

**MANAGEMENT OF PSEUDOANEURYSM ON ARTERIOVENOUS FISTULA:  
SERIAL CASES FROM WEST JAVA**

Prasetyo Edi <sup>1)</sup>, Raditya Utomo <sup>2)</sup>

**ABSTRACT**

**Background:** Pseudoaneurism is one of the many complications of dangerous AV shunt procedure. Their diagnosis and surgical treatment are important, because they can cause severe disability, including loss of upper extremity and hand. The usual techniques of pseudoaneurysm has 2 types, Ligation and patch with Fogarty thromboembolectomy. **Objective:** Here we reported 3 case of ruptured anastomotic and ruptured vein pseudoaneurysm of brachiocephalic arteriovenous fistula which has undergone surgical procedure. **Methods:** First case, a 29-years-old man presented with swelling and extreme pain in his right arm since 3 days ago. He had undergone AVF procedure 3 weeks ago. His right arm was accidentally squeezed by his mother 1 week after the surgery had been done. Second case, a 55-years-old patient presented with swelling, boils, and extreme pain in her left arm since 3 months ago. The patient's family said that the patient was often stabbed during multiple times of hemodialysis in the same place. Third case, a 65-year-old male patient, The patient fell from the motor 3 days ago, his right hand hit the motorcycle handlebar. The patient's AV fistula ruptured, was then taken to the hospital, the nurse dressing the wound, then planned for surgery. **Results:** Patient's postoperative course went well and there was no sign of complication, such as ischemia. Arm swelling were reduced after 2 weeks follow up. **Conclusion:** The management of pseudoaneurysm can be done with different surgical methods depending on the cause and condition of the blood vessels. The management of pseudoaneurysm is not intended to save AVF but to save the patient from limb salvation and amputation.

**Keyword:** Pseudoaneurism, Arteriovenous Fistula, AVF, AV Shunt

**ABSTRAK**

**Latar Belakang:** Pseudoaneurisma adalah salah satu dari banyak komplikasi prosedur AV shunt yang berbahaya. Diagnosis dan tindakan bedah bedah merupakan hal yang penting, karena pseudoaneurisma dapat menyebabkan kecacatan yang parah, termasuk kehilangan ekstremitas atas dan tangan. Teknik pseudoaneurysm yang biasa dilakukan ada 2 jenis yaitu ligasi dan patch dengan tromboembolektomi Fogarty. **Tujuan:** Kami melaporkan 3 kasus

ruptur anastomosis dan pseudoaneurisma yang disebabkan oleh vena yang pecah dari arteriovenosa fistula brakiosefalika yang menjalani prosedur pembedahan. **Metode:** Kasus pertama, seorang pria 29 tahun mengalami pembengkakan dan rasa sakit yang luar biasa di lengan kanannya sejak 3 hari yang lalu. Dia telah menjalani prosedur AVF 3 minggu lalu. Lengan kanannya secara tidak sengaja tertekan oleh ibunya 1 minggu setelah operasi dilakukan. Kasus kedua, pasien berusia 55 tahun datang dengan pembengkakan, bisul, dan rasa sakit yang luar biasa di lengan kirinya sejak 3 bulan lalu. Keluarga pasien mengatakan bahwa pasien sering ditusuk selama beberapa kali untuk prosedur hemodialisis di tempat yang sama. Kasus ketiga, pasien pria 65 tahun, pasien terjatuh dari motor 3 hari yang lalu, tangan kanannya membentur stang motor. AV Fistula pasien pecah, kemudian dibawa ke rumah sakit, perawat membalut lukanya, kemudian direncanakan untuk operasi. **Hasil:** Hasil tindakan setelah operasi baik dan tidak ada tanda-tanda komplikasi, seperti iskemia. Pembengkakan lengan berkurang setelah 2 minggu. **Kesimpulan:** Penatalaksanaan pseudoaneurysm dapat dilakukan dengan metode pembedahan yang berbeda tergantung penyebab dan kondisi pembuluh darah. Penatalaksanaan pseudoaneurisma tidak dimaksudkan untuk menyelamatkan AVF tetapi untuk menyelamatkan pasien dari kecacatan anggota tubuh dan amputasi.

**Kata Kunci:** Pseudoaneurisma, Arteriovenous Fistula, AVF, AV Shunt

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1) Division of Cardio-Thoracic and Vascular Surgery, Sentra Medika Hospital Cisalak, Raya Mayor Oking Jaya Atmaja Street No.9, Cibinong, Bogor, West Java 16917, Indonesia. Email: radityoutomo@gmail.com 2) General Practitioner, Sentra Medika Hospital Cisalak, Raya Mayor Oking Jaya Atmaja Street No.9, Cibinong, Bogor, West Java 16917, Indonesia. Email: prasmedic@gmail.com

## INTRODUCTION

Pseudoaneurism is one of the many complications of dangerous AV shunt procedure. Pseudoaneurysm in AVF can be caused by a variety of things, some of which are trauma and infection. Surgical diagnosis and treatment must be done immediately because pseudoaneurysm was emergency condition. It can makes thromboembolic complications in the hands and fingers.<sup>1,2</sup> The usual techniques are types, namely ligation and patch with

fogarty arterial embolectomy.<sup>3</sup> In other journals there is also a mention that pseudoaneurysm can be managed with patch plasty, subtotal excision, oversewing graft, and bypass.<sup>4</sup> Management can be determined by considering the cause of pseudoaneurism and the condition of damaged blood vessels. Here we reported 2 cases of ruptured anastomotic pseudoaneurysm of brachiocephalic arteriovenous fistula which has undergone surgical procedures, in the Sentra Medika

Hospital of Cisalak, West Java, on June 29, 2020 and July 13, 2020.

