Central Venous Access with Accelerated Seldinger Technique versus Modified Seldinger Technique

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Disclosures

- Expired POWERWAND™ combination device kits were donated by Access Scientific for the express purpose to be used in this study; however, no other contributions were made. We approached Access Scientific to obtain the devices to conduct this study.

- No financial relationship with Access Scientific.

- Background
- Techniques
- Research and Outcomes
- Questions

Background

- Air Force

- SAMMC
  - San Antonio, TX
  - Level 1 Trauma Center
  - 85,000+ patients annually

TEXAS
POPULATED PLACES
1,000,000 and over Houston
500,000 – 999,999 El Paso
100,000 – 499,999 Lubbock
25,000 – 99,999 Longview
24,999 and less La Grange
State capital Austin
Urban areas
TRANSPORTATION
Interstate; limited access highway
Other principal highway
Railroad
Ferry
PHYSICAL FEATURES
Streams: perennial; intermittent
Lakes
Highest elevation in state (feet) +8749
Other elevations (feet) +7825
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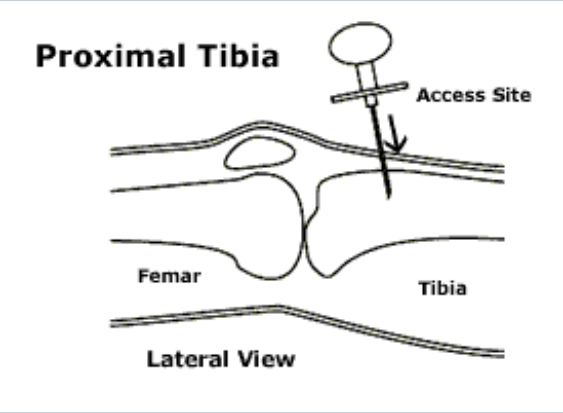
N
NEW MEXICO
OKLAHOMA
ARKANSAS
LOUISIANA
LLANO ESTACADO
EDWARDS PLATEAU
CHIHUAHUA
COAHUILA
MEXICO
DURANGO
NUEVO LEON
TAMAULIPAS
Stratford
Perryton
Dalhart
Dumas
Canadian
Channing
Borger
Pampa
Vega
Amarillo
Shamrock
Canyon
Clarendon
Hereford
Muleshoe
Plainview
Childress
Paducah
Vernon
Littlefield
Floydada
Wichita Falls
Levelland
Lubbock
Seymour
Guthrie
Gainesville
Sherman
Paris
Clarksville
Texarkana
Bowie
Bonham
Denton
McKinney
Mount Pleasant
Brownfield
Tahoka Post
Aspermont
Graham
Plano
Garland
Irving
Dallas
Stamford
Anson
Fort Worth
Arlington
Marshall
Longview
Seminole
Lamesa
Snyder
Abilene
Albany
Andrews
Colorado City
Sweetwater
Cisco
Cleburne
Ennis
Athens
Tyler
Kilgore
Corsicana
Henderson
Carthage
Midland
Big Spring
Stephenville
Hillsboro
Jacksonville
El Paso
Socorro
Guadalupe Pk
8749
Kermit
Odessa
Coleman
Brownwood
Mexia
Fairfield
Palestine
Nacogdoches
Rusk
Ballinger
Hamilton
Waco
San Augustine
Pecos
Monahans
San Angelo
Goldthwaite
Marlin
Buffalo
Crockett
Lufkin
Eden
Killeen
Temple
Madisonville
Woodville
Jasper
Van Horn
McCamey
Brady
Lampasas
Bryan
Huntsville
Livingston
Fort Stockton
Ozona
Mason
Burnet
Georgetown
College Station
Conroe
Beaumont
Orange
Mount Livermore
8206
Alpine
Junction
Sonora
Cedar Park
Johnson City
The Woodlands
Marfa
Sanderson
Fredericksburg
Austin
La Grange
Houston
Nederland
Port Arthur
Chinati Peak
7728
Kerrville
San Marcos
Columbus
Baytown
Pasadena
Presidio
Rocksprings
New Braunfels
Luling
Rosenberg
Texas City
Emory Peak
7825
Del Rio
Seguin
Gonzales
Hallettsville
Wharton
Galveston
Hondo
San Antonio
Angleton
Lake Jackson
Uvalde
Cuero
Edna
Bay City
Freeport
Victoria
Palacios
Eagle Pass
Crystal City
Goliad
Port Lavaca
Beeville
Carrizo Springs
Cotulla
George West
Sinton
Robstown
Corpus Christi
Alice
Kingsville
Laredo
Falfurrias
McAllen
Harlingen
Mission
Pharr
Brownsville
Port Isabel
Red River
Lake Texoma
Falcon Reservoir
Amistad Reservoir
0 100 200 300 km
0 100 200 mi

