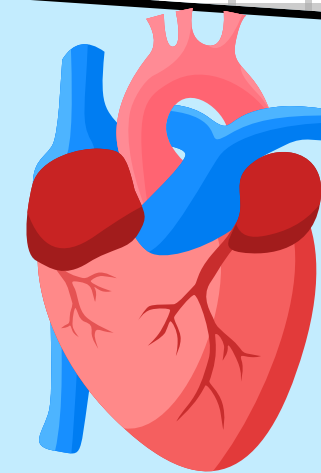




HEART SURGERY LAB



Amanda Gagne
NAAE Ideas Unlimited
Region VI



OVERVIEW

1 What is the idea?

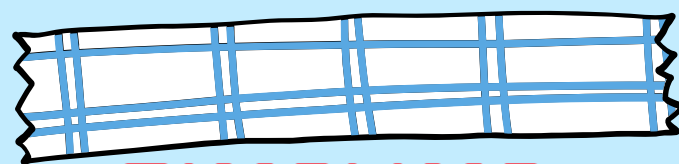
2 How do I set it up?

3 What are the learning opportunities?

4 Reflection

THE LAB

- 1 Individual-Patient Check in and physical exam record keeping
Students are given the chief complaint and PE results to record in their pt chart. Students select 2 tests to run on their pt.
- 2 Team-Students are given test results from an echocardiogram and thoracic chest x-ray along with a disease chart to interpret the tests and then diagnosis the pt.
- 3 Individual- explain what the anatomy connection is. Students then perform 2 medical calculations for pain medication and fluid therapy for the IV. They also write a script of what should be said to the owner about the disease (using the chart), the findings and next steps.
- 4 Team- Students identify surgical tools (paper), wrap a surgical pack together, don themselves and the pt. Students then perform the surgery on the pig heart (pt) and complete a follow up report for the owner



TIMELINE

Day 1: Patient history and physical exam charting.

- Individually students complete the SOAP notes report for the history and the chief complaint
- Students select 2 tests to run and then check in with the teacher
- Team- Students review the tests and make the diagnosis

Day 2: Donning and Doffing

- Individually students scrub into the surgery by washing their hands, putting on gloves and a surgical gown.
- Individually students complete medical dosage calculations and work on the script for the vet-owner communication and update their medical chart with the test results.
- As a team students surgically drape their pt and clean the incision site.

Day 3: Surgery

- As a team, Students make their incisions, locate the parts of the heart and then perform the surgery and suture the pt.
- Individually, students update their pt chart and the owner.

Part One: Patient Evaluation

Directions: Use the information below to fill out the paperwork on the patient's visit.

Owner Name: Amanda Gagne

Address: 100 E Cottage Ave Millersville, Pa

Phone: 717-877-7430

Email: amanda.gagne@pennmanor.net

Animal Name: Ludwig

Date/Time: 15 Apr 2025 @ 14:30

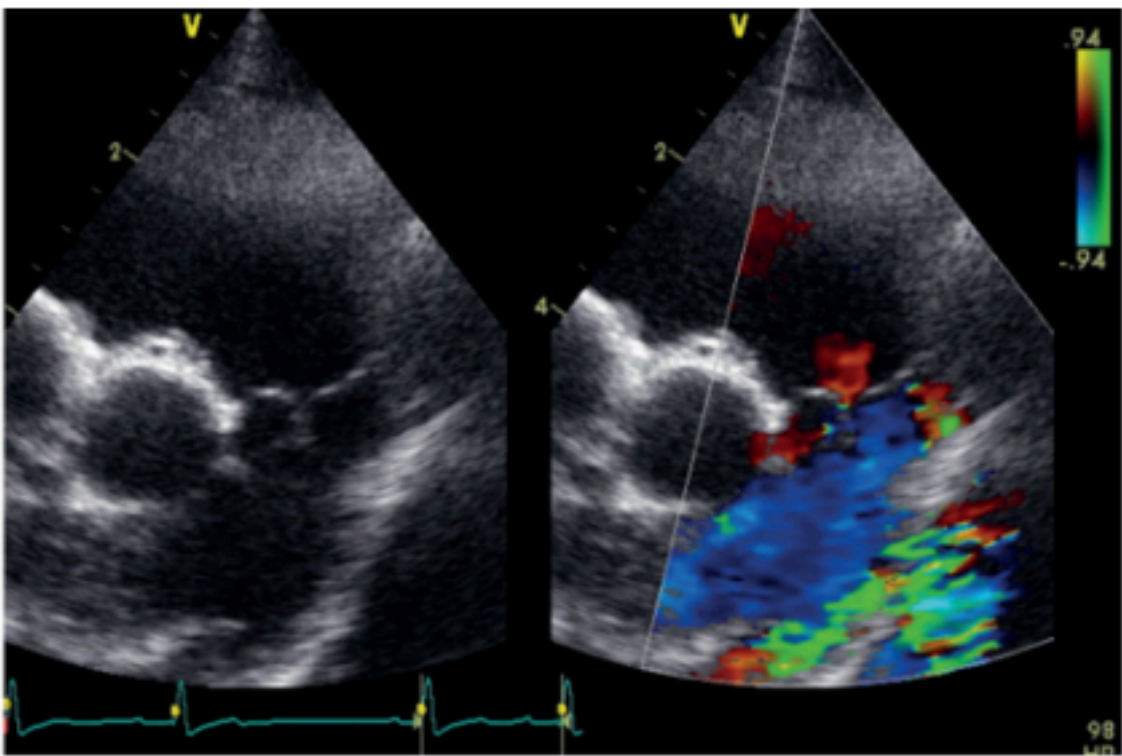
Subject: 2yo FS Mixed Breed Canine (6.99 kg)

