CHAPTER 1

INTRODUCTION

1.1 OBJECTIVES

There are two objectives in this research. Firstly is to investigate the flow behavior inside aneurismal region after double layer stents is applied to the disease region. The other objective is to determine the effect of double layer stent blood flow parameter.

1.2 SCOPES

In this research, there are four scopes. Firstly, non pulsatile blood flow will be used. Then, all the solution will be base on the numerical approach only. Next, analyze selected stents will be base upon different structural pattern and lastly the application of stent will be on fixed aneurysms.

1.3 STENT

A stent can be defined as a medical device that supports tissue. Mostly a stent refers to a specific medical device that is placed into an artery. An arterial stent is a mesh-like tube, often made of metal that can expand once it is inserted into an artery. The most frequent placement of stents is in coronary arteries, which are typically blocked by plaque built up inside. A stent is inserted into an artery during angioplasty and typically inflated with a balloon catheter.
The procedure begins at either the femoral artery in the groin, or the axillaries artery in the armpit and the stent is guided to the proper artery. The stent will acts as a kind of scaffolding for the artery during any surgical repair or procedure. Usually, the stent is left in the artery permanently. The stent will supports the narrowed or blocked artery, keeping it open for blood to flow more freely.

Stents can be divided into two basic categories which are balloon-expandable and self-expanding stents. Balloon-expandable stents have greater hoop strength, resulting in more resistance to elastic recoil after full expansion. They also deploy more precisely than self-expanding stents. Compared to balloon-expandable stent, self-expanding stents have greater longitudinal flexibility to maximize ease of delivery into tortuous vessels. They also recover from deformation secondary to extension and crushing forces, and are available in longer treatment lengths.

Stents can also be characterized by their metallic composition. The stents most commonly used today are constructed of stainless steel or thermomodulated nitinol. Bioabsorbable magnesium stents are currently in experimental trials. Bioabsorbable stents have the theoretical advantage of removing the long-term stimulus for neointimal hyperplasia from the vessel wall.

Mark D. Morasch has stated that stents can also be coated, drug-eluting, or covered with a graft material. Coated stents aim to decrease the likelihood of early thrombosis and to mitigate the longer-term risk of developing neointimal hyperplasia by coating the reactive metal surface with a nonreactive substance, such as carbon. Drug-eluting stents will release the pharmacologically active substances over a relatively short time period. This substance thought to modulate the neointimal response and to reduce hyperplasia and in-stent restenosis. Stents can be manufactured with either a Dacron (polyester) or an expanded polytetrafluoroethylene covering. This is called as stent-grafts were initially used to treat aneurysmal disease. To decreasing the frequency of in-stent restenosis, these covered stents is being used the increasing of frequency to treat long-segment occlusive disease.
**Figure 1.1:** Drug-Eluting Stent

Source: http://www.medicineworld.org

**Figure 1.2:** Graft Stent

Source: http://www.angiocardio.com