Central Access

- Common Procedure
  - Approximately 8% of hospitalized patients
- Multiple indications
  - Large volume fluid or blood product resuscitation
  - Administration of central acting medications
  - Multiple medications simultaneously
  - Trans venous pacing
  - Difficult peripheral access
- Quick Story

What if there was a simpler/quicker way?

- Intra-osseous?
  - Complications
  - Slower Flow Rate
  - Labs



- Traditional Central Line
  - Multiple steps/parts

Midlines

- Usually used for extended dwelling lines.
- Self contained, all in one device.
- Equivalent and sometimes superior flow rate.

Question

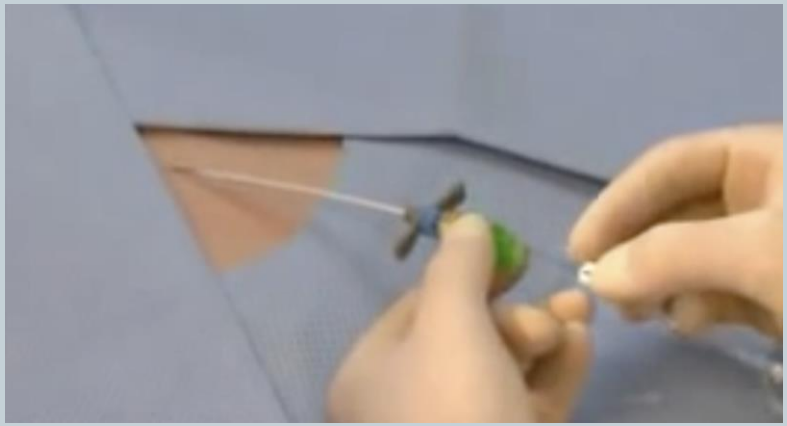
- Will the use of combination devices (midline/POWERWAND™) and the associated accelerated technique reduce the time of CVC placement?

vs

What is Accelerated Seldinger Technique?

- Needle, guidewire, dilator, and sheath into one.
- The device needle is inserted into the target vein under ultrasound guidance and a flash is observed
- The internal guidewire is then advanced into the vein and snapped into the needle hub.
- Dilator collar is turned and the dilator and sheath are advanced
- The dilator hub is disengaged from the needle hub, and the guidewire, dilator, and needle are all removed as a single unit.

Accelerated Seldinger Technique



Modified Seldinger Technique

- Cannulating the vein (needle or angiocatheter) under ultrasound guidance.
- The guidewire is then inserted into the vein through the access needle or angiocatheter
- Removal of the needle or angiocatheter while controlling the guidewire.
- A small stab incision in the skin adjacent to the guidewire allows advancement of the dilator over the guidewire into the vein.
- The catheter is then threaded over the guidewire, and the guidewire is removed