Pt presented for DVM evaluation and was found to be BAR with a BCS of 4/9. Clinical parameters remained within normal limits, including a Temp of 37.9°C, RR of 24 brpm (eupneic), and a CRT < 2 sec. Cardiovascular assessment revealed a HR of 88 bpm with a regular rhythm; however, a systolic murmur was auscultated, localized to the left hemithorax. Pt scheduled for further diagnostics on 16 Apr 2025 @ 09:05. Medical intervention has been initiated pending definitive results and the O's election of treatment options.

Owner Information	
Name:	Phone:
Address:	
Email	
Animal Information	
Name:	Breed:
DOB:	Sex:

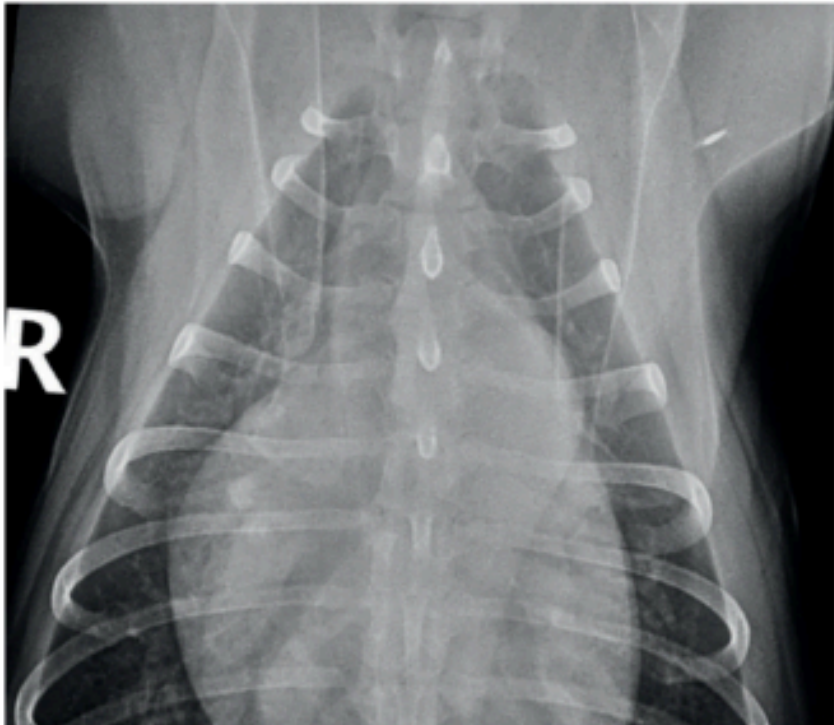
The echo serves as the primary tool for definitive assessment of cardiac structure and sys fx. By utilizing the SA basilar view at the level of the aortic valve, clinicians can visualize blood flow patterns between major vessels. The application of CFD is critical for identifying a vascular shunt, as it reveals a "mosaic" of continuous turbulence within the MPA. This imaging modality allows for the precise measurement of the abnormal vessel and an evaluation of the resulting volume overload on the heart chambers.

- **Echo:** Essential for definitive DX; allows for real-time assessment of anatomy and sys fx.
- **SA Basilar View:** Specific ultrasound window used to visualize the great vessels and valves at the base of the heart.
- **CFD (Color Flow Doppler):** Used to detect abnormal/turbulent flow; highlights the "mosaic" pattern of a vascular shunt.
- **MPA Assessment:** Monitoring for continuous turbulence within the main pulmonary artery to confirm a "leak" between systems.
- **Vessel Measurement:** The size of the ductus/shunt can be directly measured via echo to determine the severity of the condition.



Case Study and Disease Chart

- Thoracic Radiograph Findings
- The lateral and dorsoventral (DV) radiographs exhibit the following anatomical features:
 - **Vertebral Heart Score:** 12.3 (reference value <10.5).
 - **Cardiac Morphology:** Prominence of the left atrium and left ventricle is visible in both the lateral and DV views.
 - **Vascular Features:** Soft tissue densities are present in the regions of the aorta and the main pulmonary artery (MPA).
 - **Anatomical Positioning:** A structure is noted extending from the MPA into the aortic wall.
 - **Pulmonary Status:** The lung fields show no signs of fluid accumulation or vascular congestion.



Diagnostics: Use the chart below to decide what is wrong with your pt. Circle the correct answer.