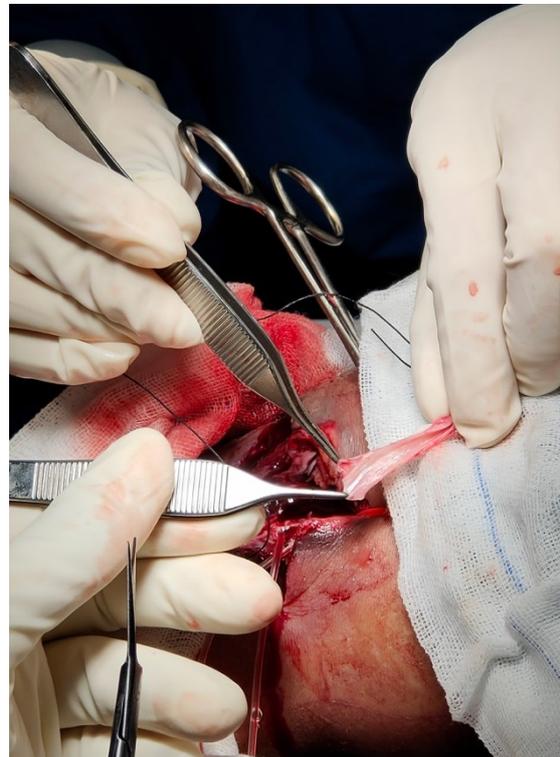
### CASE REPORT

In the first case, a 29-year-old man complained of extreme swelling and pain in his right arm since 3 days ago (Figure 1). He had undergone the AVF procedure 3 weeks ago. Accidentally, her mother squeezed her right arm 1 week after getting the AVF procedure. On a through physical examination, the patient is diagnosed with ruptured anastomotic pseudoaneurysm of brachiocephalic arteriovenous fistula. Then surgery is performed using general

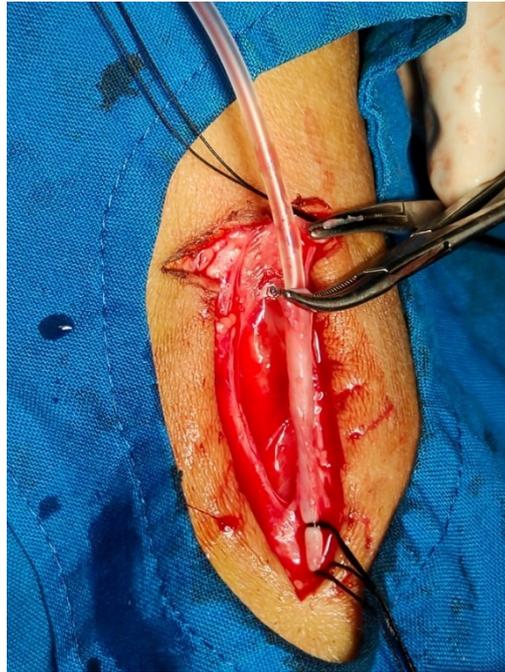
anesthesia. During the operation an infected anastomosis was found, and the blood vessels became fragile. Irregularly shaped ruptured veins were also found, so that the AV shunt anastomosis could not be saved. The brachial artery also partially ruptures but can still be saved (Figure 2). Thus, to repair the brachial artery, we chose to perform the Vein Patch Plasty procedure using Saphenous Vein Graft (SVG) (Figure 3). The surgery went well and there were no signs of complications, such as ischemia. After 2 weeks of follow-up, the swelling of the arm had decreased.



**Figure 1.** Exposing The Rupture of AVF Fistula



**Figure 2.** Harvesting Saphenous Vein Graft (SVG)



**Figure 3.** Patching The Rupture of AVF Anastomose

The second case, a 55-year-old woman experienced swelling of the right arm accompanied by boils in the middle, the patient also complained of extreme pain in his right arm since 3 months ago. He underwent AVF procedure 1.5 years ago. His right arm bled from his boil 4 days ago (Figure 4). The patient's family said that the patient was often stabbed during multiple times of hemodialysis in the same place. After a thorough physical examination, the patient is diagnosed with pseudoaneurysm caused by venous rupture without rupture anastomose on AVF fistula. This patient then underwent a surgical operation using general anesthesia. During the operation we discovered that the blood vessels were infected and damaged, causing the blood vessels to become brittle. In addition,

irregularly shaped ruptured veins make the AV shunt anastomosis too far to be saved. Therefore, we chose to do a vein ligation procedure to stop the bleeding (Figure 5). After ligation, we give gentamicin antibiotics to reduce infection. The patient's postoperative course is going well and there are no signs of complications, such as ischemia. Swelling of the arm decreased after 2 weeks of follow-up.

