Vascular Access in the Pediatric Population

Joseph T. Church, MD[a], Marcus D. Jarboe, MD[b,*]

KEYWORDS

• Vascular access • Central venous catheter • Ultrasound

KEY POINTS

- The selection of the appropriate central venous catheter requires knowledge of the indication for placement and the intended duration and frequency of use. Clear communication between the surgeon and the primary provider requesting the catheter is essential to performing the correct procedure.
- Seldinger or modified Seldinger technique is preferred for nearly all vascular access procedures. The authors recommend use of a 21-gauge (g) or 22-g access needle and thin (0.018-in) flexible-tip wire to establish access.
- Ultrasound guidance improves the safety and ease of most vascular access procedures. Transverse or in-line transducer orientations can be used depending on the anatomy and approach.
- Most central line–associated blood stream infections (CLABSIs) require catheter removal. Blood cultures should be negative for at least 48 hours before placing a new line except in rare circumstances.

INTRODUCTION

Vascular access procedures are a common and important part of pediatric surgical practice. Children require vascular access for numerous indications, including hydration, infusion of parental nutrition, administration of medications, and obtaining blood for laboratory analysis. Advances in vascular access have made many disease processes, such as intestinal atresia, short bowel syndrome, and various malignancies survivable.

Pediatric vascular access presents numerous challenges to the pediatric surgeon. In obtaining access, the pediatric surgeon must make several important preoperative

Disclosure Statement: The authors have no commercial or financial conflicts of interest or external funding sources.

[a] Department of Surgery, University of Michigan Health System, 2110 Taubman Center, 1500 East Medical Center Drive, Ann Arbor, MI 48109, USA; [b] Section of Pediatric Surgery, Department of Surgery, University of Michigan Health System, 1540 East Medical Center Drive, SPC 4211, Ann Arbor, MI 48109, USA
* Corresponding author.
E-mail address: marjarbo@med.umich.edu

Surg Clin N Am 97 (2017) 113–128
http://dx.doi.org/10.1016/j.suc.2016.08.007 **surgical.theclinics.com**
0039-6109/17/© 2016 Elsevier Inc. All rights reserved.

decisions – what type of access to obtain, the size and number of lumens required, and where to place the catheter. Therefore, sound knowledge of the indications, contraindications, advantages, and disadvantages of different types of access is required to provide the best care for the patient. This article addresses these questions in decision making and presents the basic tenets of vascular access in children and how to manage this access postprocedurally. The majority of the article focuses on central venous access, but arterial access, peripheral venous access, and peripherally inserted central catheters (PICCs) are addressed as well.

SURGICAL TECHNIQUE

Preoperative Planning

Peripheral venous access

Peripheral venous access could be considered the mainstay of vascular access during hospital admission, because it is nearly ubiquitous in inpatients. Peripheral access is adequate for intravenous (IV) hydration, most medication administration, and often blood sampling. It is usually more technically straightforward and safer than central access and can be performed at the bedside without anesthesia, although topical analgesics are often helpful.

Peripheral access is often obtained by other skilled members of the patient care team, such as nurses and anesthesia staff. Peripheral venous access can be challenging, however, in children, and a pediatric surgeon may be called on if others are unsuccessful in obtaining access. Pediatric veins are small in caliber and often difficult to see and feel, especially in a patient who may be dehydrated. It is, therefore, helpful to be familiar with the anatomic locations amenable to peripheral IV insertions as well as the technology available to assist with access.

The anatomic options for peripheral IV insertion are summarized:

- Scalp: generally limited to neonates.
- External jugular vein: of adequate size and visibility but frequently difficult to access due to excessive mobility, difficult location, and ease of compression, even with the access needle
- Superficial veins of the arm and dorsal hand/wrist: good targets for peripheral venous access; however, the antecubital fossa must not be crossed with the catheter unless the arm is immobilized
- Greater saphenous vein: often a good target, especially anterior to the medial malleolus. This is best visualized with the foot held in plantar flexion. In an emergency when no other peripheral access can be acquired, the distal saphenous vein also represents a good target for peripheral cut-down. This is performed via a small transverse incision medial and superior to the medical malleolus, with suture ligature and direct venipuncture.[1]

Technology can be used to aid in peripheral venous access. Ultrasound offers good delineation of vascular anatomy (**Fig. 1**). It can distinguish arterial from venous structures based on compressibility and pulsatility and with use of color flow Doppler. Recent studies have demonstrated that ultrasound use in peripheral vascular access increases accuracy and decreases attempts required.[2,3] More recent technological advancements have included infrared-based vein finders. This modality improves vein visibility, thereby increasing accuracy and decreasing the pain associated with access.[4,5]

Central venous access

Central venous access is required for the administration of several medications and fluids, including many vasoactive medications; hyperosmolar fluid, including total

Download English Version:

https://daneshyari.com/en/article/5734875

Download Persian Version:

https://daneshyari.com/article/5734875

Daneshyari.com