Potential Disease	Typical Symptoms	Diagnostic Findings (X-ray & Echo)	Treatment Options
Patent Ductus Arteriosus (PDA)	Continuous "washing machine" murmur, exercise intolerance, or no symptoms (asymptomatic).	X-ray: Enlarged heart (high VHS), "bumps" at the aorta/MPA. Echo: Left-to-right shunt, continuous turbulence in MPA, LA/LV dilation.	Surgical ligation (tying it off) or transarterial catheter occlusion (plugging the hole).
Mitral Valve Disease (MVD)	Left-sided systolic murmur, coughing, usually seen in older small-breed dogs.	X-ray: LA enlargement, possible fluid in lungs (edema). Echo: Leaky mitral valve with high-velocity jet, but no shunt between the aorta and MPA.	Long-term medication (ACE inhibitors, diuretics) to manage blood pressure and fluid.
Pulmonic Stenosis (PS)	Murmur heard best on the left, fainting (syncope), exercise intolerance.	X-ray: Right-sided heart enlargement (reverse D-shape). Echo: Narrowing of the pulmonary valve; RV thickening (hypertrophy) rather than LV dilation.	Balloon valvuloplasty (using a balloon to stretch the narrow valve open).
Dilated Cardiomyopathy (DCM)	Weakness, weight loss, lethargy, coughing, common in large breeds.	X-ray: Massive overall heart enlargement (globoid). Echo: Thin, weak heart walls with poor systolic function (weak squeezing).	Medications to help the heart pump stronger and manage heart failure symptoms.

Echocardiogram Findings
Conscious echo revealed LV dilation and volume overload with LA enlargement via RPS 4-ch view. Sys fx remained good. In the SA basilar view, the MPA was dilated. CFD showed continuous turbulence indicating a vascular shunt. NSR was maintained throughout the procedure per ECG.

- **Heart Chambers:** In the side-view scan (right parasternal long axis), the LV—the heart's main pumping chamber—appeared stretched out and was holding more blood than usual. The LA, which receives blood from the lungs, was also larger than normal.
- **Pumping Strength:** Despite the size changes, the heart's systolic function (its ability to squeeze and pump blood out to the body) looked strong and healthy.
- **Blood Vessels:** In a different "birds-eye" view (short axis), the main pulmonary artery (MPA)—the big pipe that carries blood to the lungs—was wider than it should be.
- **Blood Flow:** Using color flow Doppler (a tool that shows the direction of blood on the screen), the DVM saw "continuous turbulence." This means blood was swirling around in a messy, high-speed way between two major vessels instead of flowing in a smooth, one-way path.
- **Heart Rhythm:** Throughout the whole test, the ECG (heart rate monitor)

showed a normal sinus rhythm, meaning the heart's electrical timing was perfectly steady and regular.

