

## **PICC Tip Locations and Problems with Advancement**

### **Question:**

We place about 15 PICCs per month at our hospital, with the superior vena cava (SVC) being the intended tip location. Frequently we meet obstructions and can not advance the catheter all the way to the SVC. One of our IV nurses attended a local seminar where a speaker said that midclavicularly placed PICCs are now "banned".

When a catheter will not advance to the SVC, we are unclear about what action to take. Do we leave the catheter where it is and use it as a midline device for 2 to 4 weeks, or should we remove it?

### **Answer:**

In my opinion, the idea of the midclavicular tip location being "banned" is a misinterpretation of what several professional organizations have tried to accomplish with position papers. In 1997, the Intravenous Nurses Society (INS) published position papers on peripherally inserted central catheters (PICC) and midline/midclavicular catheters in an effort to encourage uniform terminology and standardization. According to INS

PICC is "defined as a catheter inserted via peripheral veins with the tip residing in the vena cava". [1] <http://www.ins1.org/popaper8.htm>

Midclavicular catheter is a "peripherally inserted catheter with the tip location in the proximal axillary or subclavian veins. If a line intended for the SVC location falls short and ends up in the brachio-cephalic (innominate) vein, it should be considered midclavicular." [2] and

Midline catheter is defined as a "peripherally inserted catheter with the tip terminating in the proximal portion of the extremity". [2] <http://www.ins1.org/popaper9.htm>

No professional organization has the authority to prohibit a healthcare professional from choosing the midclavicular tip location. NAVAN's position paper supported the tip location in the SVC and recommends that the midclavicular location be used only when anatomic or pathophysiologic reasons prevent advancement into the SVC. Research has shown that the midclavicular tip location is associated with higher complication rates, especially thrombosis; however, in some patients, this tip location may be the only choice. [3]

In the situation described in the question, I would look at this problem from two different perspectives:

1. How can we decrease the number of PICCs which are not advances to the SVC? This will require analyzing aggregate data from insertion procedures such as:

- \* How many PICCs are not advanced into the SVC?
- \* Does the frequency of the problem differ among nurses?
- \* What is the cause of the problem ? is it the patient's aberrant anatomy, venospasm, venous valves, venous stenosis from previous catheters, catheter advanced into a small tributary vein, etc.?
- \* At what point in the advancement procedure do we see this problem?
- \* What length of catheter is inserted before the problem occurs? When the obstruction is met within the first few inches, the cause will probably be different than when the obstruction is encountered after 12 or 15 inches have been advanced.
- \* In which vein is the catheter tip located when the problem is seen?
- \* What strategies, if any, can be used to decrease the incidence of meeting obstructions? These include:
  - o patient relaxation techniques
  - o more proactive assessment and insertion of the appropriate devices earlier in the course of therapy
  - o change catheter advancement technique and use the assistance of an interventional radiologist when the catheter meets an obstruction
- \* What other trends can be identified from data collection?

2. How do we manage each patient when the problem occurs? This will require a careful analysis of the specific situation, weighing the risk versus the benefit, for each patient:

- \* What is the precise tip location in which vein? An x-ray will be needed to determine this location.
- \* What fluid and/or medications will be infused through this catheter? What is the final osmolality and pH of the solution to be delivered? If these values are high or low extremes of the normal serum values, the catheter may need to be remove and inserted via another vein so that it can be advanced to the SVC.
- \* What is the primary diagnosis