VEIN Access TECHNOLOGIES

Where Tools, Technique, and Science *meet!*

The Science Behind The Skill

The Tourniquet / The Vein / Starling's *dis*Equilibrium

What no one ever taught

Nurses, EMTs, Paramedics, MLTs, X-ray Techs, Medical Assistants, or Phlebotomists

about the *Side Effects* of the Tourniquet.

Pre-test your current knowledge:

Q1. What's the pressure (in mmHg) of the blood in the antecubital artery? A. _____

Q2. What's the pressure (in mmHg) of the blood in the antecubital veins? A. _____

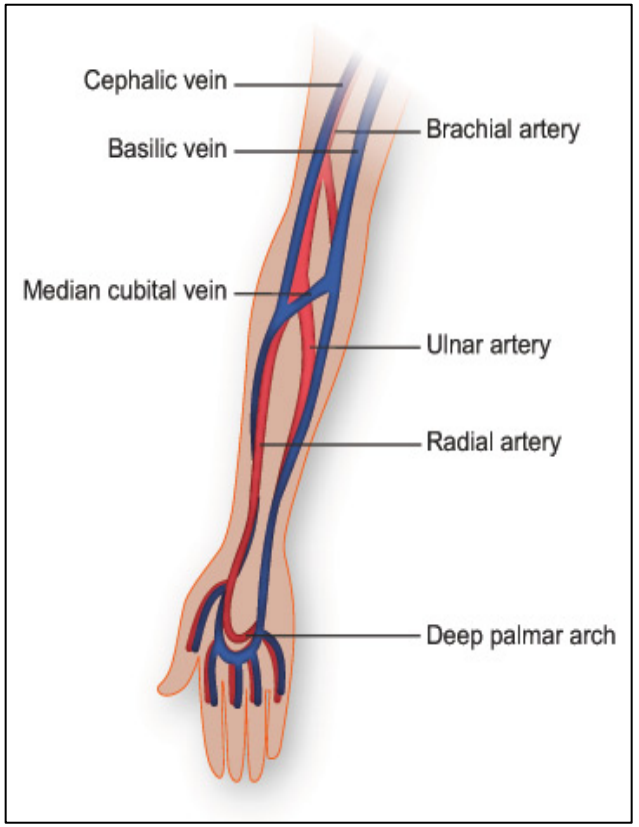
Q3. What's the pressure (in mmHg) of the Tourniquet on those vessels? A. _____

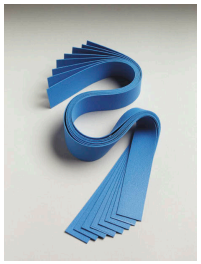
Q4. What effect does that have on arterial flow? _____

Q5. What effect does that have on Starling's Equilibrium of the vein? A. _____

Q6. What is Starling's Equilibrium? A. _____

Not Startling's Law





The Tourniquet was <u>DESIGNED</u> to *prevent bleeding to death*.

It only came to be used in vein access because of bloodletting/the razor/and people were *bleeding to death*.

The Tourniquet <u>never</u> was DESIGNED to *'dilate a vein'*.

In fact,
when the needle was invented,
and *'bleeding to death'* was no longer a threat,
the Tourniquet should have been
<u>put</u> <u>away</u>.

This *'dilatation with a tourniquet'* **must be called an** *'artificial dilatation'* **of the vein,**

because, in reality, it's really a

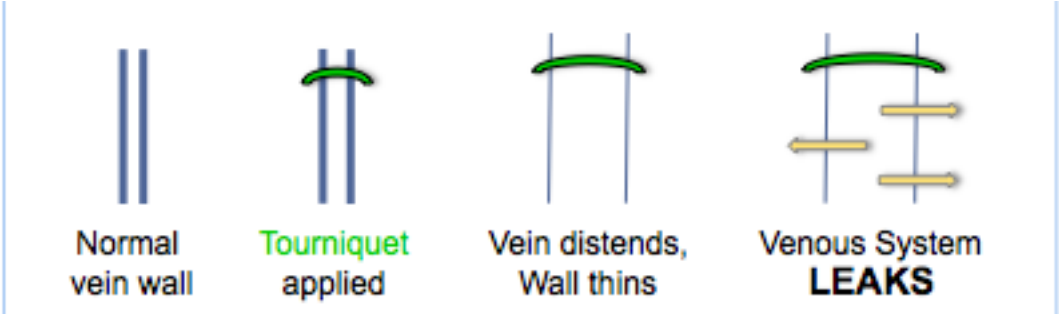
FORCED OVER DISTENTION

of the vein.

