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## LINES, TUBES, PORTS, WHAT TO DO WITH THEM

### Discusion of the following...

PICC Line

- Hickman Cath
- Chest Tubes

#### PICC's & Midlines



#### Classic PICC Line

#### A PICC line

is essentially a narrow flexible catheter inserted through a vein of the upper arm above the elbow until its tip reaches a very large heart vessel called the superior vena cava





### Different Types

#### **Double Lumen**

#### Single Lumen



#### What is a PICC

- A PICC line is, by definition and per its acronym, a peripherally inserted central catheter.
- It is long, slender, small, flexible tube that is inserted into a peripheral vein, typically in the upper arm, and advanced until the catheter tip terminates in a large vein in the chest near the heart to obtain intravenous access.

A PICC line provides <u>the best of both worlds</u> concerning venous access.

- <u>Similar</u> to a standard IV, it is inserted in the arm, and usually in the upper arm under the benefits of ultrasound visualization.
- PICCs <u>differ</u> from peripheral IV access but similar to central lines in that

a PICCs termination point is centrally located in the body allowing for treatment that could not be administered from standard periphery IV access.

- In addition,
- PICC insertions are less invasive,
- have decreased complication risk associated with them, and ...
- remain for a much longer duration than other central or periphery access devices.

- PICCs are frequently used to obtain central venous access for patients
- in acute care,
- home care and
- skilled nursing care.
- Since complication risks are less with PICC lines, it is preferred over other forms of central venous catheters.

A PICC line may requested for a variety of treatment options which include some of the following:

- Prolonged IV antibiotic treatment;
- IV access that lasts longer and is obtained by less invasive methods;
- Multiple accesses obtainable with one access line;
- TPN Nutrition;
- Chemotherapy;
- Allows for home or sub-acute discharge for extended IV therapy

## Risks, Complications of PICC

#### Air Embolism:

- Air bubbles may enter the blood vessel during insertion of a PICC and with it's use.
- <u>Proper infusion techniques are essential</u> as tip hovers above the RT Atrium.
- This may produce symptoms
- such as decreased blood pressure;
- lightheadedness;
- confusion;
- increased heart rate;
- anxiety; chest pain;
- or shortness of breath.

#### **Infection:**

- It is possible for an infection to develop either inside the vessel or surrounding the insertion site where the catheter enters the vein.
- The symptoms include...
- fever; chills; tachycardia; fatigue; muscle aches; weakness; decreased blood pressure; redness, swelling or purulent drainage at site; or elevated white blood cell count.

### PICC Complications

#### Phlebitis:

 This is inflammation of the vein where the catheter is inserted. The symptoms include redness; pain at access site; streak formation; palpable venous cord; or purulent drainage.

#### Thrombus Formation:

 Any catheter inserted into the vascular system increases the risk of thrombus formation, either in the vessel or in the catheter.

### Catheter Malposition:

- Malposition can occur during PICC insertion or later due to changes in pressure inside the chest or from catheter migration.
- After the insertion of catheter, <u>the position of its tip is</u> <u>confirmed via x-ray.</u>
- Confirmation of proper tip placement is required before using the device as a malpositioned catheter can cause serious complications.
- Securing the PICC catheter is also essential to help prevent catheter dislodgment or migration. Sutures should not be used to secure the catheter to the site as these can lead to complications such as infection at the site or catheterrelated bloodstream infections.

### PICC Complications

#### Difficult Removal:

 There may be resistance when removing the catheter and this may occur at any time during the process.

#### Nerve Injury or Irritation:

 During insertion of the catheter, nearby nerves may get injured or irritated producing symptoms such as a shooting type of pain down the arm; numbness; tingling; pins and needles effect; weakness of extremity; or paralysis.

#### Leakage:

- Occasionally leakage at the insertion site may occur.
- This may be caused by loss of elasticity of the skin at the site, outward migration of the catheter, or rupture of the catheter.

#### Catheter Breakage:

- Rarely, catheter damage can occur and most often it is from improper care.
- It may occur due to improper anchoring, using a syringe that is less than 10ml, or from applying excessive pressure when flushing the device.
- If the catheter is placed in the elbow bend, breakage can also occur from repetitive motion, which should be avoided

#### Infection is a constant risk with all intravenous devices.

- However, the reported rates of infection from PICC lines are relatively low.
- The risk of thrombosis of arm veins is also quite small, although some hospitals prescribe the anti-clotting agents like warfarin as a precautionary measure.

#### Proper Care

For minimizing problems associated with PICC lines, guidelines include:

- Always wash hands before touching the PICC line.
- Keep the insertion <u>site and dressing dry</u>.
- <u>Change dressings only after proper training</u> and completely aseptically and applies to any family members or other caregivers.
- Seek professional help immediately if any <u>discharge, redness, swelling or pain</u> around the catheter insertion site is noticed.

- Do not allow any sharp objects near the line.
- Do not clean the skin near the line with any acetone containing cleanser.
- Do not go swimming as swimming pools not only harbor bacteria but a wet dressing is an ideal medium for bacterial growth.
- Do not allow pets or young children to play with the PICC line.

