

# Thread Spiral Stent for vascular anastomosis (Lasheen Vascular Stent)

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**Received:** June 11, 2019; **Accepted:** July 03, 2019; **Published:** September 10, 2019

## Abstract

**Background:** Successful of organ transplantation and many reconstructive procedures depends on successful of vascular anastomosis technique. Still arterial anastomosis was do by sutured technique which affected by surgeon experiences and take more time(time consuming). In this study, Lasheen vascular stent used in vascular anastomosis trying to make it quick, easy, and with good results. **Methods:** Seven dogs included in this study, the femoral artery exposed and cut. Then, anastomosis do by using spiral stent inside both femoral ends and sutured technique. After anastomosis complete the stent removed by applied traction on the thread end of stent from skin. With traction the stent changed to thread and come out of body without any trauma of suture line or vessel wall(closed removable). During anastomosis maintains on blood flow through the spiral stent. All dogs received broad spectrum antibiotics and antiplatelet aggregation dose of aspirin for one week. Follow up period was 3 months. The blood flow was assessed clinically by palpitation, limb viability, and duplex scanning if needed. **Results:** The mean time to complete one anastomosis with spiral stent was 30 minutes. The blood flow re-established through artery after putting the stent in its right position within 5 minutes. No leakage or hematoma were noticed after removal of stent. The patency of all anastomosis and viability of all dog limbs are good during follow up period. **Conclusion:** Vascular anastomosis with using spiral thread stent is less time consuming, maintaining on blood flow during anastomotic technique, has short learning curve, and associated with good results.

**Keywords:** Thread, Spiral, Lasheen vascular stent.

## INTRODUCTION

Vascular anastomosis is common and important part in tissue transplantation and many reconstructive procedures. Many causes can lead to failure of vascular anastomosis as intima lacerations, vessels distortion, and unsuitable sutures [1-4]. Time which needed to finish of vascular anastomosis and re-established blood flow is very important because during it tissue exposure to more ischemia and may be leading to tissue death. The characters of ideal procedure for vascular anastomosis must be rapid (less time consuming) or maintaining blood flow during it, easy (has short learning curve), and producing good vessels patency immediately and later on [5,6].

This study offers Lasheen vascular stent which achieved this goal for vascular anastomosis.

## METHOD

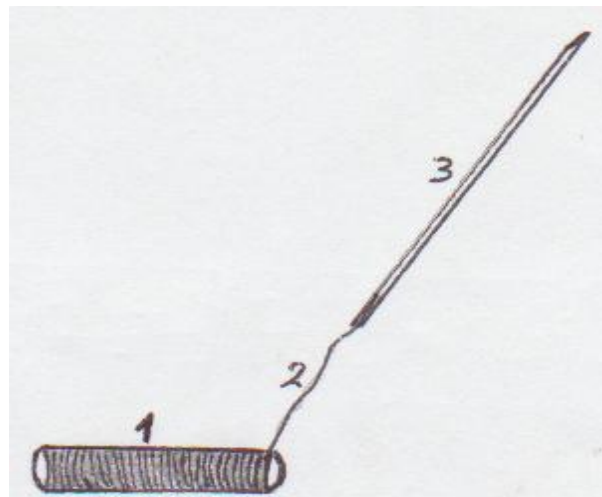
This study idea was approved from Ethical Committee of Zagazig University, Egypt at December 2018. Spiral thread vascular stent (Lasheen vascular stent) was prepared for this study by corresponding author. The stent was formed from nylon or Prolene No. 0, twisted in multiple equal circles to form tube (spiral) and these circles adherent to each other by fibrin glue. One stent end is threading its length about 10 cm and fixed inside fine long needle (metal part of spinal needle No. 20) figure 1. The stent is present in different size. Seven Egyptian native dogs were involved in this study and their weight ranged from 10 to 15 kg. Anecubital vein of each dog was cannulated, sodium pentothal injected, then intubated and anesthetized with 2% isoflurane in oxygen. The medial thigh and groin were shaved and prepared with povidone iodine. Tourniquet was applied on the thigh proximal to site of femoral artery exposure. The suitable spiral thread stent for femoral artery caliber was

prepared. The needle with thread end of stent passed through one femoral artery end lumen, then pierced the vessel wall and tissue to bring thread end on skin of thigh. The stent adjusted at the site of anastomosis, where both femoral arteries ends over the stent without any space between stent and femoral artery wall. Then, removed tourniquet to maintain blood flow through stent for dog limb. The anastomosis was completed by sutured technique using Prolene No. 5/0 with fibrin glue. After finishing of anastomosis, the stent was removed by applied fine traction on thread from outside. This traction will change the stent thread and come out from femoral artery and body figure 2 a-f. The patency of vascular anastomosis was checked and wound closed in layers. Broad spectrum antibiotics and antiplatelets aggregation dose of aspirin were given for all dogs for one week. The vascular

