A SUPERFICIAL FALSE ANEURYSM AND ARTERIOVENOUS FISTULAE CAUSED BY PENETRATING GUNSHOT WOUND: A CASE REPORT WITH RADIONUCLIDE ANGIOGRAPHIC EXAMINATION

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False aneurysms and acquired arteriovenous fistulas are most frequently caused by penetrating injuries. Contrast angiography is the best most definitive diagnostic procedure that delineates anatomy, and as a functional study, gives information about the hemodynamics of the fistulae and aneurysm. Recently, isotope angiography has been effectively used for the diagnosis and evaluation of vascular disorders. A 29 year old man with gunshot injuries to his left femoral region is presented. A false aneurysm and arteriovenous fistulae located at the left femoral vessels was resulted after the penetrating injury. He has been operated. Radionuclide angiography and contrast angiography was made in preoperative and postoperative period. These two different diagnostic methods and the patient was presented at the same time.

Key words: False aneurysm, arteriovenous fistulae, radionuclide arteriography, contrast arteriography

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Femoral aneurysms make up an important portion of peripheric arterial aneurysms; almost one third. Arteriosclerosis, fungal infections and trauma are the most important etiologic factors. It may also happen following a reconstructive surgical operation. Aneurysms resulting from perforating instruments or firearms usually cause a false aneurysm, or, an A-V fistulae rather than a classical aneurysm[1,2]. In the differential diagnosis of peripheric aneurysms, noninvasive and invasive diagnostic methods are used. Conventional contrast angiography is the basic principle for demonstrating the pathology. Because of being rapid and praetical, obtaining a noninvasive diagnosis, having the chance of getting more detailed images and showing the

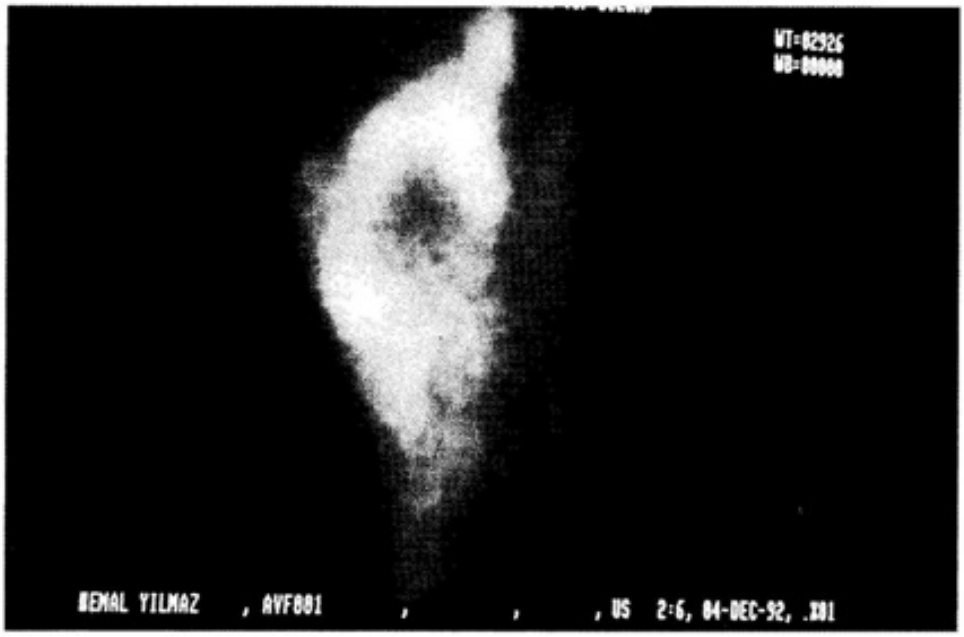

Figure 1: *The image showing existence of the aneurysm and existence of a thrombus was suspected in the middle.*

