INTRAVENOUS CATHETERS

- Presented by Allyne Moon, RVT

DEFINITION

- Catheter: a long slender flexible tube capable of being inserted into a bodily vessel or cavity
- Intravenous: within a vein


- Invention was spurred on by attempts to transfuse blood
**FIRST RECORDED TRANSFUSION ATTEMPT**

1492 ON POPE INNOCENT VIII IN ROME

POPE INNOCENT SUFFERED A STROKE AND EVENTUALLY FELL INTO A COMA.

- Pope Innocent's doctor tried to cure him by giving him an infusion of blood from three young and healthy boys.
- The physician had no means to transport the blood from one body to another, so he created an anastomosis—joining the donor and recipient.

END RESULT- ALL FOUR PATIENTS DIED
ANDREAS LIBAVIOUS IN 1597

The first to propose a device for transfusion in Alchemia (1597). “Let the performer of the operation have two silver tubes fitting into each other. Let him open the artery of the young man, and put it into one of the tubes, fastening it in. Let him immediately after open the artery of the old man, and put the female tube into it, and then the two tubes being joined together, the hot and spirituous blood of the young man will pour into the old one as it were from a fountain of life, and all of his weakness will be dispelled.”

THE GREAT OXFORD DONS 1650

- William Harvey
- Robert Boyle
- Thomas Willis
- Richard Lower
- Christopher Wren
- John Locke
- Robert Hooke

THE GREAT OXFORD DONS (CONT)

- Anne Greene, “Newes from the Dead…”
CHRISTOPHER WREN

“Wren, using a quill and a pig’s bladder, created the first working IV infusion device. His first experiment, in 1658, was to instill a mixture of wine, ale, opium and liver of antimony into a dog’s veins.” The patient survived.

PROBLEMS WITH WREN’S DEVICE

- Blood clotted easily
- No way to keep the device in place
- Quills were too soft and not very durable

RICHARD LOWER

improved on Wren’s concept by using silver. Silver was used because it was sturdy, could be shaped easily, and was made with rims at the end of the tube for attachments.
LOWER (CONT.)

• created devices to control blood flow, used silver tipped quills and animal veins give IV treatments

PEOPLE BEGAN TO DEMAND ANIMAL BLOOD TREATMENTS

• With increasing adverse events, animal to human blood transfusions were banned across most of Europe

• For 100 years no research or improvements were made in IV therapy

1818

• first successful human to human blood transfusion
• Invented several devices for blood transfusion
**DR. JAMES BLUNDELL (CONT)**

- The Impellor-infused blood under pressure

**THE GRAVITATOR**

- regulated the stream of blood, and kept exposure to air and cold to a minimum

**1832 DR. WILLIAM BROOKE O’SHAUGHNESSY**

- Cholera epidemic in Europe
- Observed patients’ blood had very little serum and proposed to infuse the blood with a mix of water, salt, and albumin (the first description of a “Normal Saline” infusion)
DR. THOMAS LATTA 1832
× performed the first IV saline injection to a woman dying of cholera. It was successful, and Dr. Latta went on to treat many more people successfully.

1845 FRANCIS RYND
× perfected the hollow needle
× Used it to treat trigeminal neuralgia with IV infusions of morphine

1853 CHARLES PRAVAZ
× developed a metal syringe. The design was converted to silver and glass
Until 1950 IV therapy still involved the use of a re-usable metal needle.

Dr. Massa in 1950 at the Mayo Clinic created the first over the needle IVC.

Massa began by shortening a 16-gauge Becton Dickinson (Franklin Lakes, NJ) needle and inserting another steel needle as an inner stylet. It looked much like today’s epidural needle, complete with stylet. Then, over the top of the needle was fitted a polyvinyl chloride (PVC) catheter, which was attached to a metal hub via a crimp band. The tip of the catheter was hardened and shrunk to fit the needle, using ethyl acetate which deplasticized the PVC.

1964 DESERET (MEDICAL MANUFACTURER)

Introduced the Angiocath™, the first disposable device. It was constructed of PVC, used a hypodermic-style needle and a flashback chamber and flow control plug, features not found on other reusable IVC. Prior to the advent of the flashback chamber the cannula's position could only be verified by observing blood flowing through the hub of the inner needle when the stylet was removed.
CONTINUED PROGRESS

Through numerous modifications, from 1964 to 1969 the IVC replaced the cut down devices for IV therapy.