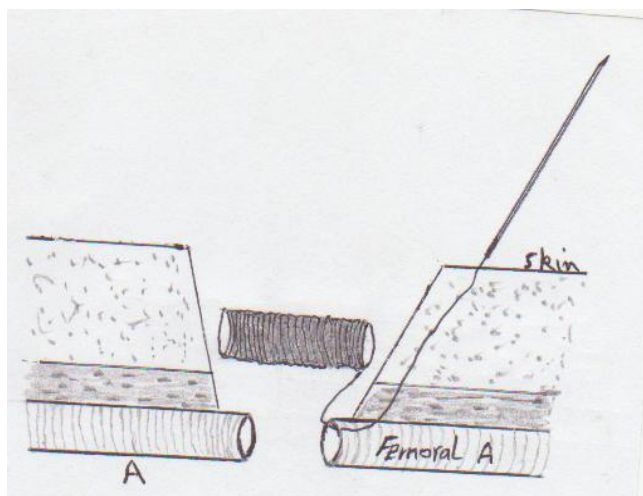
anastomosis patency was assessed in all dogs clinically by palpation, viability of dog limb, and duplex scanning if needed. Follow up period was 3 months (every day for first week, every week for next 3 weeks, every two weeks for next two months).

## RESULTS

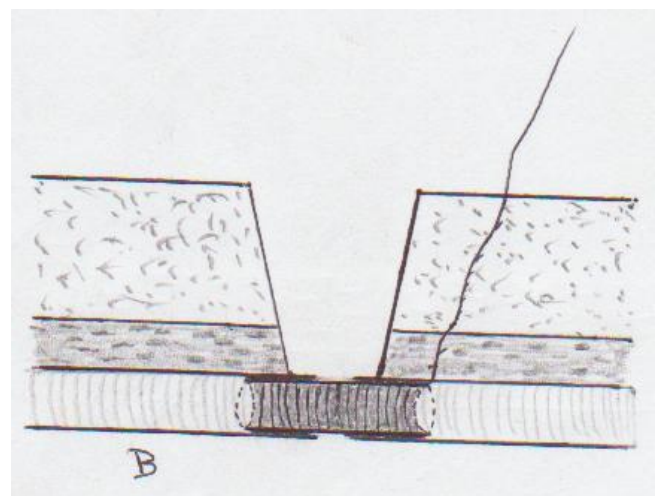
The mean time to put stent in right position and re-established blood flow for limb was 5 minutes. The mean time to finish of femoral artery anastomosis over stent was 30 minutes. No blood leakage occurred during or after anastomosis technique. All anastomosis was clearly patent after procedure and during period of follow up. No any difficulty was noticed during closed removal of stent.



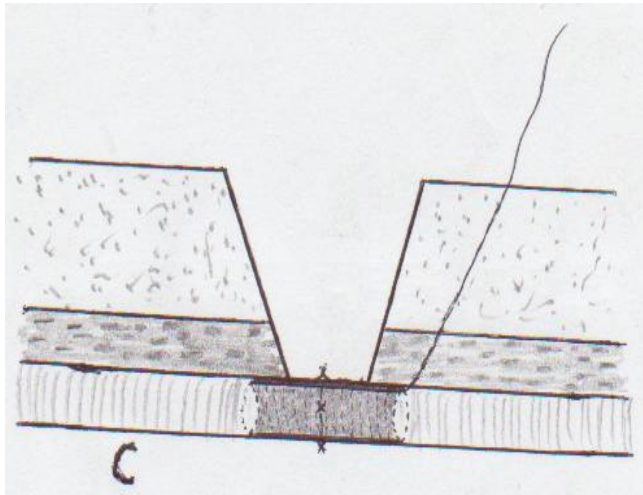
**Figure 1:** Thread spiral vascular stent. (1) spiral tube part formed of nylon or porolene No. 0 in multiple circles adherent together by fibrin glue its length about 2 cm. (2) thread end of stent about 10 cm in length. (3) long fine needle.



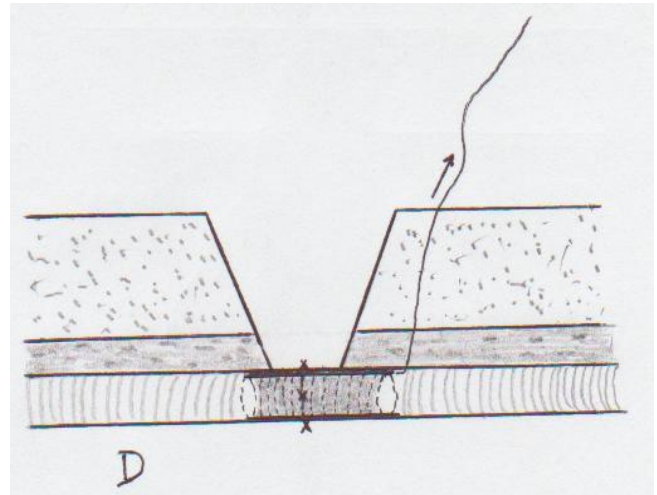
**Figure 2A:** The femoral artery exposed and cut. Then, the needle with thread stent end was passed from one artery end to pierce the femoral artery wall and tissue to bring thread from the skin.



