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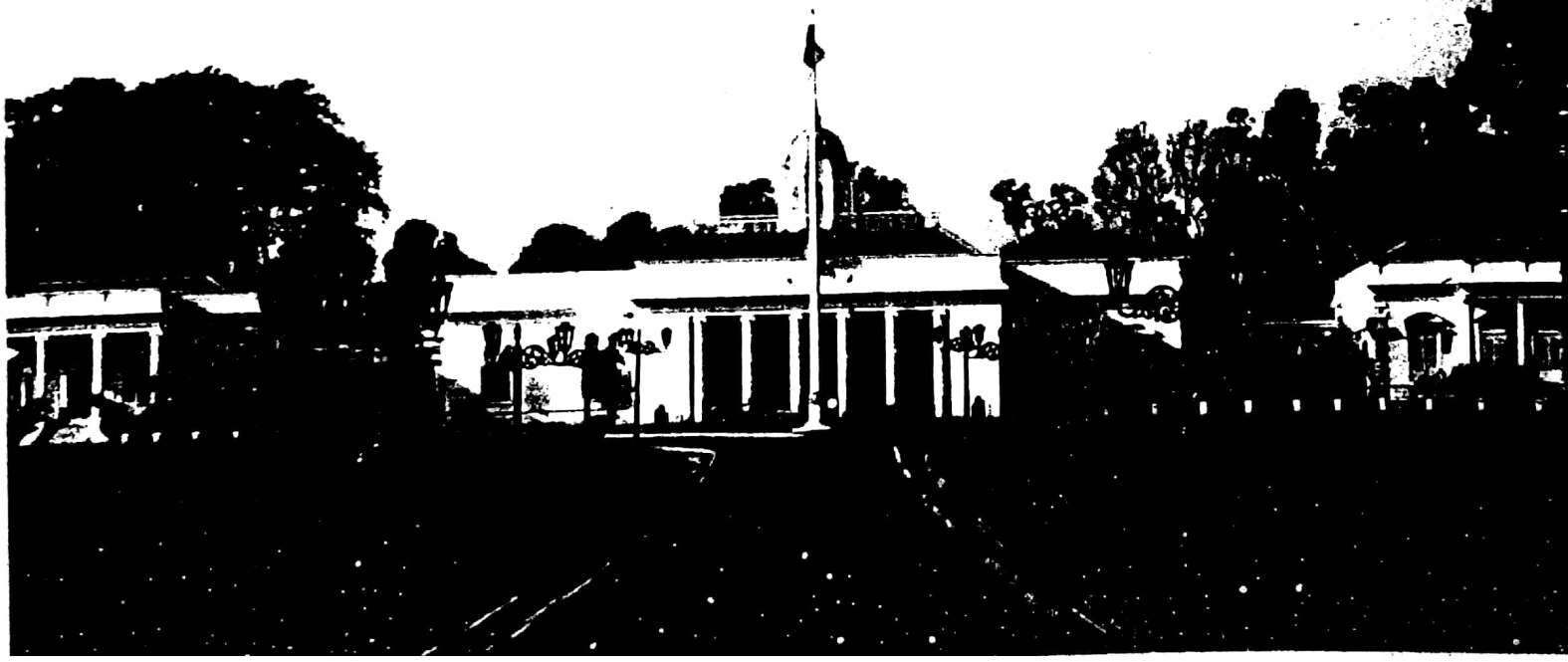
THE 14TH ANNUAL WORKSHOP OF THE REGIONAL NETWORK ON ASIAN SCHISTOSOMIASIS AND OTHER HELMINTH ZOONOSIS

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



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Electrocardiogram Analysis of Blood Autotransfusion on Local Indonesian Pig (*Sus domestica*) as Human Model

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Key words: abdominal trauma, autotransfusion, cell saver, electrocardiogram, pig

INTRODUCTION

Since the occurrence of HIV infection in homologous transfusion in several cities in the United States, the use of homologous transfusion was replaced with autologous transfusions to reduce the risk factors for transmission of infection between individuals [1]. Based on research of Henry *et al.* [2], the use of autologous blood may reduce the risk of up to 43.8% of allogeneic transfusion. This causes the number of patients who experienced transfusion with homologous blood transfusion decreased whereas with autologous blood increased significantly [3].

