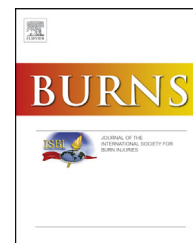


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Use of blind placements of peripherally inserted central catheters in burn patients: A retrospective analysis

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ABSTRACT

Introduction: Safe and reliable vascular access is essential for the treatment and care of burn patients. Peripherally inserted central catheters (PICCs) are widely used for various groups of critically and chronically ill patients. However, the information about PICC use and management for burn patients is limited.

Methods: The Institutional Review Board approved retrospective cohort chart review included all burn patients at a single center who received one or more PICCs ($n = 106$). Blind PICCs were placed by an intravenous clinical nurse specialist (IV CNS). Data were collected from PICC records and included general demographics, as well as PICC insertions, management, and removals.

Results: About 42% of cases were in the cubital vein, 39% in the basilic, 14% in the cephalic, and 3% in the brachial veins. In 75% of the cases, gauze dressing was identified as the primary form of routine PICC nursing care. About 62% of all patients had their dressings changed every 48 h and 37.5% had dressings changed daily. The average length of time each PICC remained in place was 18.5 days. About 16% of the cases were identified as having PICC-related complications, including one infection, two occlusions (2%), one edema at insertion place (1%), and 12 cases of mechanical phlebitis.

Conclusion: Although PICCs are adequate for burn patient care, there are no protocols or guidelines covering rational and safe usage of PICCs. Standard guidelines on PICC placement and management specifically for burn patient should be developed.

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1. Introduction

Safe and reliable vascular access is essential for the treatment and care of burn patients. The main purposes of venous access are delivering intravenous fluids, allowing the long-term use of antibiotics, and providing total parenteral nutrition, all of which integral parts of burn care. These have been

traditionally achieved by using Central Venous Catheters (CVCs) and Peripheral Venous Catheters (PVCs) to provide access. However, each of these devices has been related to both mechanical and infectious complications. CVCs using mainly subclavian and femoral veins have complications such as incidences of pneumothorax and catheter-related bloodstream infection (CR-BSI), while peripheral catheters are associated with difficulties in maintaining routes and needing

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frequent insertions [1]. Burn patients also have a higher risk of infection and sepsis due to the direct contamination of venous catheters and the migration of skin organisms at the venous insertion site into the catheter tract [2].

Peripherally inserted central catheters (PICCs) were developed in the 1970s and are now widely used for various group of patients, especially critically ill patients and chronically ill cancer patients [3–5]. PICCs have recently become popular because they perform well in overcoming problems associated with limited peripheral access and frequent venipuncture in patients undergoing long-term therapy. In particular, blind PICCs – those done without an imaging assistant – have been used by many institutions for easy, cost effective, and safe placement [6,7]. For burn patients, PICCs were compared with CVCs for both use and safety issues, and PICCs performed well in relation to CR-BSI [8]. Even though PICCs are not suitable for the initial stage of burn shock treatment, it is recommended over the short peripheral catheter when the duration of intravenous therapy exceeds six days [9].

There are wide varieties of vascular access practices from one burn unit to another [10]. Although PICCs have been used with increasing frequency in many burn centers, there are no burn-specific guidelines for optimal catheter rotation, catheter type, insertion methods, and sites [2,8,10]. The purposes of this study were (a) to analyze current PICC practices for burn patients, (b) to identify PICC related complications, and (c) to provide a clinical indication for optimal management and care guidelines for PICC usage.

2. Method

The study was approved by the Institutional Review Board as a minimal risk study. Placement of PICCs was performed at Bestian burn center in Korea during an 8-month period. Consent forms were obtained from the patients who agreed to PICC usage.

PICCs were inserted into 104 patients as requested by their physicians during the period of December 2013 to July 2014; insertion was performed by the IV clinical nurse specialist (IV CNS) without the use of ultrasonography. Data were collected from PICC records by the IV CNS and retrospectively reviewed through medical record review. Patient and PICC data included general demographics, burn-specific data, and data related to PICC insertion, management, and removal.

2.1. PICC placement and management procedures

All PICCs were inserted by one IV CNS, who is licensed as an Intravenous Nurse Specialist in Korea. The patients in the study were referred to IV CNS professionals for PICC insertion due to poor vein quality or difficulty handling frequent peripheral vein punctures because of the burn wounds. PICCs were preferentially placed in the antecubital, basilica, and cephalic vessels of the upper extremity. Site selection was intended to maximize distance from open burn wounds. Optimal sterile barrier precautions (cap, mask, sterile gown, sterile gloves, and large sterile drape) were practiced during insertion. Dressing management was compliant with standard precautions of gauze and film dressing using 2%

Chlorhexidine gluconate. The IV CNS wore sterile gloves but no gown, and draping included only the involved extremity. Ultrasound guidance was not routinely used in the placement of single-lumen PICCs. Non-valve 4F or 5F catheters were used, depending on accessibility of the blood vessels.

Routine PICC nursing care preferred the changing of gauze dressing at least daily and more frequently over occlusive dressing like Tegaderm™, which minimizes skin troubles and maximizes dressing maintenance. However, PICCs inserted near or through burn wounds were managed with Tegaderm™ occlusive dressings. Although the composition and technique of dressing placement and management in burn patients differed slightly from the guidelines set forth by the Hospital Nurses Association in Korea [11], general PICC guidelines were followed.

2.2. Statistical analysis

Data were analyzed using SPSS (Statistical Package for Social Sciences, Advanced Statistics, release 21.0, SPSS, Inc., Chicago, IL) software. Descriptive statistics, including mean, median, and standard deviation (SD), were obtained to describe the demographic, burn-specific, and PICC variables.

3. Results

3.1. Demographics and burn-related characteristics

Demographic, burn-related characteristics are presented in Table 1. A total of 104 PICCs were identified during the study period, and 67 (64.4%) of these were men. The patients had a mean age of 50.72 years, and the average hospitalization time was 41.25 (± 19.95) days. Physicians referred patients in need of IV therapy for longer than 2 weeks to the IV CNS for burn treatment. PICCs were inserted for the purposes of delivering TPN, allowing

Table 1 – Demographics and burn specific data.

Characteristics	Categories	n (%)
Gender	Male	67 (64.4)
	Female	37 (35.6)
Age	50.72 (± 16.45)	
Hospital days	41.25 (± 19.95)	
Burn type	Contact burn	12 (11.5)
	Scalding burn	34 (32.7)
	Flame burn	38 (36.5)
	Electric burn	3 (2.9)
	Frozen	4 (3.8)
	Chemical burn	13 (12.5)
TBSA (%)	Mean (SD)	12.97 (9.67)
	~10%	59 (56.7)
	11–20%	32 (30.8)
	21–30%	9 (8.7%)
	31%~	4 (3.8)
Lesion	One arm	29 (27.9)
	Both arm	32 (30.8)
	No arm included	43 (41.3)
OP	Yes	85 (81.7)
	No	19 (18.3)

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