

Accelerated Seldinger Technique

A faster, safer method for diagnostic and interventional procedures

by Ron Stoker

In 1953, Dr. Sven Ivar Seldinger (1921-1999), an innovative radiologist, described an over-wire technique of catheter insertion that offered considerable advantages over the standard techniques that were available at that time.¹

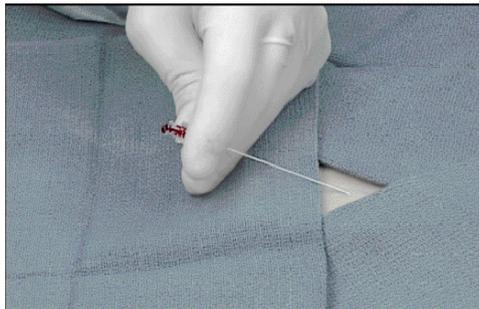
The equipment required to perform the basic technique included a thin wall introducer needle, a wire guide and a plastic catheter. Through a simple puncture, access is gained to any part of the body via the cardiovascular system, using a series of X-ray films as a guide.

Dr. Seldinger was a pioneer in interventional radiology and applied his technique to the localization of tumors by arteriography; selective renal angiography; percutaneous transhepatic cholangiography; and portal venography. The simplicity of the Seldinger technique revolutionized cardiology and radiology.

But this technique does have certain unavoidable risks. Let's take a look at some of the challenges of the technique that, with some minor changes since its invention, is now known as the Modified Seldinger Technique.

First, a bare needle is inserted directly into a blood vessel or it is attached to an aspirating syringe. Once the needle is in place, it is left momentarily without a cap on it, resulting in its proximal end being open to air. As a result, negative intravascular pressure risks air embolism and contamination of the bloodstream. If the intravascular pressure is high, then excessive bleeding can occur—a situation that is not good for the patient and can potentially contaminate healthcare workers. (See Figure 1.) Next, a long and floppy guidewire is inserted into the needle. While the clinician is reaching for the guidewire, there can be a loss of vascular access. In addition, the long length—often exceeding 40 cm—risks contamination of its proximal tip.

Figure 1. Once the Seldinger needle is in place it is open to air and can cause an air embolism, or excessive bleeding can occur



The round tipped guidewire is then advanced through the lumen of the needle and the needle is then removed. Remember that the needle is a hollow bore, blood-filled needle that is a biohazard (at least, until the safety mechanism is actuated). Moreover, many Modified Seldinger Technique kits do not have a safety needle.

At this point a coaxial dilator/sheath is threaded onto the guidewire—taxing both visual acuity and manual dexterity (see Figure 2). As clinicians thread a guidewire into a sheath-dilator combination, some of them are very successful, while others have to hunt and peck for a second or two. The sheath dilator is then threaded down the guidewire.

As the sheath dilator is threaded onto the guidewire, the proximal end of the guidewire is momentarily lost to view. As one interventional radiologist commented, “If you do enough of these procedures, eventually you will lose the guidewire.”

Figure 2. When gloved hands are wet with blood, threading the guidewire through the sheath dilator can sometimes be difficult.

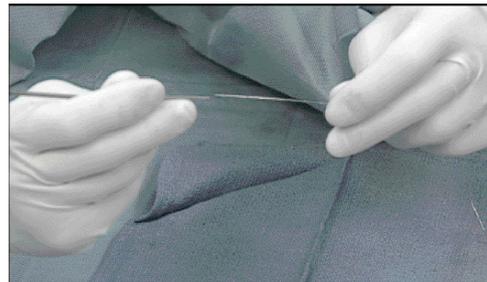


Figure 3. When the sheath-dilator is threaded onto the guide, the proximal end of the guidewire is lost to view.



The literature describes cases where a sheath dilator was placed over a guidewire and then the guidewire was inadvertently pushed into the body.²

The loss of the guidewire into a body cavity or blood vessel is a significant and generally preventable complication.³ In cases like this, the procedure must be terminated and the focus of the clinician must be to find and remove the errant guidewire.

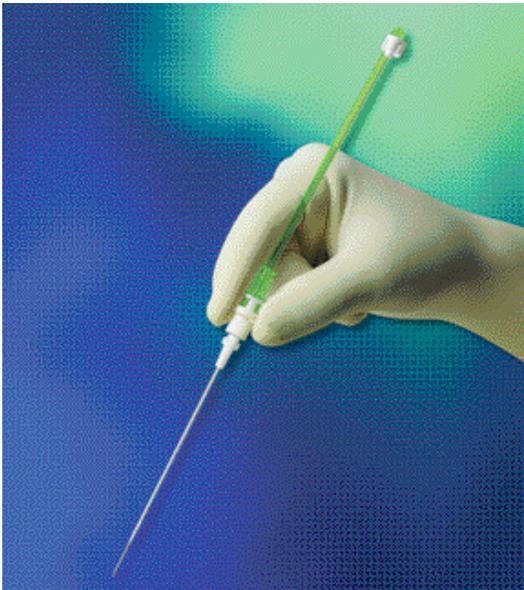
After the sheath dilator is placed over the guidewire, the guidewire and sheath are removed as one unit. Another danger: as the guidewire and dilator are removed together they can potentially splash contaminated fluid onto the clinician. At this point a second “open to air” condition exists in which an air embolism or excessive bleeding can occur.

