

Digital Arteriovenous Fistula After Blunt Trauma: Case Report

Künt Travma Sonrasında Parmakta Gelişen Arteriovenöz Fistül

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ABSTRACT An arteriovenous fistula (AVF) is abnormal connection of an artery and a vein, and pathological component of normal circulation. AVF may occur in two ways; congenital and acquired. Congenital AVF's on upper limbs are seen more frequently than acquired types. Among the rarely seen acquired AVF's, trauma (especially, gunshot and stab wounds) is the leading etiology. In decision-making of growing and painful lesions on digits in emergency departments, past questioning about the presence of trauma is important therefore we aimed to remind AVF as an uncommon cause for this clinical condition. AVF's has various trauma related differential diagnosis. If AVF's not diagnosed and treated properly, may cause heart failure due to high blood flow.

Key Words: Upper extremity; injuries; arteriovenous fistula; emergency medicine; complications

ÖZET Arteriovenöz fistül (AVF) arter ve ven arasındaki anormal bir bağlantı olup normal dolaşımın patolojik bir komponentidir. AVF doğumsal ve akkız olmak üzere iki şekilde oluşabilir. Üst ekstremitelerde konjenital olanlar akkız olanlara göre daha sık görülmektedir. Nadir olarak görülen akkız AVF'lerde etiolojinin en önemli kısmını travma (özellikle ateşli silah ve delici kesici alet yaralanmaları) oluşturmaktadır. Acil servise parmakta büyüyen ve ağrılı bir lezyon ile başvurulduğunda geçmişte travma varlığı sorgulanmalı ve ayırıcı tanıda AVF de düşünülmelidir. AVF'lerin ayırıcı tanısında travma ile ilişkili farklı tanılar bulunmaktadır. Tanı almamaları ve tedavi edilmemeleri halinde yol açtıkları yüksek kan debisi yüzünden kalp yetmezliğine neden olabilirler.

Anahtar Kelimeler: Üst ekstremiteler; yaralanmalar; arteriovenöz fistül; acil tıp; komplikasyonlar

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AVF may occur in two ways; congenital and acquired. Congenital AVF's on upper limbs are seen more frequently than acquired types. Among the rarely seen acquired AVF's, trauma (especially, gunshot and stab wounds) is the leading etiology. The other causes include blunt trauma, surgery, invasive procedures, infection, arterial aneurysm and medium/large vessel inflammation.¹⁻³ The vast majority of traumatic AVF's (82-98%) consist of penetrating injuries.⁴ Post-traumatic vascular injury after upper extremity fractures and/or dislocations was reported as between 0.3-6.5%.⁵ Reviews of the literature show that AVF's on upper extremities secondary to blunt trauma occurred so rarely that only 8 patients [(7 fingers (thumb 2), and 1 patient in the wrist] were reported.^{3,4,6-10} Pathophysiological changes depend on the duration of the fistula, size of the arteriovenous

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shunt and place of formation. If not treated, they may cause heart failure due to the high flow rates.¹¹ Our aim is to remind this rare occurrence of AVF's on digits in the patients admitted to emergency service with digit swelling and pain, and prevent inadvertent treatment due to incorrect diagnosis and warrant appropriate referral of the patient as soon as possible to the relevant branches.

CASE REPORT

Twenty seven year old male patient was admitted to the emergency service with escalating complaints of swelling and pain on the third digit of the left-hand. A year ago an iron door accidentally clenched his hand and at that time the radiographs had revealed no fracture. A month after the incident, swelling started and surgery was recommended with a pre-diagnosis of possible lipoma. He refused surgery and was started on analgesics, despite a somehow decrease in pain, the symptoms continued. He described that when he carried heavy things, he was feeling an increase in the severity of pain and a burning sensation on the swelling. On physical examination; a mass of 2 cm x2cm in size on the lateral side of the third digit was seen. An increased heat and pulsation was noted in this digit of left hand (Figure 1). There was no finger ischemia or trill. Doppler ultrasonography revealed tubular vascular structures in the region with high flow



FIGURE 1: Swelling and erythema on the III. digit of left hand.

rates suggestive of an AVF. Digital subtraction angiography (DSA) confirmed the diagnosis of post-traumatic arteriovenous fistula (Figure 2). Cardiovascular surgery consultation recommended follow-up rather than surgery option.

