

60th Medical Group (AMC), Travis AFB, CA

INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE (IACUC)

FINAL REPORT SUMMARY

(Please type all information. Use additional pages if necessary.)

PROTOCOL #: FDG20190021A

DATE: 4 Feb 2021

PROTOCOL TITLE: Porcine (*Sus scrofa*) Model of Cardiac Tamponade and Development of an Animal Model for Pericardiocentesis, a Pilot Study.

PRINCIPAL INVESTIGATOR (PI) / TRAINING COORDINATOR (TC): Capt Timothy Guenther

DEPARTMENT: SGSE

PHONE #: 402-840-5875

INITIAL APPROVAL DATE: 20 Jun 2019

LAST TRIENNIAL REVISION DATE: N/A

FUNDING SOURCE: Air Force Surgeon General's Office

1. RECORD OF ANIMAL USAGE:

Animal Species:	Total # Approved	# Used this FY	Total # Used to Date
<i>Sus scrofa</i>	8	0	6

2. PROTOCOL TYPE / CHARACTERISTICS: (Check all applicable terms in **EACH** column)

- | | | |
|--|---|--|
| <input type="checkbox"/> Training: Live Animal | <input type="checkbox"/> Medical Readiness | <input type="checkbox"/> Prolonged Restraint |
| <input type="checkbox"/> Training: non-Live Animal | <input type="checkbox"/> Health Promotion | <input type="checkbox"/> Multiple Survival Surgery |
| <input type="checkbox"/> Research: Survival (chronic) | <input type="checkbox"/> Prevention | <input type="checkbox"/> Behavioral Study |
| <input checked="" type="checkbox"/> Research: non-Survival (acute) | <input type="checkbox"/> Utilization Mgt. | <input type="checkbox"/> Adjuvant Use |
| <input type="checkbox"/> Other () | <input type="checkbox"/> Other (Treatment) | <input type="checkbox"/> Biohazard |

3. PROTOCOL PAIN CATEGORY (USDA): (Check applicable) C D E

4. PROTOCOL STATUS:

***Request Protocol Closure:**

- Inactive, protocol never initiated
- Inactive, protocol initiated but has not/will not be completed
- Completed, all approved procedures/animal uses have been completed

5. Previous Amendments:

List all amendments made to the protocol. **IF none occurred, state NONE. Do not use N/A.**

For the Entire Study Chronologically

Amendment Number	Date of Approval	Summary of the Change

6. **FUNDING STATUS:** Funding allocated: \$ 0.00 Funds remaining: \$ 0.00

This protocol used animals that were already part of general surgery training labs and also expired medical materials, so there were no costs associated with this protocol.

7. **PROTOCOL PERSONNEL CHANGES:**

Have there been any personnel/staffing changes (PI/CI/AI/TC/Instructor) since the last IACUC approval of protocol, or annual review? Yes No

If yes, complete the following sections (Additions/Deletions). For additions, indicate whether or not the IACUC has approved this addition.

ADDITIONS: (Include Name, Protocol function - PI/CI/AI/TC/Instructor, IACUC approval - Yes/No)

<u>NAME</u>	<u>PROTOCOL FUNCTION</u>	<u>IACUC APPROVAL</u>

DELETIONS: (Include Name, Protocol function - PI/CI/AI/TC/Instructor, Effective date of deletion)

<u>NAME</u>	<u>PROTOCOL FUNCTION</u>	<u>DATE OF DELETION</u>

8. **PROBLEMS / ADVERSE EVENTS:** Identify any problems or adverse events that have affected study progress. Itemize adverse events that have led to unanticipated animal illness, distress, injury, or death; and indicate whether or not these events were reported to the IACUC.

None.

9. **REDUCTION, REFINEMENT, OR REPLACEMENT OF ANIMAL USE:**

REPLACEMENT (ALTERNATIVES): Since the last IACUC approval, have alternatives to animal use become available that could be substituted in this protocol without adversely affecting study or training objectives?

No.

REFINEMENT: Since the last IACUC approval, have any study refinements been implemented to reduce the degree of pain or distress experienced by study animals, or have animals of lower phylogenetic status or sentience been identified as potential study/training models in this protocol?

No.

REDUCTION: Since the last IACUC approval, have any methods been identified to reduce the number of live animals used in this protocol?

Yes. This protocol was conducted with animals used for live animal surgical training labs without requiring any extra animals.

10. **PUBLICATIONS / PRESENTATIONS:** (List any scientific publications and/or presentations that have resulted from this protocol. Include pending/scheduled publications or presentations).

Submitted for presentation at the Western Trauma Association Meeting

11. **PROTOCOL OBJECTIVES:** (Were the protocol objectives met, and how will the outcome or training benefit the DoD/USAF?)

Yes. A useful swine pericardiocentesis model was developed that can be used for training Air Force medical personnel.