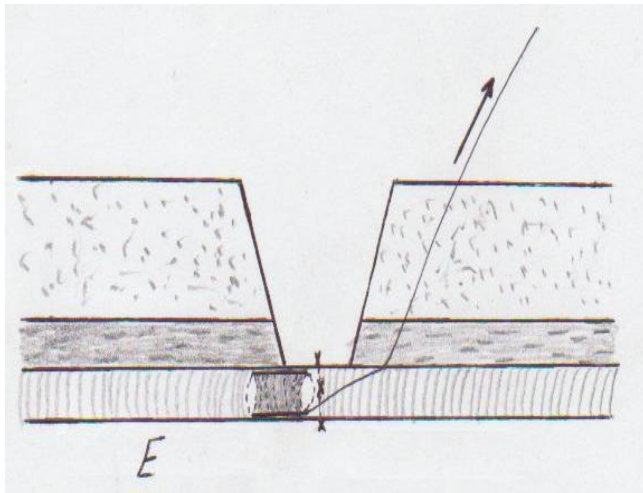
**Figure 2B:** The stent was put in right position to connect the two femoral artery ends without any space between artery wall and stent. Then, the blood flow was allowed to pass through the stent to supply the limb.



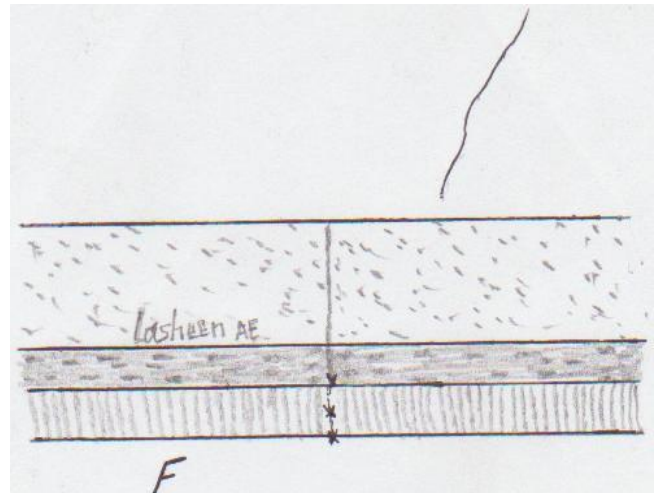
**Figure 2C:** The anastomosis of both femoral ends completed by using 5/0 prolene and fibrin glue over spiral stent.



**Figure 2D:** Stent removal starts by applied fine traction on thread from outside the skin, which make the stent changed to thread and come out of skin step by step.



**Figure 2E:** Continuous application of traction on thread from outside the skin and stent changed to more thread, come out.



**Figure 2F:** The stent changed completely to thread and come out the body through tissue and skin. Then the vessel patency was assessed and wound closed in layers.

## DISCUSSION

For important of vascular anastomosis in many reconstructive procedures and organ or transplantation, many researches were done to improve technique and outcome results. The advance in vascular anastomosis techniques related to new devices as clips and magnetic or new substances glue and gel [7-9]. While can be used devices in venous anastomosis, still the sutured technique is the first in arterial anastomosis especially small vessels [10]. Laser assisted vascular anastomosis is largely confirmed to experimental studies [11]. Many reports about used of stents in vascular anastomosis. The stents divided for two types, first which is used during anastomosis technique and removed before closure of anastomotic line or dissolve spontaneously after finishing directly. This type using may be leading trauma for artery wall

or obstruction of vessel by stent remnants [12,13]. Second type, which left in its position after finishing of anastomosis procedure for some time (days) to dissolve spontaneously or permanent present, this may be complicated by thrombosis formation or tissue over growth or vessel obstruction by stent remnants [14,15]. With using of Lasheen vascular stent the blood flow is re-established within 5 minutes (once the stent put in right position), no more tissue ischemia. Our stent was removed after finishing of anastomosis without more trauma for vessel wall or anastomosis line (closed removable), and without left any stent remnants.

## CONCLUSION

Vascular anastomosis with Lasheen vascular stent is quick, easy, has short learning curve, and associated with good results on short and long-term time.

**Funding:** None

**Conflicts of interest:** Conflicts of interest: None declared

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