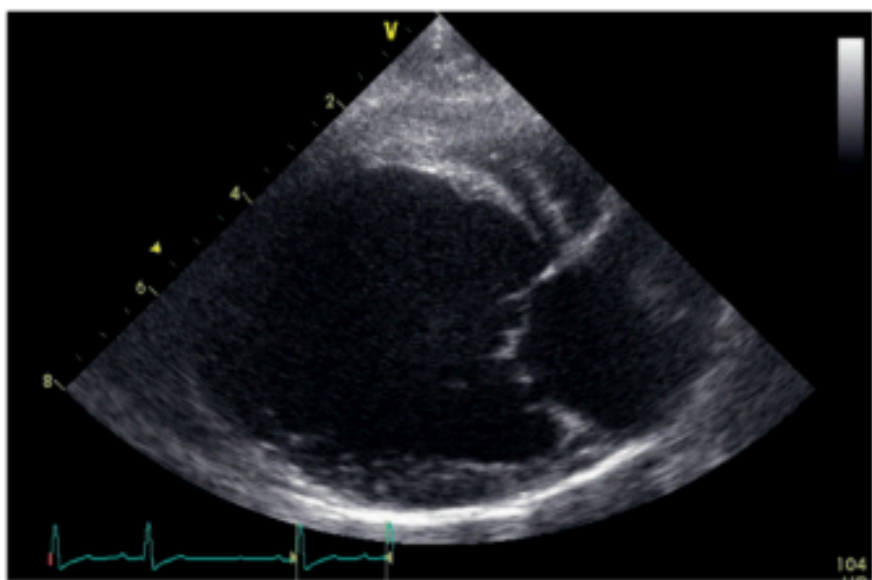
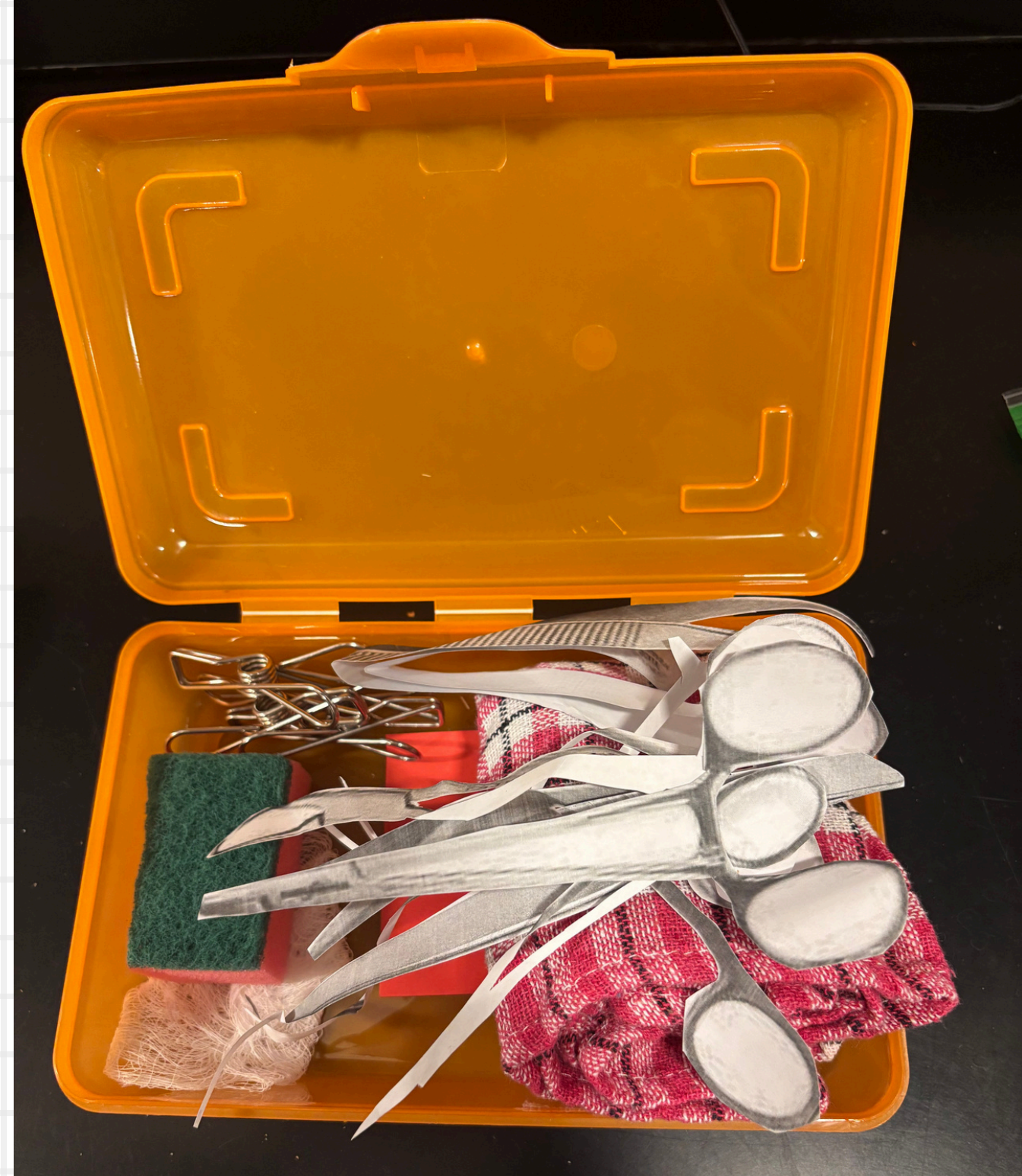