The sheath may then be used to introduce catheters or other devices to perform a variety of procedures. Upon completion of the procedure, the sheath is withdrawn.

In summary, the Modified Seldinger Technique allows clinicians to use a relatively small needle graduating to a larger catheter, with somewhat improved first-attempt success. But it is far from perfect, entailing real risks to both healthcare workers and patients. Among potential hazards of the Modified Seldinger Technique are:

- ▶ “Open to air” events leading to contamination, bleeding or air embolism;
- ▶ Needlestick injury;
- ▶ Loss of cannulation;
- ▶ Guidewire loss or contamination; and
- ▶ Splash contamination.

Figure 4. The WAND combines a needle, guidewire, dilator and sheath into one unit.



Clearly, a better, safer approach is needed. I recently had an opportunity to review a new product that has just been introduced to the market. The WAND[®], manufactured and distributed by Access Scientific, is an all-in-one, micro access, safety introducer. The device was developed by the same team that invented StatLock catheter stabilization devices, which greatly improved the ease and safety of IV and other catheters.

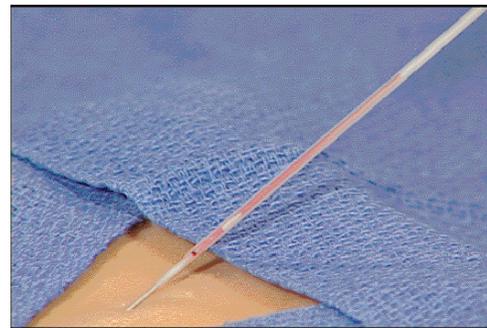
The WAND combines a needle, guidewire, dilator and sheath into one unit. The WAND allows clinicians to perform what the manufacturer calls the Accelerated Seldinger Technique—a faster, safer and simpler technique that will assist in all over-wire vascular access procedures. (See Figure 4.)

The Accelerated Seldinger Technique reduces the number of exchanges and steps necessary for vascular access. It reduces the risk of air embolism, contamination, guidewire embolus, loss of cannulation during the procedure, and accidental needlestick injury

So how is The WAND used in actual practice? The patient is prepared and draped according to hospital policy and procedures. Aseptic technique should be used during insertion, maintenance and removal of The WAND.

The WAND is removed from its packaging and placed onto a sterile field. The clinician should verify that the guidewire cap is in the locked and upright position and that all components are properly aligned. The Wand is held by the needle hub with the fin pointing up. The needle bevel should also be pointed out as well. The 21-gauge introducer needle is inserted into the target vein. As soon as the “fast-flash” is observed through The WAND’s translucent sheath, the needle is held still (see Figure 5).

Figure 5. Once the needle is inserted into the target vein, a fast flash is observed through The Wand’s translucent sheath.



The guidewire cap is disengaged from the track and the guidewire is advanced. The guidewire should advance smoothly, without resistance. The guidewire cap is snapped onto the needle hub. While the clinician holds the needle hub, the dilator collar is turned one-quarter-turn clockwise to disengage. With the needle hub held still, the dilator and sheath are advanced. This generally locks the needle hub to the track, thereby sheathing the needle tip and preventing an accidental needlestick injury.

In patients with more remote vessels, the needle may not lock automatically. In such cases, hold the sheath and dilator hubs firmly

in place and carefully withdraw the needle hub until it locks. Now, disengage the dilator hub from the needle hub and remove the guidewire, dilator and needle as a unit. Immediately cover the sheath hub with your gloved thumb to prevent bleeding or air embolus. The sheath may then be used to introduce other diagnostic or interventional devices.

As you can see, using The WAND to perform the Accelerated Seldinger Technique is faster, safer and simpler than all other over-wire insertion techniques.

Again, to summarize the usage of this product the clinician:

- ▶ Inserts the needle and observes the “fast flash”;
- ▶ Advances the guidewire;
- ▶ Disengages and advances the dilator and sheath;
- ▶ Withdraws the guidewire, needle and dilator as a unit.

For more information about this product, contact Access Scientific at 801.280.8797 or visit their Web site at www.the-wand.com. †

References

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