ROLE IN VETERINARY MEDICINE

- Same as human medicine
- IV fluid therapy
- Shock
- Hospitalized patients
- Chemotherapy
- IV nutrients (TPN)
- Anesthesia

PLACEMENT

- Depends on treatment
- Emergency: find a vein, any vein!
- Hospitalization: consider what you are treating
- Chemotherapy: must be a perfect stick! Rotate veins between treatments
- Anesthesia: place the catheter in a vein away from the surgical site if possible
**PLACEMENT**

- Find a vein you can feel
- The vein feels like a tiny water balloon beneath the skin

**SHAVE THE AREA OVER THE SELECTED VEIN**

- Have an assistant hold off the vein
- Shave the area but be careful not to cause abrasions with the clippers

**WASH YOUR HANDS FOR 2 MINUTES PRIOR TO IVC INSERTION OR WEAR STERILE GLOVES**

- This is the most important step!
PERFORM A SURGICAL SCRUB OVER THE AREA

- Alternate between scrub and alcohol - if the patient has very sensitive or damaged skin, use a surgical solution in place of alcohol
- Start at the middle and use a circular motion to scrub to the outside being careful not to touch the cleaned area after you have scrubbed over it

REMOVE THE IVC FROM THE PACKAGING BEING CAREFUL NOT CONTAMINATE THE IVC

CONSIDER PAIN PREVENTION

- If your patient resistant to having the catheter placed, use some type of local anesthesia
LIDOCAINE GEL

- Apply a thin layer over shaved site
- Cover in plastic wrap and vetwrap
- Wait 5 minutes and proceed with catheterization

EMLA CREAM

- Apply a thin layer over shaved site
- Cover in plastic wrap and vetwrap
- Wait 5 minutes and proceed with catheterization

LOCAL BLOCK

- 2% Lidocaine 0.1 cc or less injected interdermally over the placement site
INSERT THE CATHETER INTO THE SKIN WITH THE BEVEL SIDE UP.

ADVANCE THE CATHETER INTO THE PLACE WHERE YOU VISUALIZED OR PALPATED THE VEIN. ONCE YOU RECEIVE BLOOD BACK INTO THE HUB OF THE CATHETER, SLOWLY FEED THE CATHETER OFF THE STYLET AND INTO THE VEIN.

IF NO BLOOD IS BACKING UP INTO THE HUB, PULL THE CATHETER AND STYLET OUT UNTIL YOU SEE BLOOD FLOW INTO THE HUB. ATTEMPT TO FEED THE CATHETER OFF THE STYLET AGAIN.

ONCE THE CATHETER IS FULLY ADVANCED INTO THE VEIN, REMOVE THE STYLET AND PLACE A T-SET ADAPTOR OR INJECTION CAP ON THE END OF THE CATHETER. MANY KINDS OF ADAPTORS CAN BE USED WITH CATHETERS, BUT MOST VETERINARIANS AND TECHNICIANS PREFER A T-SET ADAPTOR SINCE IT OFFERS AN INJECTION PORT AND A PORT WHERE INTRAVENOUS FLUIDS CAN BE ATTACHED.

PROCEED TO TAPE THE CATHETER IN PLACE USING 1-IN POROUS HOSPITAL GRADE TAPE. THIS IS ONE OF SEVERAL WAYS TO PROPERLY SECURE A CATHETER. USING ANOTHER METHOD, SUCH AS BANDAGING MATERIAL, IS FINE AS LONG AS IT IS SAFE AND COMFORTABLE FOR THE PATIENT AND SECURES THE IV CATHETER FIRMLY IN PLACE. IT IS IMPORTANT TO TEST AND FLUSH THE CATHETER AFTER PLACEMENT. (BRANDY TERRY, CVT, VTS (ECC), FEB 10, 2010 FIRSTLINE.)
The 72 hour rule is out.

A 2007 JAAHA study on catheter placement in dogs and cats demonstrated that one out of four intravenous catheters became colonized with harmful bacteria. There was no association between the risk of a positive bacterial culture and the following factors: type of catheter used, blood sampling through the catheter, type of IV fluids administered, duration the catheter was in place, catheter location, complications with the catheter, and final patient outcome. Many human studies also have found no association between the length of time a catheter has been in place and the risk of catheter-associated infection. (Kibble, Spring 2011, a publication for Veterinary Technicians in and around the Big Apple from NYC Veterinary Specialists)

CARE/MAINTENANCE (CONT.)

- Sterile insertion and clean bandages are the best way to prevent IVC complications.
- Wash your hands for 2 minutes prior to IVC insertion or wear sterile gloves.
- Change the bandages if they become soiled or wet.

CARE/MAINTENANCE (CONT.)

- Every three days, remove the bandage, clean around the IVC as steriley as possible and apply new, clean bandages.