

CHAPTER I INTRODUCTION

1.1 Background of Research

The Fogarty balloon catheter is usually used on embolectomy surgery which aims to removing material that blocks blood flow (Fischer *et al.*, 2007). This instrument has simplified, increased the effectiveness, and reduced the risk of arterial embolectomy or thrombectomy (Ascher, 2012). In the veterinary, the use of this instrument is considered as treatment in pulmonary thromboembolism (PTE) in cats and dogs. The risk-associated with embolectomy procedure however, is high without substantial experience and multidisciplinary approaches (Weisse and Berent, 2015). Clinical experience demonstrates the use of a balloon catheter embolectomy is safe and effective, but also lead to various complications such as intimal hyperplasia, endothelium denudation, and thrombus formation (Yamashita and Asada, 2011; Colman, 2006).

Endothelial denudation cause infiltration of plasma molecules, lipoprotein particles, and leukocytes especially monocytes, to the bottom of subendothelial tissue. These monocytes differentiate into macrophages and start to ingest oxidized low density lipoprotein (ox-LDL) by specific receptors on surface of macrophage called scavenger receptor, which results in foam cell (Schrijvers *et al.*, 2007; Baraas, 2006; Falk, 2006).

Foam cell is the lesion found in the early stage of atherosclerosis. In other words, the presence of foam cells in artery's wall is an early indication for the occurrence of atherosclerosis events (Moore and Freeman, 2006). Atherosclerosis

remains the most common cause of death and morbidity worldwide (Watanabe *et al.*, 2013). Incidence of atherosclerosis can not be separated from the formation of plaque consisting of foam cells and smooth muscle cells (Yuan *et al.*, 2012). Inhibition in foam cell formation means also inhibits the development of atherosclerosis (Hristina *et al.*, 2014). Foam cell can be assessed using simple method, through observation of histopathology with hematoxylin eosin staining (Nugroho, 2005). This research used New Zealand White rabbit (*Oryctolagus cuniculus*) as the experimental model because rabbits are good as animal models for the principles of physiology and surgical on mammals (Kusumawati, 2004).

L-Arginine is a conditionally essential amino acid in human diet that act as precursor of nitric oxide (Nascimento *et al.*, 2014). Nitric oxide is produced endogenously through the action of nitric oxide synthases (NOS) from the substrate L-Arginine (Lei *et al.*, 2013). Nitric oxide was described initially as a vasodilatory chemokine, it plays a major role in vascular biology in terms of anti-thrombotic, anti-inflammatory, antiproliferative and antioxidative effects. Nitric oxide inhibits proliferation and migration of smooth muscle cell (SMC), enhances migration of endothelial cells and inhibits apoptosis, suppresses platelet aggregation, and inhibits platelet, and monocyte adhesion to the endothelium (Lei *et al.*, 2013).

Based on the background above the research untitled the effect of L-Arginine on decreasing of foam cell development at post surgical embolectomy with Fogarty balloon catheter on iliac arteries of rabbit has been conducted.

1.2 Identification of Problems

Does L-Arginine affecting on the decreasing of amount of foam cell at post surgical embolectomy with Fogarty balloon catheter on iliac arteries of rabbit?

1.3 Theoretical Base

Vascular injury caused by Fogarty balloon catheter increase the expression of VCAM-1 (Eto *et al.*, 2005). Vascular cell adhesion molecule-1 (VCAM-1), promotes the adherence and migration of monocytes in and into the artery wall, which is then transformed into macrophages (Singh *et al.*, 2005; Charo and Taubman, 2004). In the artery wall, macrophages start to ingest oxidized low density lipoprotein (ox-LDL) which results in foam cell (Schrijvers *et al.*, 2007).

L-Arginine is a conditionally essential amino acid in human diet that act as precursor of nitric oxide (NO) (Nascimento *et al.*, 2014; Rochette *et al.*, 2013). On the previous study, NO has shown to decrease foam cell formation (Lei *et al.*, 2013; Hristina *et al.*, 2014). The mechanism of NO decreases foam cell is already demonstrated before that NO donors suppressed the expression of vascular cell adhesion molecule-1 (VCAM-1) (Delatorre *et al.*, 1999). Study by Liao (2013) afterward, show that NO prevented endothelial cell produce VCAM-1.

1.4 The Aim of Research

The aim of this study is to prove the effect of L-Arginine on the decreasing of amount of foam cell at post surgical embolectomy with Fogarty balloon

catheter on iliac arteries of rabbit through histopathology assessment with hematoxylin eosin staining.

1.5 Outcomes of The Research

The outcomes of this research are:

1. To provide knowledge and information about the potency of L-Arginine on the decreasing of amount of foam cell at post surgical embolectomy with Fogarty balloon catheter on iliac arteries of rabbit.
2. To provide knowledge and information about the use of Fogarty balloon catheter as a treatment of thromboembolism cases in the veterinary world in Indonesia in the future.

1.6 Hypothesis

L-Arginine affecting on the decreasing of amount of foam cell at post surgical embolectomy with Fogarty balloon catheter on iliac arteries of rabbit.