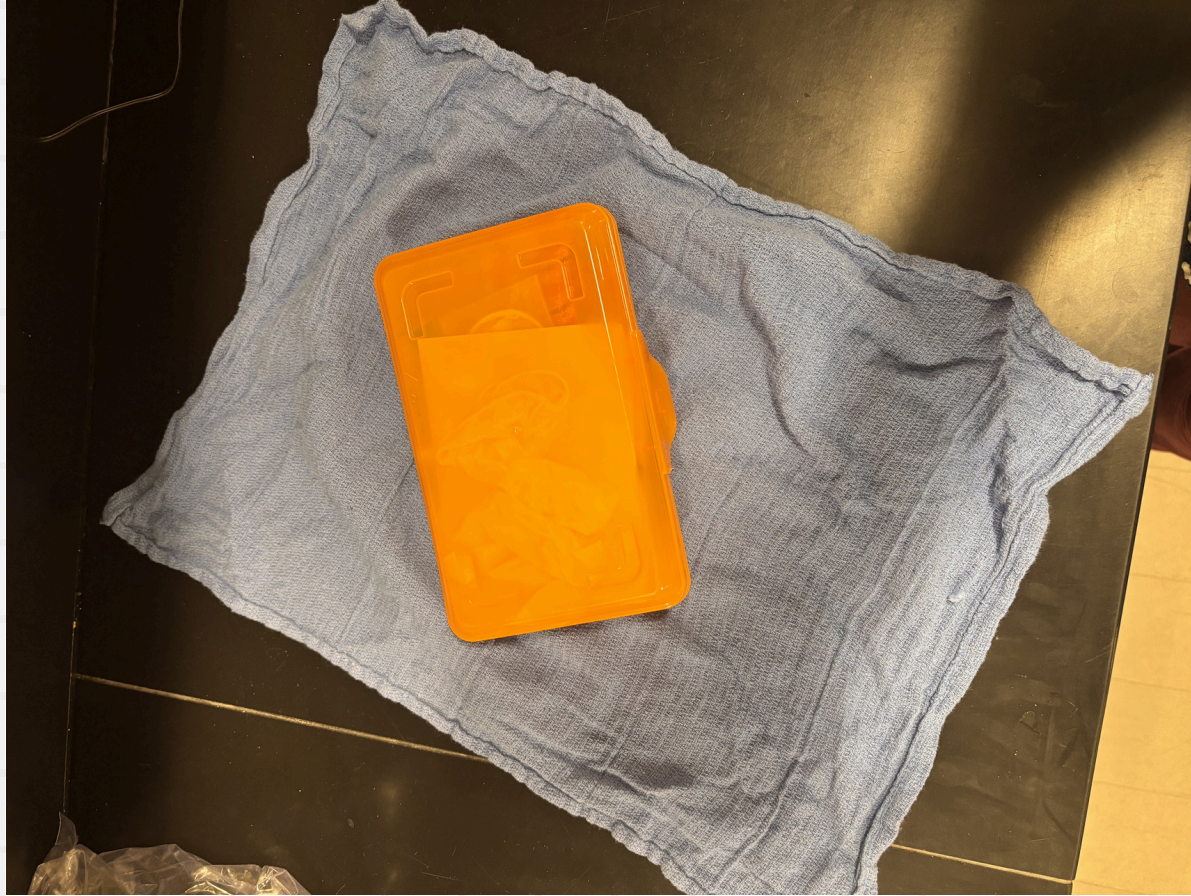
Figure 2. Echocardiographic right parasternal four chamber long axis view showing left atrial enlargement.

Materials:

- Surgical tray- Pencil Case
- Surgical Drapes- hand towels
- Autoclave indicator tape - making tape
- Autoclave indicator strip- sticky note
- Gauze pads- dollar store sponge cut up and 1 piece of gauze
- Surgical Tools- Paper
- Towel Clamps- Binder Clips
- Sterile Field- Cardboard Box Lid
- Suture Materials- Dental Floss or fishing line
- Suture Needles- Curved Sewing Needles
- Surgical gown- button up shirt or donated gowns
- Gloves- non latex gloves or winter gloves work well
- Optional-Ultra sonic cleaner- cleans dissection tools
- Dissection kit- just need scalpel, forceps and probe
- Heart- Pig heart
- Lab sheet and case study- Cornell University



The “surgical tray” set up to go through packing and wrapping. Students must ID the tools they are going to use, count the sponges and drapes and pack this box up neatly for their surgery



Surgical Pack (Pencil Case) on the drapes prepared to be wrapped



Surgical pack wrapped once and ready for the second wrap



Surgical pack fully wrapped and ready to be graded

Wrapping a surgery pack and suture kits!