Autolog blood transfusion or renown by autotransfusion is transfusing blood from and to particular individual [4]. Autotransfusion could be performed several days before transfusion (preoperative), intraoperative, and post operative. Preoperative autotransfusion (PA) collects blood several weeks before transfusion. Simple intraoperative autotransfusion (SIA) is managed by collecting extravasated blood during surgery and returning the blood after filtration. Autotransfusion is widely enhanced for treating major trauma or high blood loss possibility during giving birth. This methode provide simplicity in preparation, utilization, and overcoming difficulties in obtaining donor blood. The most advance method is autotransfusion by cell saver (CS) apparatus where the extravasated cell blood is filtered, washed, sterilized and rejuvinated additional fluid for transfusion.

Due to the limited distribution of blood in Indonesia, we proposed simple intraoperative autotransfusion as alternative protocol. We conducted study in pigs as animal model for autotransfusion protocol. We focused our study in evaluating electrocardiography activity.

METHODS

Nine local pig with body weight 18 - 25 kgs were distributed into three groups of treatment. The AP group blood were collected 14 days before and preserved in the CPDA (Citrate, Phosphate, Dextrose, and Adenine) blood bag and kept in the refrigerator. In the SIA and CS protocol, blood was collected from extravasated spleenectomy to mimic abdominal trauma. Transfusion of bloods were conducted after confirmed 30 % blood loss from splenectomy. All invasive protocol were performed under anesthesia of Ketamine and Xylazine combination

Electrocardiography evaluation were performed four times which were before blood loss, after transfused blood, second day after transfusion, and day seventh post transfusion. Every ECG sampling was performed under anesthesia.

RESULTS AND DISCUSSION

There were no significant differences between group in the P wave, PR Interval, R wave, QT Interval, and T wave. However there were significant increased in the QT interval after transfusion in CS group (Table 1).

Increase in QT interval happens in electrolyte imbalance such as hypocalcemia due to acid base disorder and hypoalbuminemia. Hypoalbuminemia could be resulted from excessive bleeding.

When bleeding occurred, whole blood loss including calcium contained plasma. Most of calcium inside the body are bond with skeletal system or ligated with plasma albumin. In the cell saver autotransfusion group, erythrocyte were filtered, washed, and returned to the body without addition of plasma. Therefore in we found increased in QT interval compared with other group.

Table 1. Interval QT average (seconds)

Time of Observation	Treatment Protocol		
	PA	SIA	CS
Pretreatment	0,41 ± 0,06^{ax}	0,33 ± 0,06^{ax}	0,37 ± 0,04^{abx}
Post transfusion	0,46 ± 0,14^{ax}	0,39 ± 0,05^{ax}	0,43 ± 0,06^{bcdx}
Day 2	0,46 ± 0,21^{ax}	0,35 ± 0,13^{ax}	0,32 ± 0,03^{ax}
Day 7	0,33 ± 0,07^{ax}	0,34 ± 0,04^{ax}	0,34 ± 0,03^{ax}

Different superscript (a, b, c) letters in the same column indicate significant differences (P<0.05) within the group. Different superscript (x, y, z) letters in the same line indicate significant differences (P<0.05) between the group.

Table 2. T amplitudo average (seconds)

Time of Observation	Treatment Protocol		
	PA	SIA	CS
Pre Treatment	0.23 ± 0.05^{ax}	0.29 ± 0.27^{ax}	0.29 ± 0.20^{ax}
Post Transfusion	0.32 ± 0.16^{ax}	0.38 ± 0.41^{ax}	0.30 ± 0.17^{ax}
Day 2	0.37 ± 0.24^{ax}	0.40 ± 0.28^{ax}	0.17 ± 0.07^{ax}
Day 7	0.30 ± 0.21^{ax}	0.58 ± 0.46^{ax}	0.13 ± 0.04^{ax}

Different superscript (a, b, c) letters in the same column indicate significant differences (P<0.05) within the group. Different superscript (x, y, z) letters in the same line indicate significant differences (P<0.05) between the group.

There were increasing tendencies in T amplitudo on all groups after transfusion. Increasing T amplitudo often resulted from hyperkalemia and miocardial hypoxia [5]. Increasing T amplitudo in this research was possibly resulted from induced abdominal trauma and hemolysis of extravasated blood. Booth of these condition lead to released excessive Kalium from destroyed cells. Higher increase was found in SIA group. This is due to higher erythrocyte damage from collecting and filtering process before transfusion.

CONCLUSION

In general, all protocol of autotransfusion described above did not impair electrical conductivity in the heart. All of the differences that occur in the treatment showed no significant disruption in the heart's electrical conductivity if anticipated. We suggest conducting further research in larger number of sample and different animal model before extrapolation to human.

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