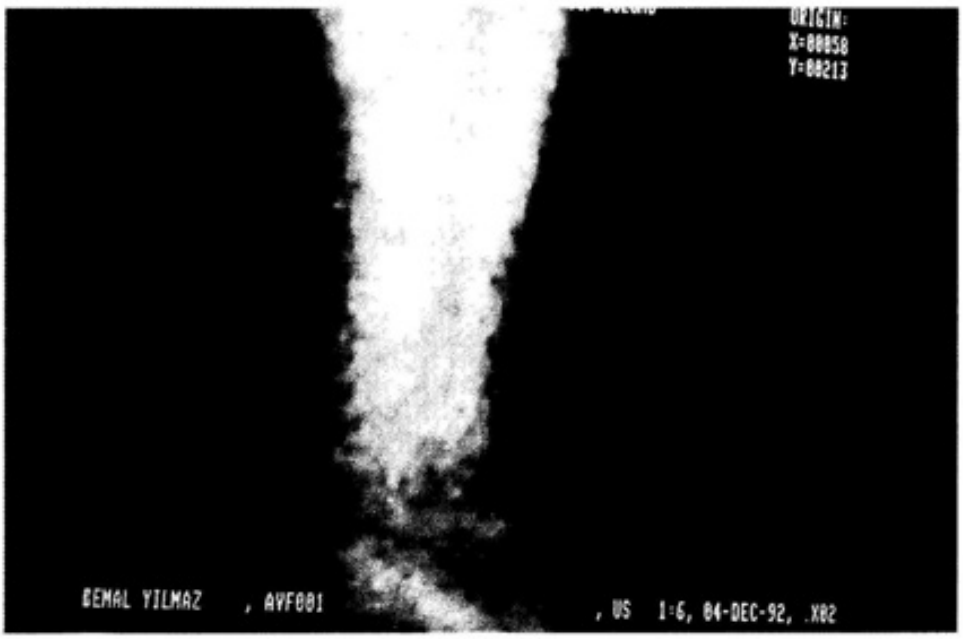

Figure 2: *The image showing normal perfusion of the left leg at distal.*

local tissue perfusion and existence of the A-V shunt; radionuclide angiographic methods are accepted currently as the diagnostiic method to be chosen first. If an A-V fistulae exists while applying Tc-99m MAA intraarterially, pulmonary perfusion scintigram could be visualised at same time [3,5].

CASE REPORT

A 29 years old male patient (C.Y.) was admitted to the Gaziantep University Medical School Hospital because of an aching mass at his lower left extremity. He was describing a penetrating firearm injury at his left leg four months ago.

After this event, the patient received medical treatment for a short time. He expressed that a localized swelling occured at his femoral region, and it enlarged by the time. In his physical examination, arterial blood pressure was 110/80 mmHg, heart rate 118/min, and vital signs were stable. His systemic findings were regarded as natural. A mass of 15x15 cm in dimensions were found at the medial face of his left lower extremity, approximately 15 cm below the inguinal ligament. By palpation thrill and pulsation could be taken upon the mass, by oscultation a systolodiastolic murmur could be heard. There was no history of a peripheric embolism, and all distal pulses were palpable.

First, radionuclide arteriography was applied to the patient. Tc-99m MAA was used in order to evaluate the relationship between the mass at the left femoral artery and the vessel structures, the existence of A-V fistulae and the perfusion of the extremity at the distal of the lesion simultaneously.

Dynamic and static images were taken by injecting 10 mCi (370 MBq) radiopharmaceutical using under the gamma camera (Siemens-Diacam) with LEAP collimator.

First, 120 images of 0,5 seconds and, after that a blood-pool image of 60 seconds, and then static images of 500 000 counts were taken. While evaluating the images; it was realised that the mass was filled with the activity, but in the middle portion there was a round region having less activity. By this image, the existence of a thrombus was suspected. (Figure 1). Intramural thrombus was confirmed at the time of operation. By showing that the perfusion of the extremity at the distal of the lesion was enough, it was decided that there was no possible peripheric embolism because of the intramural thrombus (Figure 2). The existence of the A-V fistulae was confirmed by pulmonary uptake of the radiopharmaceutical agent. No other pathology was seen at the pulmonary image except for the partial perfusion defect at the upper right zone (Figure 3). After radionuclide imaging, left percutaneous femoral contrast arteriography was applied. An aneurysm sac of 15x15 cm dimensions at the left superficial femoral artery, and a passage through the vein was observed (Figure 4).

The patient was operated with the diagnosis of traumatic femoral artery aneurysm and A-V fistulae.

An aneurysm sac of 15x15 cm was proved at the left superficial femoral artery during the operation. Surgical by-pass procedure was fulfilled as aneurysmectomy, end-to-end anasthomosis of the left superficial vein, and autogeneous vein interposition to the left superficial femoral artery. There was no postoperative complication. The patient has a symptom free, active life for 9 months.

