

Remission of High-Output Heart Failure after Surgical Repair of 30-Month Arteriovenous Femoral Fistula: Case Report

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ABSTRACT

We present a 15-year-old male patient who was admitted to our hospital because of breathlessness and palpitations at minimal physical effort (New York Heart Association class II). The patient had a history of an abdominal and left thigh firearm wound that was surgically treated 30 months earlier. Auscultation over the left femoral groin region revealed a systolo-diastolic murmur. X-ray examination of the chest demonstrated significant cardiomegaly. Transthoracic echocardiography revealed an enlargement of 4 cardiac chambers, as well as significant mitral and tricuspid regurgitation. Vascular ultrasound of the femoral artery and vein confirmed the diagnosis of a traumatic arteriovenous fistula. The patient underwent surgical correction of the fistula, after which the symptoms subsided rapidly. Follow-up echocardiography performed 2 months after surgical repair showed a substantial reduction of cardiac size and a nearly complete absence of valvular regurgitations. This case highlights the importance of the recognition of arteriovenous fistulas as a cause of unexpected heart failure and demonstrates that the condition may improve substantially and rapidly after fistula correction.

INTRODUCTION

Hyperkinetic heart failure is not a rare type of heart failure. It may occur as a result of systemic illnesses (hyperthyroidism, beri-beri, Paget disease of the bone) and arteriovenous fistulas. Arteriovenous fistulas due to arteriovenous malformations, iatrogenic interventions (dialysis fistulas, nephrectomy, arterial puncture), and trauma (blunt, penetrating) have been described [Stellbrink 1991. Khoury 1994, Pereira 1995, Hirai 2001, Durakoglugil 2003]. The earliest

findings in patients with arteriovenous fistulas may be heart failure, breathlessness, palpitations, cardiomegaly on chest x-rays, or heart chamber enlargement on echocardiography. We report the case of a 15-year-old male with high-output heart failure due to a 30-month femoral arteriovenous fistula caused by a firearm wound. Surgical repair of the fistula resulted in remission of high output heart failure.

CASE PRESENTATION

A 15-year-old male patient was admitted to our cardiology clinic with a complaint of breathlessness and palpitations for the last 3 months. The patient had no prior history of congenital, inflammatory (myocarditis), or acquired valvular heart disease. Thirty months prior to this admission, the patient suffered from an abdominal and left thigh firearm wound during the Kosovo war, for which he had undergone abdominal surgical intervention with bowel resection. There were no medical records to indicate that there was associated vascular injury.

On physical examination, a thrill was palpable over the left femoral groin. Auscultation revealed sinus tachycardia (120 beats/min) and a third heart sound. A systolodiastolic murmur and thrill on the left groin were found. Neither rales nor rhonchi were present. Laboratory tests including complete blood cell counts, blood clotting parameters, thyroid function tests, serum electrolytes, and liver function tests were within normal limits. Electrocardiography showed sinus tachycardia and signs of left ventricular hypertrophy. Chest x-rays demonstrated an enlarged cardiac silhouette. Transthoracic echocardiography demonstrated enlargement of 4 cardiac chambers. The left ventricle in particular was markedly enlarged; however, the left ventricular ejection fraction was preserved (Table). Other cardiac cavities were also enlarged (Figure 1). Left ventricular end-diastolic and end-systolic diameters were elevated (Figure 2). The subcostal view showed dilatation of the inferior cava vein. Mild to moderate mitral regurgitation, moderate tricuspid regurgitation, and a maximum pulmonary artery pressure of 32 mm Hg were detected by color Doppler.

Surgical treatment was undertaken and consisted of the reconstruction of the superficial femoral artery with a polytetrafluoroethyl prosthesis approximately 8 cm long. Two

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Echocardiographic Chamber Diameters before Surgical Correction of Femoral Arteriovenous Fistula and 2 Months after Correction

	Before Correction	2 Months Later
Left ventricular end-diastolic diameter, cm	6.5	5.8
Left ventricular end-systolic diameter, cm	4.2	3.8
Ejection fraction, %	61	58
Left atrium-short axis, cm	4.2	2.8
Left atrium-long axis, cm	6.3	5.7
Right atrium, cm	4.0	3.2
Right ventricle, cm	3.3	2.7

months after surgery, the patient had minimal symptoms. The follow-up echocardiography at this time showed the left ventricular end-diastolic diameter to be at the upper normal limit. Other heart chambers had nearly normal dimensions (Table; Figures 3 and 4), and valvular regurgitations were minimal.

DISCUSSION

Hyperkinetic heart failure may occur in systemic diseases such as severe anemia, beriberi, hyperthyroidism, malignancies, and Paget disease. Arteriovenous fistulas are uncommon causes of heart failure. Arteriovenous fistulas can be caused by invasive procedures (arterial punctures, percutaneous renal biopsy), surgical procedures (laminectomy, nephrectomy), or trauma [Stellbrink 1991, Khoury 1994, Pereira 1995, Hirai 2001, Durakoglugil 2003]. Acquired arteriovenous fistulas are most often caused by firearm wounds, and may occur in any part of the body [Dorney 1957].

