildiğimizi ve işlemin sonunda sıkça gördüğümüz kateter katlanması gibi sorunlarla da karşılaşmadığımızı bildirmeyi amaçladık.*

Gereç ve Yöntem: *Çalışmamızda retrospektif olarak kemoterapi uygulanması amacıyla venöz port yerleştirilen hastalar incelenmiştir. Uygulanan tek insizyonun alt ve üstüne iki adet ciltaltı cep oluşturuldu. Oluşturulan tünelden kesi yerine geçirilen uygun mesafede kesilmiş kateter rezervuar ile dışarıda birleştirildi. Rezervuar üst cebe alınmış durumda iken, kılıf içinden kateter damar içine yerleştirildi. Rezervuar alt cebe alınarak önceden geçilmiş askı dikişleri ile sabitlendi.*

Bulgular: *Tanımladığımız teknik ile ICP uygulanan 256 erişkin hasta incelenmiştir. Bütün prosedürler hematom, pnömotoraks ya da primer malpozisyon gibi komplikasyonlar olmadan tamamlanmıştır. En az 6 aylık takip süresi boyunca bir olguda "pinch-off", bir olguda da yanlış kullanıma bağlı port disfonksiyonu görülmüş; hiçbir hastada kateter katlanması, port disfonksiyonu ya da kateter migrasyonu gözlenmemiştir. Yedi hastada infeksiyon nedeni ile port kateter çıkarılmıştır.*

Tartışma ve Sonuç: *Çift cep yöntemi ile kateter ve rezervuar birleştirilmesinin oldukça kolay olduğu, iğne giriş ve rezervuar bağlantı yerinde katlanmanın olmadığı, uzun dönem kullanımda ise port disfonksiyonu sorunlarının minimal düzeyde olduğunu gözlemledik.*

Anahtar kelimeler: *yerleştirilebilir venöz yol, aletler, teknikler*

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INTRODUCTION

Implantable venous ports (IVPs) have many advantages in clinical practice. Continuous safe and secure access into the central venous system allows clinicians to infuse medications such as chemotherapy drugs, parenteral nutrition solutions, antibiotics and blood products as well as obtaining blood samples for laboratory tests [1]. Also IVPs provide these advantages with lower contamination and infection, and higher patient satisfaction rates compared with long-term used permanent central venous catheters (e.g. Hickman and Broviac) [2]. In spite of these advantages; port dysfunction, infections, embolization, and occlusion of the port system and leakages from ports and reservoirs remain to be noticeable complications related to implantable venous chest ports [3-5].

In clinical practice mostly subclavian, internal jugular and recently cephalic veins were used for central venous catheterization [1]. Deltoid and pectoral muscle sites are recently considered for reservoir placement however in clinical practice medial and cephalad chest sites was mostly used. We combined the double pocket technique with conventional technique in which the subclavian and internal jugular veins were used. While, medial and cephalad chest sites were used for reservoir placement. Here we describe a new modification that is less inclined to catheter kinking and difficulties with catheter-reservoir connection previously occurred due to narrow manipulation area are less frequently seen in this technique.. Our modification in single incision technique facilitates manipulations and has lower kinking and port dysfunction rates compared with conventional techniques.

MATERIAL and METHODS

Retrospectively 256 adult patients (142 female, 114 male) who had undergone IVP placement between January 2012 and March 2015 were included in this study. Indication for IVP placement is chemotherapy requirement for malignancy. Patients were assigned to undergo implantation of a single type of port, constructed of titanium and silicone rubber, with an attached 7F polyurethane catheter tubing (Bard PortTM, Bard Inc., Salt Lake City, UT).

All procedures were uneventful and no procedure related early complications like hematoma, pneumothorax, or primary malposition were observed. Mean procedure time was 40±10 min. We didn't observe kinking, port dysfunction and port migration with this modification including IVPs with 6 months and longer duration, excluding one patient with catheter 'pinch off' and another with damaged port catheter. Seven of our patients suffered from port infection and their IVP's were removed due to infection. Contralateral subclavian or internal jugular vein was used to implant IVP (Table 1).