DISCUSSION

Doppler flowmeter, pletismography, contrast angiography, digital substractional angiography (DSA), and radionuclide angiography methods are used in the diagnosis of peripheral arterial occlusion and aneurysms. Contrast angiography is the main principle in the view of surgical procedure to show the pathology. Invasive diagnostic methods have difficulties because of being usually time wasting, expensive, dissuasive from the view of the patient and needing special instrumentation. Recently non-ionic agents and DSA have begun to taken the place of direct arterial catheterization [3-8]. However, still these methods cannot be easily available everywhere. False aneurysm usually rise from weakness or destruction of the arterial wall according to the ethiological reasons. Most of the time, the existing aneurysm sac involves thrombus. The internal face of the aneurysm sac is usually surrounded by endothel cells and have no medial and adventitial layer[4,2,9]. Passive A-V fistulas develop usually after penetrating injuries [10-13]. Acute trauma usually causes a false aneurysm or A-V fistula rather than a classical aneurysm. Even if developing secondary to trauma, false aneurysms should be treated surgically as immediately as possible[4]. Late complications (false aneurysm and A-V fistulae) of missed arterial injuries show that, arterial injuries at acute term could not be diagnosed and

Figure 3: *The image showing the existence of A-V fistulae by the pulmonary uptake.*

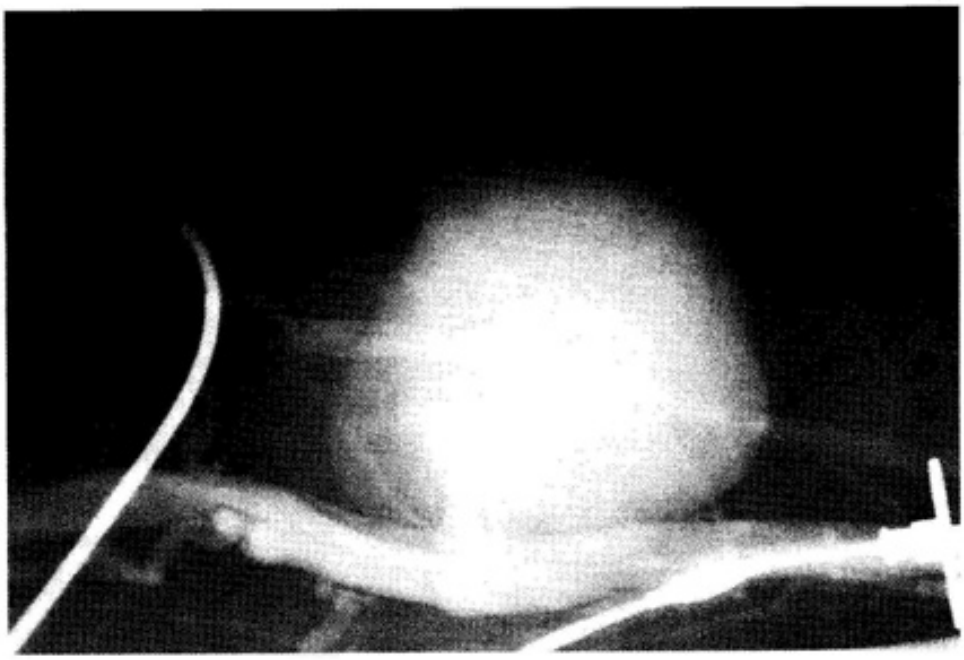

Figure 4: *The image showing the aneurysm sac and a passage through the vein.*

treated well[2,4]. Most common late complications of missed vessel injuries are aneurysms, A-V fistulas and ischemia. Burnett and his friends have found that late complications of arterial injuries are 62% of false aneurysms, and 31% of A-V fistulas[11]. If not treated, these lesions cause arterial thrombosis at high rate, and this concludes gangrene, amputation and even death [1,9]. Lateral suture, endaneurysmoraphy or interposing vein grafts are used for repairing

false aneurysms. Ligation, resection and using vein grafts could be the methods for the repairment of the A-V fistulae. Burnett and his friends, in their series, have used autogenous vein grafts at a rate of 31% for peripheral arterial injuries. Aneurysmectomy, vein interposition to the superficial femoral artery and primary femoral vein repairment was applied in this case.