DISCUSSION

Without a recent trauma; swelling and pain in the finger is not a common cause of an emergency department visit. As differential diagnosis; hematoma, lipoma, phalangeal fracture, finger-joint dislocation and AVF should all be considered. Lipoma is a slowly progressive, painless and solid mass, with no history of trauma however hematomas, dislocations and fractures develop after an acute trauma and are painful. AVF usually develops months after the trauma and it presents usually a painful lesion.



FIGURE 2 A, B: Digital subtraction angiography (DSA) of posttraumatic arteriovenous fistula.

AVF was initially described by Hunter et al. in 1757. In the following years the AVF's were grouped into congenital and acquired types.¹⁰ Peripherally located AVF's may lead to local or central changes. These changes depend on place, size and duration of the fistula. Clinically, disfigurement, pain, edema, arterial insufficiency (paresthesia, pallor, pulse loss, hypothermia, cold intolerance), increased skin turgor, pulsation, and trill may occur. The small-diameter AVF's on extremities may be asymptomatic, only recognizable by palpable pulsation or thrill.^{1,4,10} Pain is due to steal syndrome or pressure on digital nerves.

Chronic AVF's may cause venous hypertension and may also cause cardiac valvular insufficiency. In chronic AVF's the feeder artery dilatation and elongation is typical. Large AVF's may lead to significant shunt and may cause hyperdynamic circulation and a malfunction in peripheral circulation. The rate of blood flow to cardiac output determines the systemic effects of the AVF and development of cardiac failure. Increase in the flow cause an increase in the cardiac output and heart failure develops gradually over the years. Many AVF's are asymptomatic or have a few ignorable symptoms and they can simply be followed-up.^{10,12} In our case, the AVF's size was not very large and AV stream was not very fast suggesting heart failure development least likely so a follow-up was recommended.

History and physical examination are often sufficient for diagnosis of AVF's. The most important and non-invasive method to confirm the diagnosis is Doppler ultrasonography. In cases which are complex and cannot be diagnosed initially, DSA, magnetic resonance (MR) angiography or MR may be required.^{5,10}

Conservative treatment is appropriate for asymptomatic and not causing a cosmetical problem. Early treatment is recommended in sympto-

matic traumatic AVF to avoid potential complications. Treatment must be planned for growing lesions before the complications such as deformity of the extremity, bleeding, infection, critical distal ischemia, severe pain and the development of heart failure. Large-diameter AVF's may cause serious deformities due to rapid growth and may cause a life-threatening bleeding. Especially for lesions in the proximal parts of the hands of workers and young people, the finger artery reconstruction is done to prevent loss of cold intolerance by providing more physiological blood flow.¹⁰ The main feeder artery ligation and resection is the most commonly applied and recommended method but have to be careful because it may cause ischemic necrosis on the distal part of the finger. Incomplete resection and arterial ligation are the most common cause of recurrence. Due to the risk of severe ischemia and necrosis of fingers, embolization of the artery is not recommended.^{2,10} Besides these, there are several methods for treatment of congenital fistula without taking off the fistula as endovascular technique of stent implantation, superficial laser ablation, etching, curettage and cryotherapy. These methods are not recommended for traumatic finger AVF's.^{2,4}

Traumatic arteriovenous fistula of the distal end of the upper extremity is very rare. In decision-making of growing and painful lesions on digits, past questioning about the presence of trauma is important for differential diagnosis of AVF. The verification of the diagnosis and the early treatment planning of patients with cardiovascular surgery should be concerned to prevent late-onset complications.

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