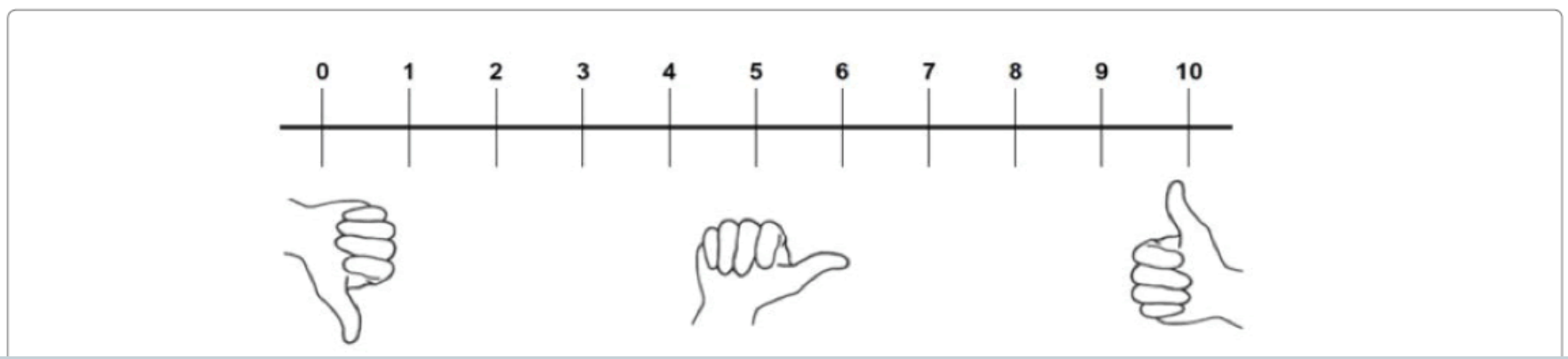
Research

- We completed a two-arm randomized crossover study comparing the AST to the MST in a simulation setting.
- Subjects were randomized to perform either the MST (control arm) first followed by the AST (intervention arm), or vice versa.
- The subjects were observed for errors, timed, and completed a survey at the end.


Discharge

Survey

- Use of Visual Analog Scale
  - Satisfaction
  - Ease of Use



Subject Population

Breakdown of Subjects							
Sex		Age		Level of Training		Number of Performed Central Lines	
Male	25	Median	29	Resident, PGY-1	13	0-10 Performed	19
Female	10	Mean	30.7	Resident, PGY-2	5	10-20 Performed	4
				Resident, PGY-3	9	20-30 Performed	7
				Physician Assistant	6	30+ Performed	5
				Medical Student	1		
				Staff/Attending	1		

Errors

Distribution of Errors			
MST	Number of Error	AST	Number of Error
Sterile Technique, Sterilized Site per Protocol	0	Sterile Technique, Sterilized Site per Protocol	0
Lidocaine Anesthetic Administered	4	Lidocaine Anesthetic Administered	2
U/S Guided Technique	4	U/S Guided Technique	2
Seldinger Technique (Needle advance until flash, wire through needle)	1	Seldinger Technique (Needle advance until flash, wire through needle)	1
Dilator over wire		Advance Sheath/dilator over wire	3
Catheter over wire	2	Remove dilator/needle/wire in one device	3
Remove wire		Catheter Placement	1
Flush/Draw all ports	2	Flush/Draw all ports	1
Correct Vessel	4	Correct Vessel	3
TOTAL ERRORS	17	TOTAL ERRORS	16

Results

	Median		IQR		p-value
	AST	MST	AST	MST	
Time to Completion	69	119	56	73	<.0001
Ease of Use (Visual Analog Scale)	74	75	13	28	0.0456*
Satisfaction (Visual Analog Scale)	79	73	19	19	0.2603
MST = Modified Seldinger Technique, AST = Accelerated Seldinger Technique					

Results

- The AST was completed in significantly less time versus the MST.
- This reduction in time was seen regardless of experience level of the subjects.
- These devices and the AST were significantly easier to use, without increasing errors when compared to the MST

Another tool…

- Time to and ease of access are crucial advantages of combination devices
  - In certain settings they may have limited utility.
- In the military setting offers a portable, quicker central access tool

Questions?