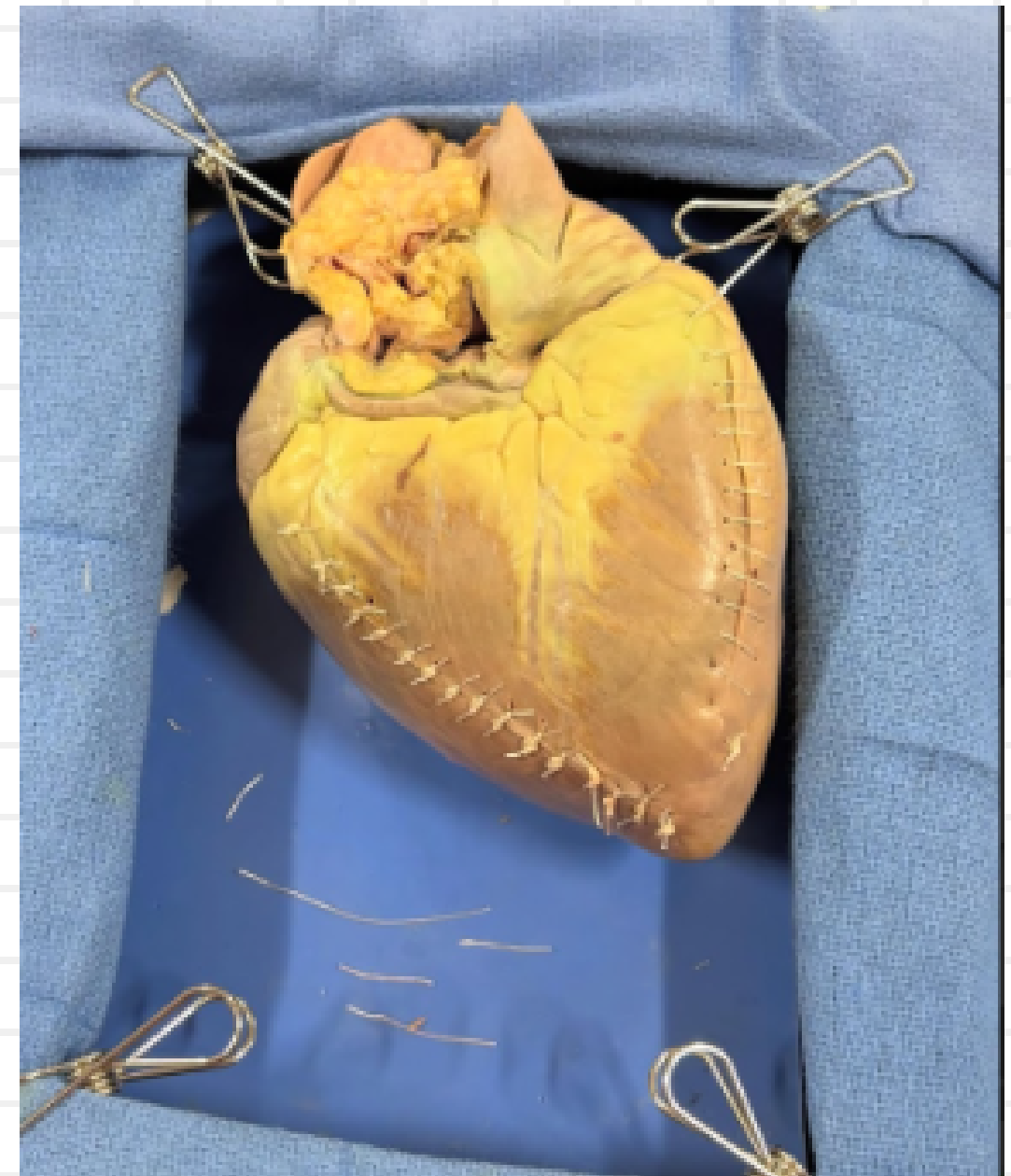
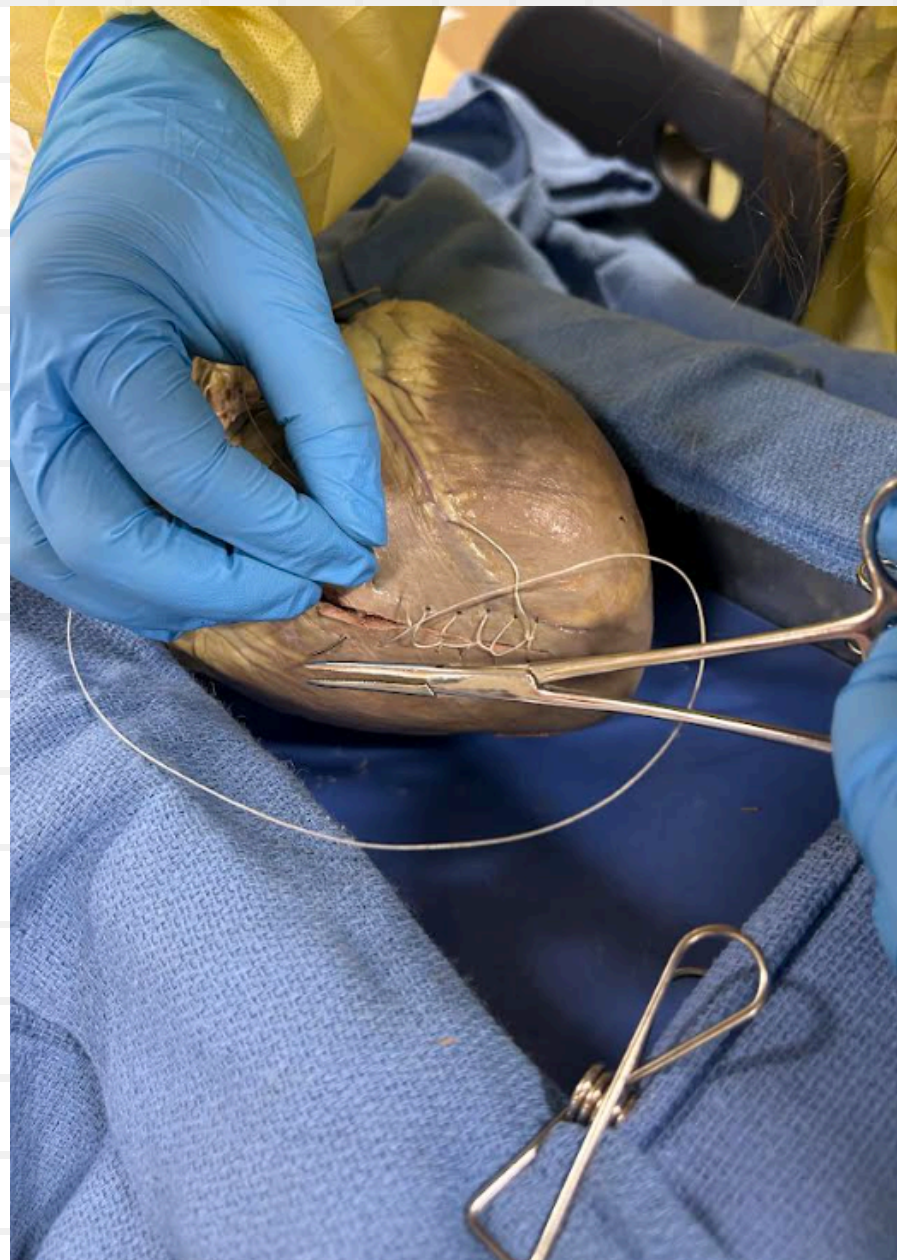
Suture Kits with needles and dental floss to complete 2 types of sutures