In our patient, the femoral arteriovenous fistula could be detected clinically because of increased pulse pressure, thrill, and a systolodiastolic murmur over the left femoral groin.

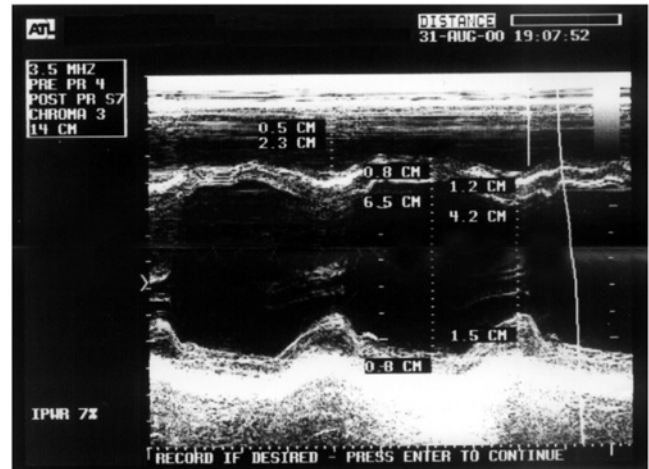


Figure 2. Left ventricular end-diastolic and end-systolic diameters before surgical correction of the arteriovenous fistula.

Vascular ultrasound confirmed the diagnosis of femoral arteriovenous fistula. In the absence of other apparent causes of heart failure, echocardiographic findings including cardiac chambers enlargement and dilatation of the inferior vena cava also suggested the possibility of high-output heart failure due to arteriovenous fistula. The patient's history of prior trauma further strengthened the suspicion of an acquired arteriovenous fistula. Careful analysis of such data is of particular importance for recognition of this problem, especially for centers (including our center) without the technical capability to perform arteriography.

In cases of arteriovenous fistulas, the increased cardiac output and volume overload will lead to heart failure. The primary factors determining heart failure are the extent of the shunt and decreased systemic vascular resistance [Portela 2001, Durakoglugil 2003]. Our patient, who had a structurally normal heart, developed high-output heart failure 30

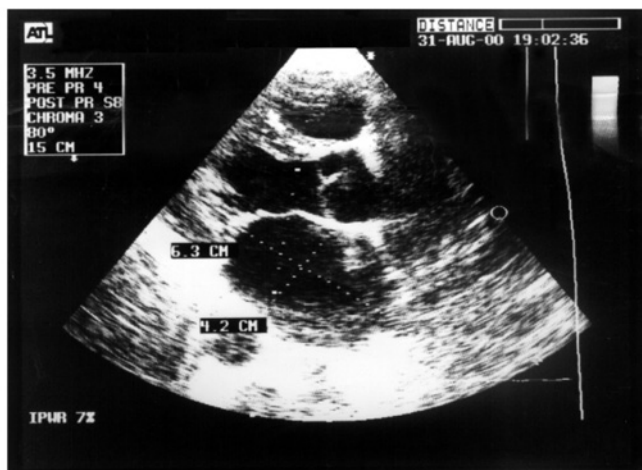


Figure 1. Parasternal long-axis view and left atrial dimensions before surgical correction of the arteriovenous fistula.

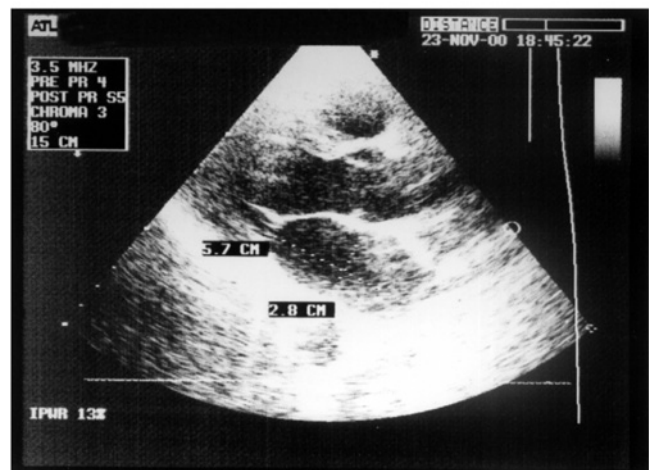


Figure 3. Parasternal long-axis view and left atrial dimensions 2 months after surgical correction of the arteriovenous fistula.