This '*forced over distention*':
#1 **Disturbs the Anatomy of the vein wall.**
#2 **Disturbs the Physiology of the venous system.**

Here's what no one ever taught us about the side effects of Tourniquet dilatation.

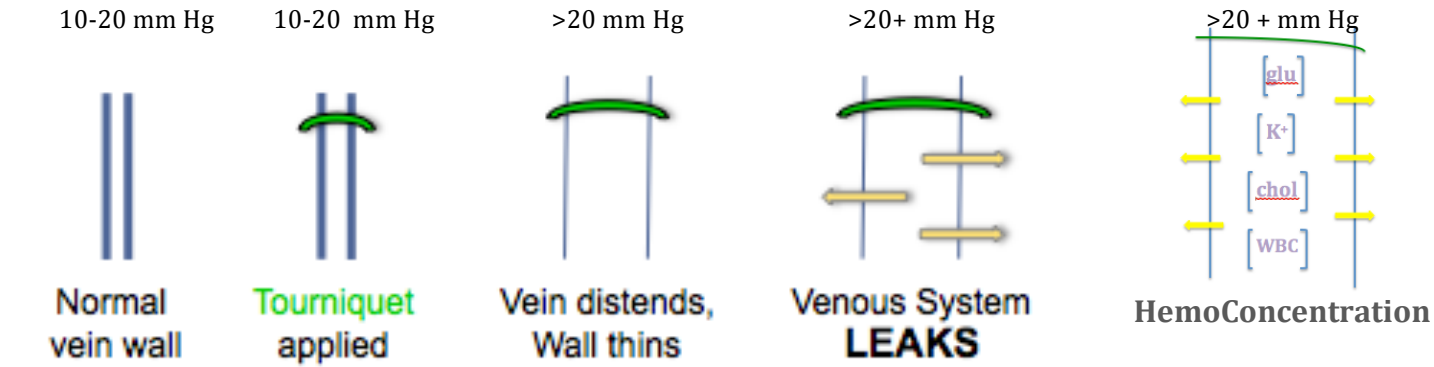
1. The vein wall has a 'normal wall thickness' at rest.
2. And when the Tourniquet is applied, the vein starts to fill, and the wall begins to thin.
3. And the vein **over distends**.
4. And when that wall gets too thin, it starts to LEAK.



- This leakage is called an extravasation/transudation in the SCIENCE WORLD.
- It is called an INFILTRATION in the NURSING WORLD and RADIOLOGY WORLD.
- And, in the LAB WORLD, infiltration results in HEMOCONCENTRATION.

<u>INFILTRATION</u> AND <u>HEMOCONCENTRATION</u>
ARE JUST TWO
OF THE MANY SIDE EFFECTS
WITH THE USE OF THE TOURNIQUET
IN VENIPUNCTURE.

The use of the Tourniquet in Venipuncture.



1. The normal blood pressure in the antecubital vein is **10-20** mm Hg. The antecubital artery has a BP of **120/80.**
2. When the vein is forcefully distended, the BP rises above 20 mm Hg, and the venous system begins to leak.
3. This leakage is called an INFILTRATE. You've heard it said that the IV infiltrated! Infiltration' begins the split second the Tourniquet is applied.
4. When fluid leaks out of the vein, the [concentration] of blood components falsely rises: Potassium, Glucose, WBCs. This is called HEMOCONCENTRATION. The blood 'concentrated'.

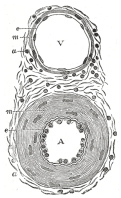
- ✓ Falsely elevated laboratory results result in incorrect diagnoses. This can result in incorrect treatment.
- ✓ An infiltration of contrast results in incorrect diagnosis. This can result in incorrect treatment.
- ✓ Infiltrations of fluids or meds result in delay in treatment. And can result in collateral damage.

The Tourniquet causes a FORCED OVER DISTENTION of the vein - with SIDE EFFECTs.

This is all based upon the <u>Anatomy</u> of the Vein <u>&</u> the <u>Physiology</u> of the Venous System.

1894

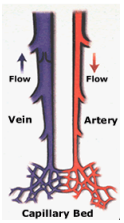
Sir Henry Gray's - *Gray's Anatomy*



Vein Anatomy

AND

Dr. Ernest Starling's - *Starling's Equilibrium*.