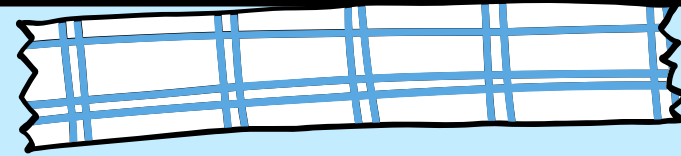


Surgical packs (pencil cases) stored with all the supplies in it

SURGERY SET UP

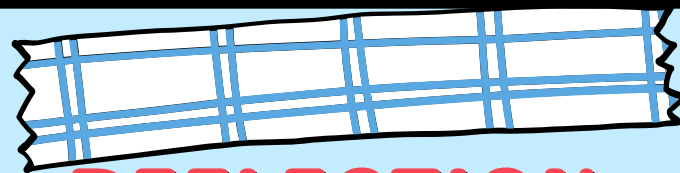
Preforming the sutures and
the results at the end of the
surgery!





LEARNING OPPORTUNITIES

- Students lack confidence in their abilities to complete tasks so, this provides the opportunities for students to try to tackle a case study in a safe environment
- This recalls on knowledge from the course including terms, posology, sutures, biosecurity, professionalism and more. Students are tested to see if they really know the veterinary field and the anatomy of the circulatory system
- Students are working independently at times and alone to allow for critical thinking and collaboration of colleagues like a veterinary clinic would be
- Students are reading a rigorous case study without having to read it straight from the doctor's notes—I have paraphrased it for them to make it manageable. This again tests medical terms, critical thinking and anatomy.
- Client– patient– vet communication– the students are writing a script of what they would tell the owner. This is important to practice to share the key details and monitoring that needs to occur without scaring the owner. This helps keep a healthy relationship
- Record Keeping– students are updating the patient's chart in real time and in an organized manner to keep records for a future veterinarian



REFLECTION

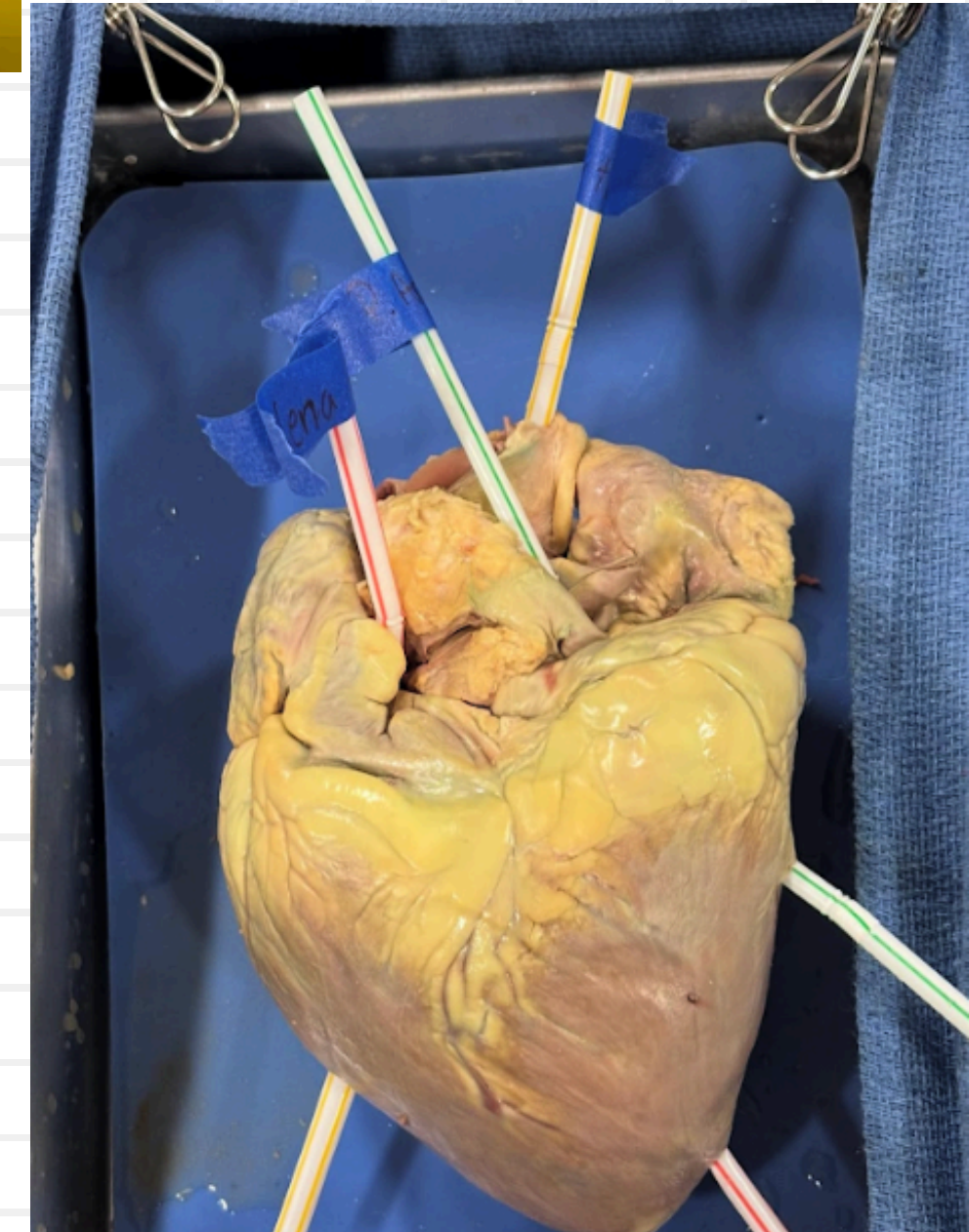
- Students struggled with post operative care so, to do this for the next school year, I added a choice box option that included choices for students to assign for post operative care
- Some groups worked way faster than others and finished before others. Allowing them to explore the heart or practice more sutures was helpful.
- Grading this in real time helped keep all the parts organized and grading in the student packet was ideal.
- Next year I might invite a local vet, vet tech or nurse in to help grade the surgical preparations or have students record it so cut down on time and grade more perfection.
 - Having a tech come in can also help watch for maintaining surgical field since doing this for several groups is not ideal