Table 1. Early - late complications and characteristics of the patients

	Internal jugular vein (n=24))	Subclavian vein (n=23)
Age (years)	59±11	61±9
Female	18 (7.03)	162 (63.28)
Male	6 (2.34)	70 (2.73)
Right Side	21 (8.20)	214 (83.59)
Left side	3 (1.17)	18 (7.03)
Pneumothorax	0	0
Primary malposition	0	0
Port-related bacteremia and/or pocket infection	4 (1,56)	3 (1.17)
Migration/malposition	0	1 (0.39)

Numbers are mean±standard deviation or number of patients (%)

After monitorization with electrocardiography, peripheral oxygen saturation and non-invasive blood pressure measurements, peripheral venous access was accomplished. Patients were sedated with intravenous midazolam (0.05 mg/kg) and fentanyl (1 μg/kg). Patients were positioned supine and head down and a pillow located under shoulders. Local anesthesia accomplished with subcutaneous bupivacaine infiltration applied to the puncture, port implantation and subcutaneous tunnel sites. Central venous access was guided with ultrasound imaging (USI), right (n: 194) and left (n: 38) subclavian, right (n: 20) and left internal jugular veins (n: 4) were used for venous port implantation. A J guide wire was inserted through the introducer needle and the correct placement of the J guide wire was confirmed with direct fluoroscopy and ultrasonography. The engagement of the distal point of guide at the superior cavoatrial junction was confirmed. The middle point between clavicula and the nipple is approximately the possible port implantation site. After a nearly 3 cm-long single skin incision, two subcutaneous pockets were surgically created just 3 cm above and below the incision (Figure

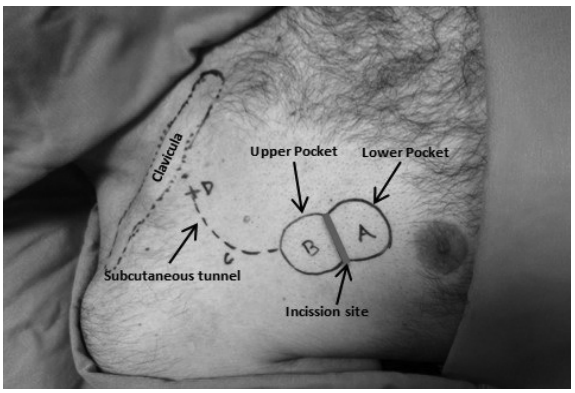

Figure 1. Anatomic landmarks of double pocket technique.

1). Subcutaneous tunnel was created with a tunneler. The catheter was cut 1-2 centimeters more than the appropriate length and connected to the reservoir. Catheter and reservoir were connected at outside. The reservoir was colligated with deep lower pocket tissues with two sutures before its insertion into the upper pocket. Peel away sheath has been placed and the catheter was inserted through the sheath when the port is in the upper pocket. After the successful placement of the catheter to the superior cavoatrial junction (approximately 18-20 cm), reservoir was taken down and fixed at the lower pocket. Fluoroscopy was employed to confirm the correct positioning of the catheter, and the chest port. Blood was withdrawn from the reservoir and the system was washed with heparin in saline solution. Skin closure was done with surgical technique.

In 'pinch off' case; tip of the port catheter was caught with endovascular snare system advanced via femoral vein under direct fluoroscopy. After successful removal of free floating port catheter at the right atrium another IVP was placed via contralateral subclavian vein. Damaged port catheter was pulled back for 2 cm from the damaged port- reservoir connection. Damaged distal 2 cm segment of the catheter was cut and reservoir and catheter connection was accomplished with success under direct vision and fluoroscopy. Successful management of the damaged port catheter was confirmed with positive aspiration of blood from port reservoir.