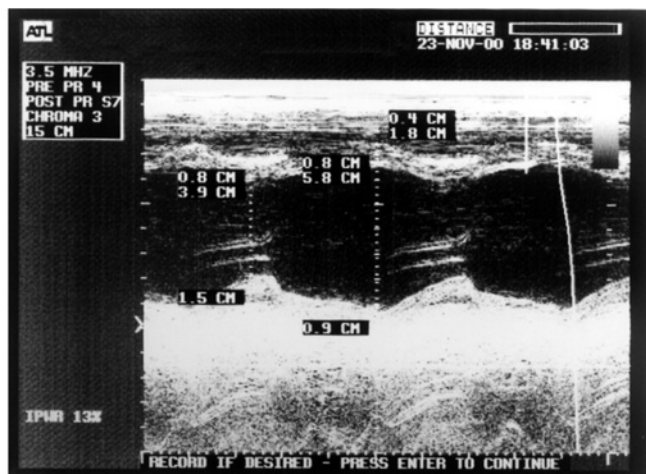


Figure 4. Left ventricular end-diastolic and end-systolic diameters 2 months after surgical correction of the arteriovenous fistula.

months after fistula formation. In previous studies different times were reported for the onset of the signs of heart failure, from 8 months to 63 years after a trauma [Frishman 1974, Stellbrink 1991, Pereira 1995, Abreo 2000, Hirai 2001, Durakoglugil 2003]. Another factor that also may contribute to the development of heart failure is the sudden development of an arteriovenous shunt, which appears to happen in wounds caused by firearms [Flaim 1979].

Surgical repair with excision is usually recommended in fistulas that develop after a trauma. It has been reported that traditional surgical repair has satisfactory results [Khoury 1994]. In general, common signs of heart failure disappear following surgery. Accordingly, in our patient 2 months after surgical repair, the symptoms and signs of heart failure improved dramatically. However, irreversible heart failure after surgery has been reported in a patient with a bilateral hemodialysis fistula [Ingram 1987].

The previous case reports showed that many arteriovenous fistulas presenting with heart failure are found in the elderly population [Ingram 1987, Stellbrink 1991, Pereira 1995]. Conversely, our patient with heart failure following an acquired arteriovenous fistula was of younger age, being only 15 years old.

In conclusion, we presented a young patient with heart failure after an acquired femoral arteriovenous fistula caused

by a firearm wound. The most important clues for a correct diagnosis were increased pulse pressure, systolodiastolic murmur, thrill, vascular ultrasound findings (dilation of the inferior vena cava), in addition to the history of trauma. Transthoracic echocardiography was the most important tool for the diagnosis of heart failure, the determination of its etiology, and the evaluation of treatment efficacy. This case also highlights the importance of the recognition of arteriovenous fistulas as a cause of heart failure, particularly because the condition will improve substantially after surgical repair of the fistulas.

REFERENCES

- Abreo G, Lenihan DJ, Nguyen P, Runge MS. 2000. High-output heart failure resulting from a remote traumatic aorto-caval fistula: diagnosis by echocardiography. *Clin Cardiol* 23:304-6.
- Dorney ER. 1957. Peripheral AV fistula of fifty-seven years duration with refractory heart failure. *Am Heart J* 54:778.
- Durakoglugil ME, Kaya MG, Boyaci B, Cengel A. 2003. High output heart failure 8 months after an acquired arteriovenous fistula. *Jpn Heart J* 44(5):805-9.
- Flaim SE, Mintees WJ, Nellis SH, Clark DP. 1979. Chronic arteriovenous shunt: evaluation of a model for heart failure in the rat. *Am J Physiol* 236:H398.
- Frishman W, Epstein AM, Kulick S, Killip T. 1974. Heart failure 63 years after traumatic arteriovenous fistula. *Am J Cardiol* 34:733-6.
- Hirai S, Hamanaka Y, Mitsui N, Kumagai H, Nakamae N. 2001. High-output heart failure caused by a huge renal arteriovenous fistula after nephrectomy: report of a case. *Surg Today* 31:468-70.
- Ingram CW, Satler LF, Rackley CE. 1987. Progressive heart failure secondary to a high output state. *Chest* 92:1117-8.
- Khoury G, Stein R, Nabbout G, Jabbour-Khoury S, Fahl M. 1994. Traumatic arteriovenous fistula: "the Lebanese war experience". *Eur J Vasc Surg* 8:171-3.
- Pereira H, Cotrim I, Abreu A, et al. 1995. Heart failure due to a post-laminectomy arteriovenous fistula. *Rev Port Cardiol* 14:579-8.
- Portela A, Bastos R, Pessoa B, Duarte R, Medeiros M, Paiva J. 2001. Remission of heart failure through endoluminal repair of femoral arteriovenous fistula with the use of a covered stent. *Arq Bras Cardiol* 76(3):242-4.
- Stellbrink C, Kunze KP, Lambertz H, Urhahn R, Hanrath P. 1991. An iatrogenic arteriovenous fistula following laminectomy. A rare differential diagnosis of heart failure [in German]. *Dtsch Med Wochenschr* 116:1141-3.