Chloroxidine - Yellow
Alconol - Blue

★ Grab some of each in
a cup and bring to your
group to scrub pt.



Students scrubbing their
patient into surgery



Students labeling the parts
of the heart

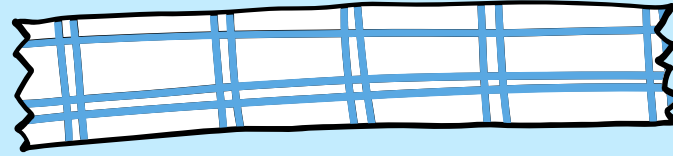
WRAP UP

Students write a script that includes a post operative report they would tell the owner. Students fill in their patients chart for the surgical notes including what was preformed, where sutures were made and when a follow up care report was needed.

This section is done independently

Wrapping it up:

1. Circle what post operative care instructions you would give the O.
 - Activity: Strict exercise restriction (leash walks only) for 10–14 days.
 - Activity: Allow normal running and jumping immediately to improve circulation.
 - Incision: Monitor daily for redness, swelling, or discharge.
 - Incision: Scrub the area daily with soap and water to keep it clean.
 - Protection: Use an E-collar (cone) at all times to prevent licking/chewing.
 - Protection: Apply a tight bandage and antibiotic ointment over the stitches
 - Diet: Offer a small amount of water and a bland meal this evening.
 - Diet: Resume a full, normal diet and free-choice water immediately.
 - Medication: Administer prescribed veterinary pain relief exactly as labeled.
 - Medication: Use human Ibuprofen or Tylenol if the patient seems painful.
 - Monitoring: Seek emergency care for pale gums, difficulty breathing, or collapse. Monitoring: Ignore any coughing, as it is always normal after heart surgery.

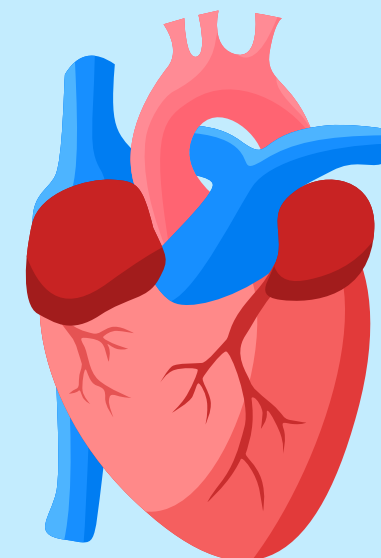


EXTENSION ACTIVITIES

- Patient physical exam– have a recording of the lungs with a patient with PDA and have students complete a full physical exam on a stuffed dog and record these components into the chart
- Bandaging– Using a stuffed dog, have students bandage where the surgical incision would be
- Sterilization and Tool Cleaning– My students use an ultrasonic cleaner to clean the tools and then lubricate them using tool milk
- Injections– Have students complete the math practicum in the packet and then demonstrate the IV set up on a fake dog leg including shaving the site. This can be done with aquarium tubing and felt even!
- Prescription filling– Fill the prescription needed for after surgery using beans as tablets!



**THANK
YOU!**



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