In open arterial injuries, contrast angiography purposing differential diagnosis is not indicated, and delays the repairment. In uncertain arterial injuries, it is indicated. Contrast angiography can give normal results at the acute term of the arterial injury[11]. It has been reported recently that, contrast arteriographies related with false aneurysms and A-V fistulas, false negative results have been found at a rate of 23%[15]. If a vessel injury is suspected,it has been pointed out that direct exploration is better[11]. Contrast angiography shows the anatomy of a vessel to a diameter of 1-2 mm. The existence of the intraluminal disease, obstruction and collateral circulation is observed by this method. While contrast angiography before surgical operation shows the gross vascular anatomy, radionuclide angiography shows peripheral blood circulation, distribution and microcirculation. The radiolabeled particles having diameters of 15-50 micrometer are caught in the capillary bed, and thus this distribution imaged with gamma camera at capillary level reflects the tissue perfusion[3,16,17]. Radionuclide total body angiography is a useful method for pointing out the existence of false aneurysm and direction of the emboli if there is any[5]. Visualisation of the lungs following the intraarterial application of the radionuclide substance (macroagregate or analogs labeled with Tc-99 m) is an important and exact finding of the existence of A-V fistulae. At the same time it shows the existence of pulmonary embolus[3].

Radionuclide angiography could not take place of conventional angiography, but because of its rapidness, having no side effects, being comfortable and practical for the patient, having no necessity for hospitalisation, it is primarily a practical visualisation method applied to peripheric vascular disorders. Radionuclide angiography is used in the differential diagnosis of the peripheric vascular diseases, and is important to improve the diagnosis beside these advantages, it determines the results of the treatment in the long term follow up patients.

REFERENCES

1- Haimovici H: Peripheral Arterial Aneurysms In Haimovici's Vascular Surgery Principles and Techniques. Haimovici H., ed. Appleton and Lange 3 rd ed. California 1989; pp. 670-84

2- Clarke AM, Poskitt KR, Blaird RN, Horroks M: Anastamotic aneurysms of femoral artery: Aetiology and treatment. Br J Surg 1989; 76: 1014-1016

3- Greyson ND: Peripheral Vascular Disorders. In Clinical Nuclear Medicine. Second edition. Maisey MN, Britton KE, Gilday DL, Chapman & Hall Medicine London. 1989; pp 75-90

4- Rudavsky AZ: Isotope Angiography in Evaluation of Peripheral Vascular Disease In Haimovici's Vascular Surgery Principles and Techniques. Haimovici H. ed. Appleton &Lange, California, 1989; pp. 124-135

5- Awad AN, Yang DC, Girgis M, et al: Evaluation of Klippel-Trenaunay syndrome with radionuclide total body angiography: A case report. Clinical Nuclear Medicine. 1992; 17:866-70

6- Hessel SJ, Adams DF, Abrams HL: Complications of angiography. Radiology, 1981; 128:273

7- Jeffrey SR: Contrast media, complications and preparation of the patient. In Vascular Surgery, Rutherford RB ed, W. B. Sounders Company, 2 nd ed 1984; pp 244-52

8- Shehadi WH: Contrast media adverse reactions and occurence, recurrence and distribution patterns. Radiology 1982; 143:11-15

9- Chavez MC: False Aneurysms of the Femoral Artery: A Challenge in Management. Ann Surg 1976; 183:694-700

10- Gloviczki P and Hollier LH: Arteriovenous Fistulas. In Haimovici's Vascular Surgery. Principles and Techniques Haimivici H ed. Appleton & Lange 3 rd ed. California, 1989; pp. 698-716

11- Burnett HF, Parnell CL, Williams GD, Campbell GS: Peripheral Arterial Injures. Ann. Surg. 1976; 183:701-709

12- Shumacker HB Jr, Wayson EE: Spontaneous cure of aneurysms and arteriovenous fistulas with some notes on intrasaccular trombosis. Am J Surg. 1950; 79:532-535

13- Erkmen B.: Periferik Damar Yaralanmaları. Kalp ve Damar Yaralanmaları. AY Bozer ed. Ankara H.Ü. Basımevi 1983; pp 147-173

14- Linder F: Acquired arteriovenous fistulas. Report of 223 operated cases. Ann Chir Gynaecol 1985; 74:1-9

15- Hughes CW, Jahnke EJ: The Surgery of traumatic arteriovenous fistulas and aneurysms. A five-year follow- up study of 215 lesions. Ann Surg 1958; 148: 790-797

16- Moss CM, Veith FJ, et al: Isotope Angiography in Arterial Trauma. Surgery. 1979; 86:881

17- Siegel EM, Stewart AC: Radionuclides inPeripheral Arterial Disease. In Cardiovascular Nuclear Medicine. Lyons PK ed. Appleton & Lange California 1988; pp267-291