### Flushing Lines

- Clean the catheter caps with alcohol swab pads prior and post each use.
- The catheter must be flushed every 12 hours and after each use
- Flushing is done with 0.9% normal saline : 10cc or amount directly printed on device
- Use only a 1occ syringe which generates the proper intralumen pressure
- Adopt a "push-pause" technique to minimize tip "flip-flop"
- Some catheters, however, are considered "saline only". They do not have clamps and do not require heparin for flushing.

- The clamp of the catheter should be closed when not in use.
- If clamps are not present on the catheter, it is a "saline only" PICC lines which do not have clamps and <u>do not require</u> flushing with heparin following the flush with normal saline.
- Avoid blood pressure readings in the arm with the PICC.

- The arm with the PICC line must not be babied.
- Normal use, in fact, increases blood circulation in that arm.
- Never pull on the catheter.
- Protect the lumens so they do not inadvertently get caught or tugged on.

### Questions..?



#### Central Venous Access Devices

- CVADs have become a mainstay for patients requiring intravenous (IV) administration of medications and other therapies.
- In fact, more than 7 million CVADs are implanted every year in patients in the United States.
- Non-tunneled, (shortest duration)
- Tunneled, (longer)
- Implanted (longest)
- & PICC

#### Implanted port: Access with Huber needle.





#### Hickman, Broviac, Groshong: CVAD's





- Hickman cath: usually dbl. lumen for chemotherapy (tunneled)
- Groshong: a brand of double-lumen cath that does not require heparin flush
- Broviac: another CVAD (is tunneled)

### As with PICC's, CVAD's..

- can be used either short- or long-term for the infusion of...
- Parenteral nurtition
- Chemotherapy or other vesicant or irritating solutions
- Blood and blood products
- Antibiotics

- Medication/solutions in patients with limited peripheral access
- Therapy that is ongoing or continued at home
- are also useful when frequent blood tests are required, reducing the need for repeated venipuncture.

### Hemodiaiysis Catheter: a CVAD

Temporary



Cuff under skin Tunneled catheter

Tunneled

## Managing Chest tubes



#### Chest tubes

- Are long, semi-stiff, clear plastic tubes
- that are inserted through the chest wall.
- they can drain collections of fluids or air from the space between the pleura.
- Are placed as a result of lung tissue collapse from fluid accumulation or loss of the pleural space vacuum.
- Placing the tube to air, water or low suction seal will allow the lung to re-expand

#### Emergent Chest Tubes

- Traumatic Pneumo or Hemo thorax
- Is placed by Surgeon in strategic position
- The entry point is ...

- the fourth or fifth intercostal space, on the mid-axillary line,
- The tube is inserted towards the collection: sometimes up and in front,
- or up and in back,

or wherever the collection lies.



#### "There's the landmark right there!"



### Safe spot



### Chest tube placement

#### Can thrust with Trocar in ER Landmarks are essential

# Trocar Chest tube Lung Pleural space



Source: Cont Edu Anaesth Crit Care & Pain @ 2008 Oxford University Press



#### **Carefull incision at landmark**



# Tube inserted with special forcep



#### Once in place attach a seal/vac

- The CT attaches to a pleurevac,
- a large plastic box with what appears to be several separate compartments in it
- The box actually imitates an old system that was invented to drain chest tubes, which used three chambers –
- they were actually glass bottles held by a metal rack - in series.

#### Original concept for drain system



#### THREE-BOTTLE SYSTEM

When suction is turned on, air and fluid are pulled out of the pleural space and into the rainage collection bottle. Suction is applied through the entire system until it reaches ne pressure that will draw atmospheric air in through the open tube of the suction ontrol bottle. When the incoming atmospheric air reaches the lower end of the tube, it ubbles into the bottle. At this point, the desired suction level will be maintained as an ncrease in suction will just draw in more atmospheric air.

#### Pleuravac system a glorified one-way valve

#### Chest drain system



### Monitoring the system

- The Pleuravac is a simplification of the old 3 bottle chest drainage system.
- When properly prepared it's use is almost fool proof.
- It functions in 3 ways

- By providing a reservior of exudate/fluid liberation.
- A water seal vacuum to prevent backflow
- A suction chamber to assist reestablishing the negative pleural space.

#### Subcutaneous emphysema

- is the collection of air in the tissues just under the skin once you feel it, you'll never forget it:
- as though Rice Krispies had been spread around under the patient's skin.
- If a chest tube isn't properly placed, or

- if the site dressing isn't airtight, air can leak into the tissue around the insertion site.
- Eventually it can track up and down the body, sometimes causing the neck and face to swell, sometimes threatening the airway.
- If this occurs the patient should be <u>immediately</u> assessed for intubation
- Correcting the position of the chest tube usually stops the leakage of air into the tissues, and the air itself is almost always very rapidly reabsorbed - a matter of several days at most.

### The goal



#### CT attached to heimlich valve



#### Management

- Chest tubes should be kept free of dependent loops, kinks, and obstructions which may prevent drainage
- In general, chest tubes are not clamped except during insertion, removal, or when diagnosing air leaks
- Manual manipulation, often called milking, stripping, fan folding, or tapping, of chest tubes was commonly performed to clear chest tube obstructions but has not shown to be beneficial and has been noted to be detrimental.

## Complications

- Hemorrhage,
- infection,

- and re-expansion pulmonary edema.
- Injury to the liver, spleen or diaphragm is possible if the tube is placed inferior to the pleural cavity.
- Injuries to the thoracic aorta and heart can also occur

### Questions...?

