

Proceedings

3 JOINT INTERNATIONAL MEETINGS 2014

**THE 14TH ANNUAL WORKSHOP OF THE REGIONAL NETWORK ON
ASIAN SCHISTOSOMIASIS AND OTHER HELMINTH ZONOSIS**

**THE 5TH ANNUAL MEETING OF SOUTH EAST ASIA
VETERINARY SCHOOL ASSOCIATION**

**THE 3RD SCIENTIFIC MEETING OF INDONESIAN
VETERINARY SCHOOL ASSOCIATION**

**IPB International Convention Center, Bogor, Indonesia
13-15 October 2014**



ISBN: 978-602-95733-3-6

PROCEEDINGS

THE 3 JOINT INTERNATIONAL MEETINGS 2014

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THE REGIONAL NETWORK ON ASIAN SCHISTOSOMIASIS AND OTHER HELMINTH
ZOOZONOSIS (RNAS+)

THE 5TH ANNUAL MEETING OF
SOUTH EAST ASIA VETERINARY SCHOOL ASSOCIATION (SEAVSA)

THE 3RD SCIENTIFIC MEETING OF
INDONESIAN VETERINARY SCHOOL ASSOCIATION (AFKHI)

IPB International Convention Center, Bogor, Indonesia
13-15 October 2014

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Proceedings
The 3 Joint International Meeting 2014

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Editors : NWK Karja, IKM Adnyane
Layout : K Mohamad, MF Ulum
Cover : *Design* MF Ulum | *Photo* K Mohamad

Publisher :
Faculty of Veterinary Medicine, Bogor Agricultural University (IPB)
Jl. Agatis Kampus IPB Dramaga, Bogor 16680, INDONESIA

Phone/Fax +62-251-8629459, e-mail fkhipb@ipb.ac.id

ISBN: 978-602-95733-3-6

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P-08

Echocardiography Evaluation in Piglet (*Sus scrofa*) during Recruitment Maneuver on Pediatric Acute Lung Injury Model

Gunanti^{1*}, Siti Khaerotun Nufus¹, Riki Siswandi¹, Ririe Fachrina Malisle², Antonius Pudjiadi³

¹Department of Clinic, Reproduction, and Pathology, Faculty of Veterinary Medicine, Bogor Agricultural University (IPB), Jl. Agatis Kampus IPB Dramaga, Bogor 16680, INDONESIA

²Faculty of Medicine, University of Riau, Pekanbaru, INDONESIA

³Faculty of Medicine, University of Indonesia, Jakarta, INDONESIA

*Corresponding author: vetsurgeon38@gmail.com

Key words: ALI, echocardiography, recruitment maneuver, piglet

INTRODUCTION

Acute lung injury (ALI) is the acute onset of bilateral infiltrate on chest radiograph without evidence of left atrial hypertension and with a partial pressure of oxygen (PaO_2) / fraction of inspired oxygen (FiO_2) ratio of less than 300 [1]. ALI characterized by destruction of alveolar-capillary integrity with manifestations of increased capillary permeability, non-hydrostatic pulmonary edema, alveolar collapse, decreased lung compliance, and ventilation - perfusion mismatch as the main cause of hypoxemia [2]. An ALI patient usually manages by mechanical ventilation but improper use can worsen occurred lung injury, especially in children. Recent can be handled by recruitment maneuvers.

The effectiveness of the mechanical ventilation is measured by cardiac output (CO) of the left heart ventricle for supplying oxygen to the body [3]. Therefore, evaluation of echocardiography is necessary. This study use piglets (*Sus scrofa*) as an animal model due to its similar anatomical and physiological structure to human.

MATERIALS AND METHODS

Ethical clearance was approved by the IPB ACUC with number 03-2013 IPB. Eight piglets 1-3 months in age with 5-8 kgs body weight were divided into two groups. The first group received recruitment maneuver without chest bandaging (B_{TB}) and the second group with chest bandaging (B_B). Both of groups get the same treatment like anesthesia, intubation, lung lavage, installation of mechanical ventilation, and recruitment maneuvers. Recruitment maneuver was performed after induced ALI by lavaging warm Saline 0.9% into lung parenchymal. Chest bandaging is a model of diaphragm that has not been fully developed in infants. Echocardiography examination was performed using echocardiography equipment (Sonosite®, M-Turbo) with microconvex transducers. Echocardiography was performed by measuring the M-mode image on the right parasternal short axis view on papillary muscle level. Samples were taken at an early stage (screening) were used as the normal value and at post-recruitment.

RESULTS AND DISCUSSION

Echocardiography evaluation resulted worse in the group with chest bandaging (B_B), characterized by significant ($p < 0.05$) decreased of heart rate (HR) and Cardiac Output (CO). Heart rate was decreased significantly ($p < 0.05$) in B_B due to worse mismatch of perfusion and ventilation. It supported by the results of research that chest bandaging group had worse figures on the increase in the value of carbon dioxide pressure (PaCO_2), decrease in pH value and oxygen pressure (PaO_2) in arterial blood due to worse ventilation and perfusion [4]. This condition will stimulate the chemoreceptors in the aortic and carotid sinus so that the heart will respond by decreasing HR which is the primary reflex of the heart. Next, the body will compensate by secondary reflex that will transfer impulses to the vasomotor center to increase the work of breathing and simultaneously increasing HR [5]. However, this secondary reflex will be inhibited by the action of anesthesia so that the body cannot compensate. Anesthetic used was propofol and fentanyl; both

anesthetics can cause a decrease in HR [6]. Therefore, a significant decrease in HR ($p < 0.05$) and decreased of SV can cause a significant disturbance in the group with chest bandaging (B_B) because CO is the multiple of these two value.

Echocardiography evaluation during recruitment maneuvers on pediatric ALI model describes the preload decreased due to increased intrathoracic pressure. Intrathoracic pressure will decrease and transmitted to the walls of the large vein that will affect venous return from the periphery to the heart. This situation will decrease central venous pressure (CVP) so that the central venous volume increase, stroke volume (SV) increased followed by increasing in CO [7].

The preload decreased characterized by increasing interventricular septum value (IVS) and left ventricular posterior wall (LVPW), decrease of left ventricular diameter (LVD), end-diastolic volume (EDV), SV, and CO. In accordance with Starling's law that the heart will have large output if the heart is filled with larger volume at end diastole [3].

CONCLUSION

The results of this study showed preload decreased in left ventricular after recruitment maneuver. The evaluation results of echocardiography had worse at B_B group. B_B group had significant differences ($p < 0.05$) to HR and CO. Hence, recruitment maneuver had worse effect to the ALI pediatrics with diaphragm that has not been fully developed

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