DISCUSSION

Oncology patients frequently require (IVPs) for repeated administration of chemotherapy drugs and obtaining blood samples for laboratory tests [6]. Subclavian or internal jugular venipuncture is the most popular routes for temporary and long-term central venous cannulation [7]. The other route is surgical cut-down of the cephalic vein at the deltoid–pectoralis groove. There is limited literature about surgical cut-down method. The first two methods have similar advantages and disadvantages however, ultrasound (US) guided catheter insertion had significantly lower failure rates when subclavian site was used [8]. In our study we preferred US guided subclavian method due to higher success rates of venipuncture.

In the recent literature there are different viewpoints about reservoir positioning. There are some recent publications describing new approaches like forearm positioning of the reservoirs with internal jugular vein catheter placement of the IVPs however the majority of the clinicians prefer chest wall for reservoir positioning and subclavian vein for catheter placement [4,5]. In cases with forearm positioning of the reservoir higher rates of catheter-related thrombotic events have been reported [9]. Besides it has higher risk of damage at greater vessels of the neck and brachial plexus. Additionally cosmetic aspects, discomfort during arm movements are another reasons for us to choose chest wall implantation of the reservoir.

We had two major problems with classic approach during chest wall implantations. First of them is manipulation difficulty and risk of unintentional withdrawal of the catheter during catheter and reservoir connection due to narrow manipulation site. Secondly when reservoir is fixed at the chest wall before connecting reservoir with catheter, we observed increased risk of kinking during this procedure (Figure 2). The advantage of this technique was that we could perform catheter- reservoir connection outside the narrow manipulation site. After connection reservoir placed at the upper pocket and peel-away sheath was introduced, catheter was implanted via peel –away sheath to the cavoatrial junction. The risk of kinking of the catheter in the puncture site minimized with replacing the reservoir to 3 cm away from caudally located lower pocket (Figure 3). In double pocket modification; clinicians have greater manipulation area with lower incidence rates of kinking and long-term port dysfunction without any requirement for additional incision.

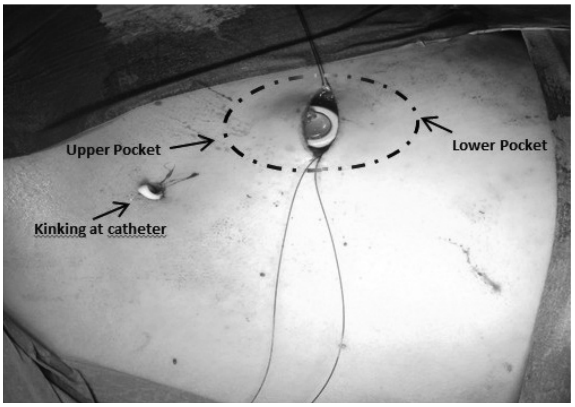

Figure 2. Kinking at catheter when the reservoir is at the upper pocket.

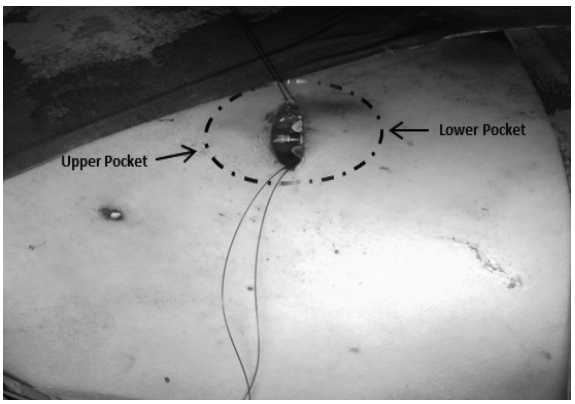

Figure 3. Kinking at the catheter is straightened when the reservoir is pulled to the lower pocket.

This modification in single incision technique is easy and efficient method for adult patients requiring IVP placement. We conclude that this modification facilitates the connection procedure between catheter, and reservoir when compared with conventional technique and decreases the kinking that may possibly occur at the puncture site during implantation. Further studies dedicated to this issue are needed for comparing single incision technique with other techniques.

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