Starling's Equilibrium

$J_v = K_f([P_c - P_i] - \sigma[\pi_c - \pi_i])$

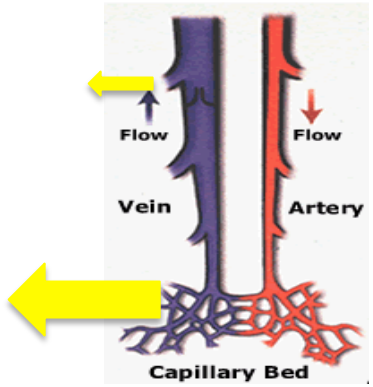
1896

Starling's Equilibrium $J_v = K_f([P_c - P_i] - \sigma[\pi_c - \pi_i])$

*Paraphrased: When the **intravenous pressure exceeds "Normal" mm Hg**, there is an immediate Extravasation of intravascular fluids across the*

- *venous capillary membrane, profuse leakage*
- *the venule, moderate leakage, and*
- *vein walls, lesser leakage,*

*out into the extravascular tissue – creating the "lymphedema"" – an "**infiltrate**".*

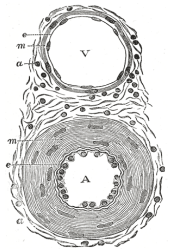


Q. How can we locate a vein, if we don't dilate it? Q. How can we dilate a vein without a Tourniquet?

A. Anatomy & Physiology

1894

Sir Henry Gray's - *Gray's Anatomy*



Vein Anatomy

The vein wall consists of a middle layer of innervated smooth muscle – called the Media.

All innervated muscle responds to gentle touch by relaxing. Bio101.

Therefore, gentle touch of the vein results in vasodilatation of the vein – a NATURAL dilatation – maintaining the integrity of the vein wall and the venous BP.

Based upon that very same A&P –

Smacking, ***slapping***, ***flicking*** or ***tapping*** the vein,
in an effort to 'raise the vein' - to better locate the vein
actually **causes VasoConstriction**, not dilatation.

There is a ***new palpation*** technique for Locating, Dilating, and Grading Veins – that works.

21cVA PalpationTechnique

See if you can answer the questions now…

Q1. What's the pressure (mmHg) of the blood in the antecubital artery? A. _____

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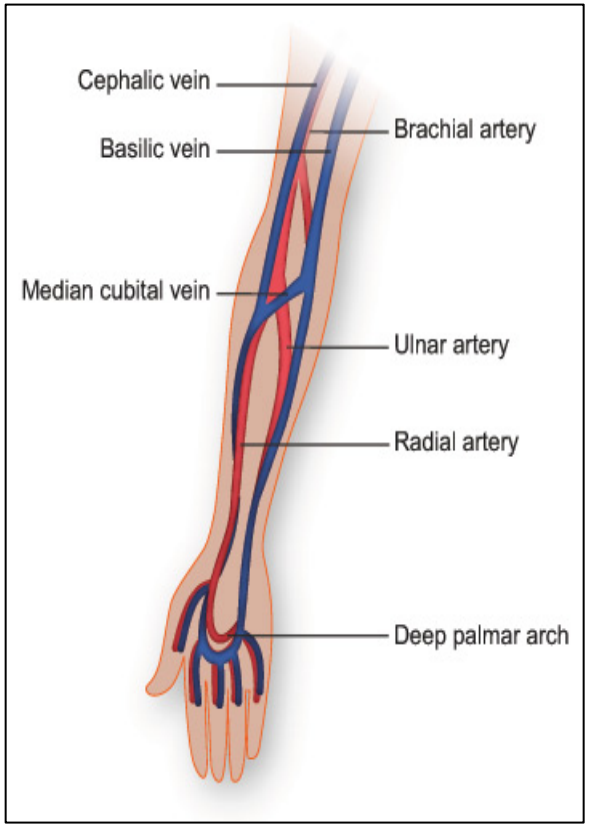

What are the current instructions for the

Mastectomy/Lymphadenectomy Patient

R_X Do not touch <u>THAT</u> arm. No BPs, IVs, or Blood Draws.

This was based upon Starling's Equilibrium.

Every venipuncture that starts with a Tourniquet results in some INFILTRATION & HEMOCONCENTRATION – and can alter medical outcome.

VEIN Access TECHNOLOGIES

Where **Tools, Technique, and Science** *meet!*

Get rid of the Tourniquet, use

Vein Access Technologies' method for

How To Locate A Healthy Vein

The 21cVA Palpation Technique for Locating, Dilating, and Grading Veins.

www.STEM21cVA.com