In the third case, a 65-year-old male patient, had undergone a hemodialysis procedure for 3 months, a hemodialysis patient Monday and Thursday. Performed AV fistula procedure 1 month ago. The patient fell from the motor 3 days ago, his right hand hit the motorcycle handlebar. The patient's AV fistula ruptured, was then taken to the hospital, the nurse dressing the

wound, then planned for surgery. On a through physical examination, the patient is diagnosed with ruptured anastomotic pseudoaneurysm of brachiocephalic arteriovenous fistula (Figure 5). Then surgery is performed using general anesthesia. During surgery, total brachial artery rupture was found to be 3 cm long

and then 5 cm arterial resection was performed. After that, we do SVG harvesting, then anastomose is done by end to end technique (Figure 6). The surgery went well and there were no signs of complications, such as ischemia. After 2 weeks of follow-up, the swelling of the arm had decreased



**Figure 4.** Exposing the Rupture of AVF



**Figure 5.** Ligation of The Vein



**Figure 6.** Exposing the Rupture of AVF



**Figure 7.** End to End Anastomosis

## DISCUSSION

Pseudoaneurysm can be derived from iatrogenic or from anastomosis and reflects perioperative blood leakage outside the arterial lumen due to surgical techniques or occurs as a complication of infection. Pseudoaneurysm and prolonged bleeding can also form from puncture AVF or arteriovenous graft (AVG) either as part of a standard dialysis needle or from an intervention. AVG is perilous if the needle is pricked in the same place. True aneurysms are difficult to define. Changes in the shape of blood vessels because of increased blood flow will cause the proximal AVF arteries to enlarge periodically. Increase in AVF venous diameter is usually greater than 3 times until mature enough for the needle used for hemodialysis. Most autologous AVFs in situ often widen asymmetrically and irregularly.<sup>5,6</sup>

In our cases we have three kinds of pseudoaneurysm treatment, first the graft method with patch technique, second with the ligation method, and third the graft with end to end technique. The two methods that we did succeeded in handling the pseudoaneurysms and the results were good. We do these two methods in different cases, the first is in pseudoaneurysm cases caused by ruptured anastomose which is usually caused by trauma. For the second case, pseudoaneurysm is caused by an

infection causing rupture of veins. The vein in this case rupture due to multiple punctures in the same place. All the treatments were not to save the AVF but saving from limb salvage and amputation.

In the first case, pseudoaneurysm that occurs cause by trauma and located in larger branches, such as the brachial artery (which is suitable for graft interposition), can be treated by resection of the diseased part and end-to-end anastomosis or with graft inter-positioning. To maintain arterial continuity and to save the extremity, most pseudoaneurysm of the upper extremity, especially of the brachial region, should be treated with reconstruction using saphenous vein interposition.<sup>7-9</sup>

In the second case, pseudoaneurysm that occurs is caused by infection. Infection at the puncture site, is one of the most common causes of bleeding, and is a complication that often occurs in patients with AVF and arteriovenous graft (AVG). Bleeding in AVF is also caused by increased venous pressure due to venous stenosis. Patients usually come in poor general conditions, and performing large procedures increases the risk of morbidity and mortality for these patients. BAL is a safe procedure for this condition. The ligation of the brachial artery of elbow appears to be a safe site because of rich arterial network and collateral circulation around the elbow. The most common long-

term symptom reported after BAL is exercise-induced ischemia. None of the patients in our study had any signs of ischemia in the postoperative period, and re-exploration was not required.<sup>2</sup>

In the third case, we use end to end techniques. This technique can also be called total repair or definite repair. Some journals, this technique produces good outcomes. In the study of Taylor et al, there were two reported cases of bleeding after graft removal in 19 patients. Both cases occurred within 2 weeks after graft removal, and arterial reconstruction was done to control the bleeding. Wu et al. said that the rate of postoperative arterial bleeding was 22.6% when arteriotomy or graft stump was simply observed and suggested definite repair. Padberg et al. reported that stump oversewing was more reliable than direct arteriorrhaphy or venous patch angioplasty. In cases where there were no signs of infection.<sup>2</sup>

## CONCLUSIONS

Although pseudoaneurysm in AVF is uncommon, it must be diagnosed and managed promptly and accurately. The management of pseudoaneurysm can be done with different surgical methods depending on the cause and condition of the blood vessels. The management of pseudoaneurysm is not intended to save AVF but to save the patient from limb

salvation and amputation. All cases of pseudoaneurysm in this case were performed by open surgery. Although operations are performed using different methods, with good and correct management, the results will be good.

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