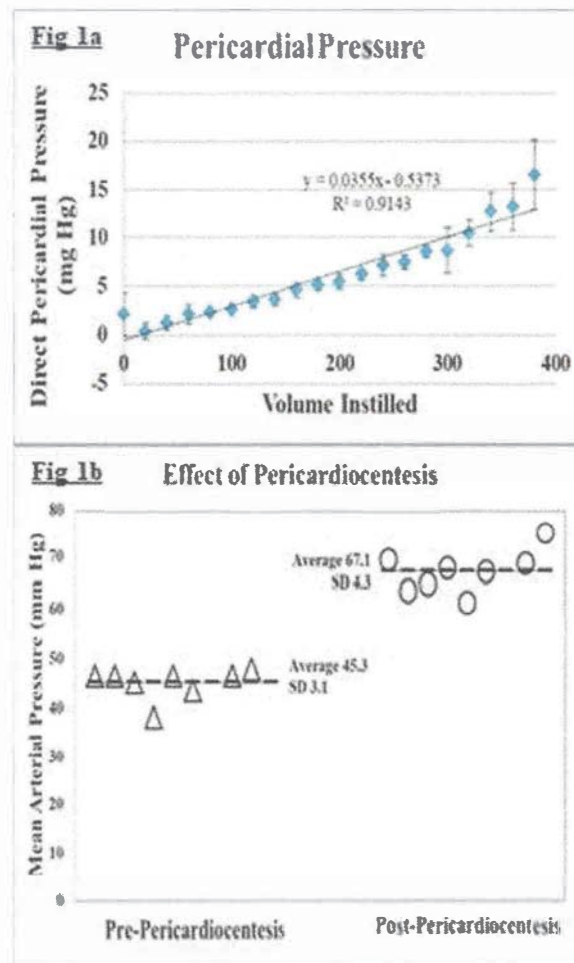
12. PROTOCOL OUTCOME SUMMARY: (Please provide, in "ABSTRACT" format, a summary of the protocol objectives, materials and methods, results - include tables/figures, and conclusions/applications.)

Introduction- Pericardiocentesis is a lifesaving skill providers should know how to perform. Though cadaveric, mannequin, and inanimate models of pericardiocentesis have been developed, many lack in vivo anatomic relationships and the hemodynamic feedback associated with successful pericardiocentesis.

Methods- A large animal model of cardiac tamponade was created in 5 Yorkshire-cross swine. The pericardium was accessed through an anterolateral thoracotomy and a 14F pigtail catheter was placed into the pericardium using Seldinger technique. Colored saline was then instilled into the pericardium while hemodynamics were monitored. Cardiac tamponade was defined as 25% decrease in systolic blood pressure. A cohort of participants then practiced ultrasound assisted sub-xiphoid pericardiocentesis using the model.


Results- Cardiac tamponade was achieved after instillation of an average of 204 (range 100- 340 cc, SD 99 cc). A direct relationship between volume in the pericardium and pericardial pressure was observed. (Fig 1a) Nine participants (3 attendings, 3 residents, and 3 medical students) performed pericardiocentesis using the model with a success rate of 88.9% after 3 attempts. Feedback was provided by retrieval of colored fluid and measurable changes in mean arterial pressure (Fig 1b).

Conclusions- This large animal model of pericardiocentesis serves as another avenue to practice this invasive procedure in conjunction with large animal trauma labs. This model also allows for the practice of both ultrasound diagnosis of cardiac tamponade as well as surgical release of cardiac tamponade through an "ED thoracotomy" in a realistic manner.





(PI / TC Signature)



(Date)

Attachments:

Attachment 1: Defense Technical Information Center (DTIC) Abstract Submission (Mandatory)

Introduction- Pericardiocentesis is a lifesaving skill providers should know how to perform. Though cadaveric, mannequin, and inanimate models of pericardiocentesis have been developed, many lack in vivo anatomic relationships and the hemodynamic feedback associated with successful pericardiocentesis.

Methods- A large animal model of cardiac tamponade was created in 5 Yorkshire-cross swine. The pericardium was accessed through an anterolateral thoracotomy and a 14F pigtail catheter was placed into the pericardium using Seldinger technique. Colored saline was then instilled into the pericardium while hemodynamics were monitored. Cardiac tamponade was defined as 25% decrease in systolic blood pressure. A cohort of participants then practiced ultrasound assisted sub-xiphoid pericardiocentesis using the model.

Results- Cardiac tamponade was achieved after instillation of an average of 204 (range 100- 340 cc, SD 99 cc). A direct relationship between volume in the pericardium and pericardial pressure was observed. Nine participants performed pericardiocentesis using the model with a success rate of 88.9% after 3 attempts. Feedback was provided by retrieval of colored fluid and measurable changes in mean arterial pressure.

Conclusions- This large animal model of pericardiocentesis serves as another avenue to practice this invasive procedure in conjunction with large animal trauma labs. This model also allows for the practice of both ultrasound diagnosis of cardiac tamponade as well as surgical release of cardiac tamponade through an “ED thoracotomy” in a realistic manner.