

## Case Report

## Surgical Repair of a Ruptured Arteriovenous Fistula During Percutaneous Balloon Intervention

Arterivenöz Fistüle Balon Katater Girişime Sırasında Oluşan Rüptürün Cerrahi Tamiri

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### ABSTRACT

*A functioning vascular access as an arteriovenous (av) fistula or an arteriovenous graft is a very important factor for patients undergoing hemodialysis on long-term survival and optimal quality of life. Percutaneous salvage is a possible treatment for occluded or stenotic segments of fistula but rupture can be seen as an important complication during these interventions. In this case we reported a patient who had a rupture at venous side of the fistula during percutaneous intervention, ruptured was repaired surgically after failed percutaneous restoring techniques.*

**Keywords:** hemodialysis; arteriovenous fistula: complication

### ÖZET

*Kronik böbrek yetmezlikli hastalarda hemodializ tedavisi için hastanın fonksiyone bir arteriovenöz fistülü veya grefti olması hem yaşam süresini uzatan hemde yaşam kalitesini arttıran önemli bir faktördür. Oluşturulan fistüllerde zamanla meydana gelen darlık veya tıkanıklıklara perkütan girişimlerle müdahale edilebilir ve bu girişimlerde en önemli komplikasyonlardan biriside rüptürdür. Bu vakada, perkütan girişim sonrası ven segmentinde rüptür meydana gelmiş, bu komplikasyon perkütan yollarla düzeltilememiş ve hastanın fistülünün devamlılığı cerrahi müdahale ile sağlanmıştır.*

**Anahtar Kelimeler:** hemodializ, arteriovenöz fistül; komplikasyon

### INTRODUCTION

A functioning vascular access as an arteriovenous (av) fistula or an arteriovenous graft is essential to achieve long-term survival and optimal quality of life for patients undergoing hemodialysis. These interventions improve the quality of life for hemodialysis patients by reducing the need for temporary hemodialysis catheters and prolong total survival time by preserving existing access sites and by saving venous segments for future access creation.

### CASE

The patient was a 70-year-old female admitted to our center for repair of venous stenosis at the right sided braciocephalic av fistula. The av fistula was created 4 months ago and was used successfully for nearly 3 months. Early developed stenosis was detected at the proximal part of venous outflow of the fistula by doppler ultrasonography and percutaneous intervention was planned.

The patient underwent balloon intervention under local anesthesia via 4-mm balloon catheter. During the procedure a rupture was occurred by balloon inflation with a pressure of 12 atm. (Figure: 1-2). Although percutaneous treatment models such as stenting the ruptured area was tried, they were not successful to stop extravasation, so surgical repair was planned immediately.

The balloon was left inflated at the ruptured area for to control bleeding while transferring the patient to the operation room. A nearly 4-5 cm long 6-mm PTFE graft was interposed successfully between intact parts of the cephalic vein under local anesthesia. The patient was discharged at postoperative second day with a functioning fistula.

### Contact

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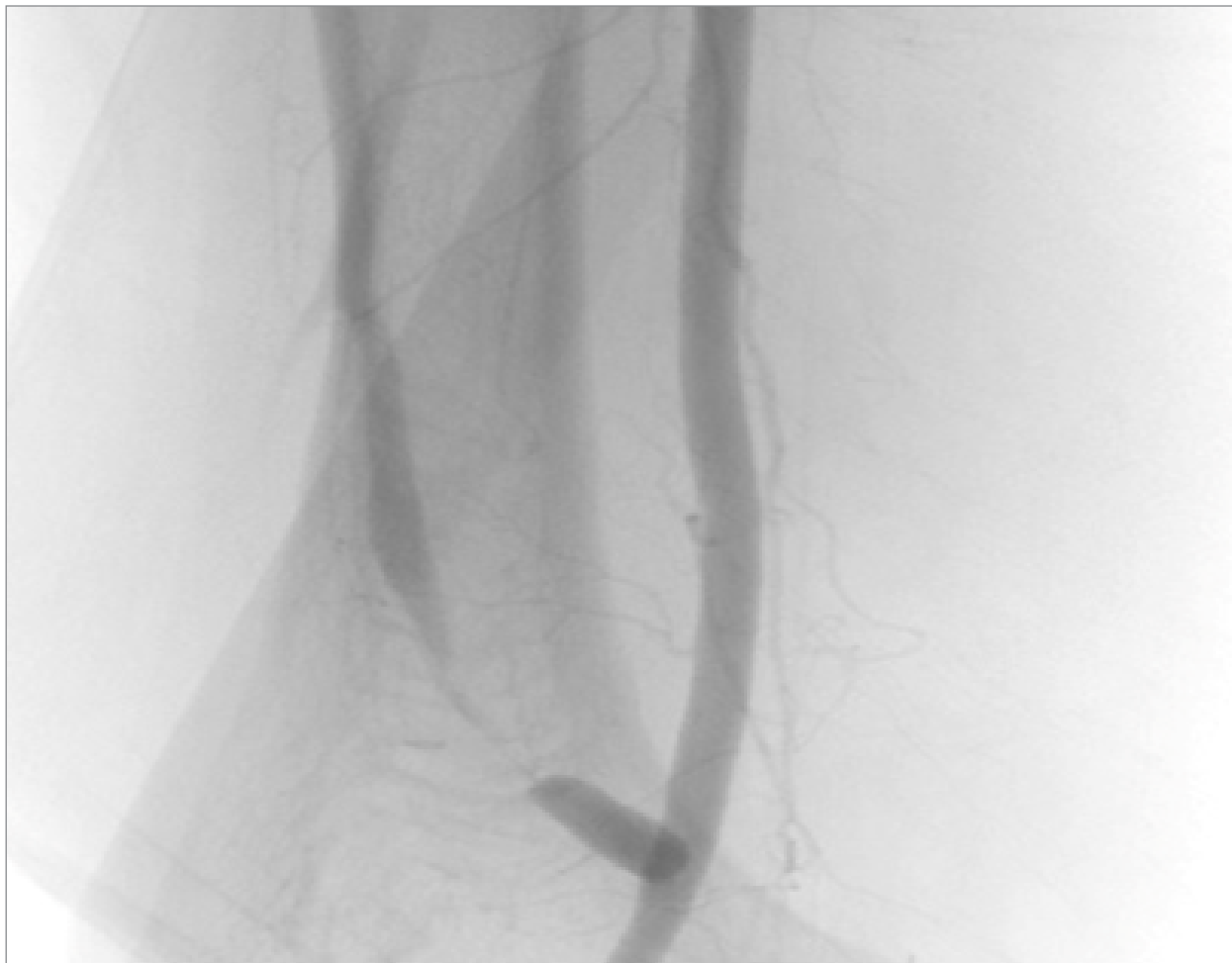
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**Figure 1:** Stenosis at the proximal segment of the venous outflow.

## DISCUSSION

Venous percutaneous transluminal angioplasty (PTA) can be performed when stenosis or occlusion is determined at the vascular access for hemodialysis. Venous stenosis is characterized by extensive fibrosis, so ultra-high pressure balloon inflations (1) or cutting balloon atherotomy is needed for optimally treatment (2-4). High-pressure, noncompliant balloons with rated burst pressures of 20 to 24 atm can be used. Cutting balloons can be used when high-pressure balloons are unsuccessful (3, 4) with an increased risk of rupture (5).

Rupture can be seen during these catheter-based interventions and usually treated with the placement of a covered or bare nitinol stent (6, 7) but if not possible, surgery is the only choice.

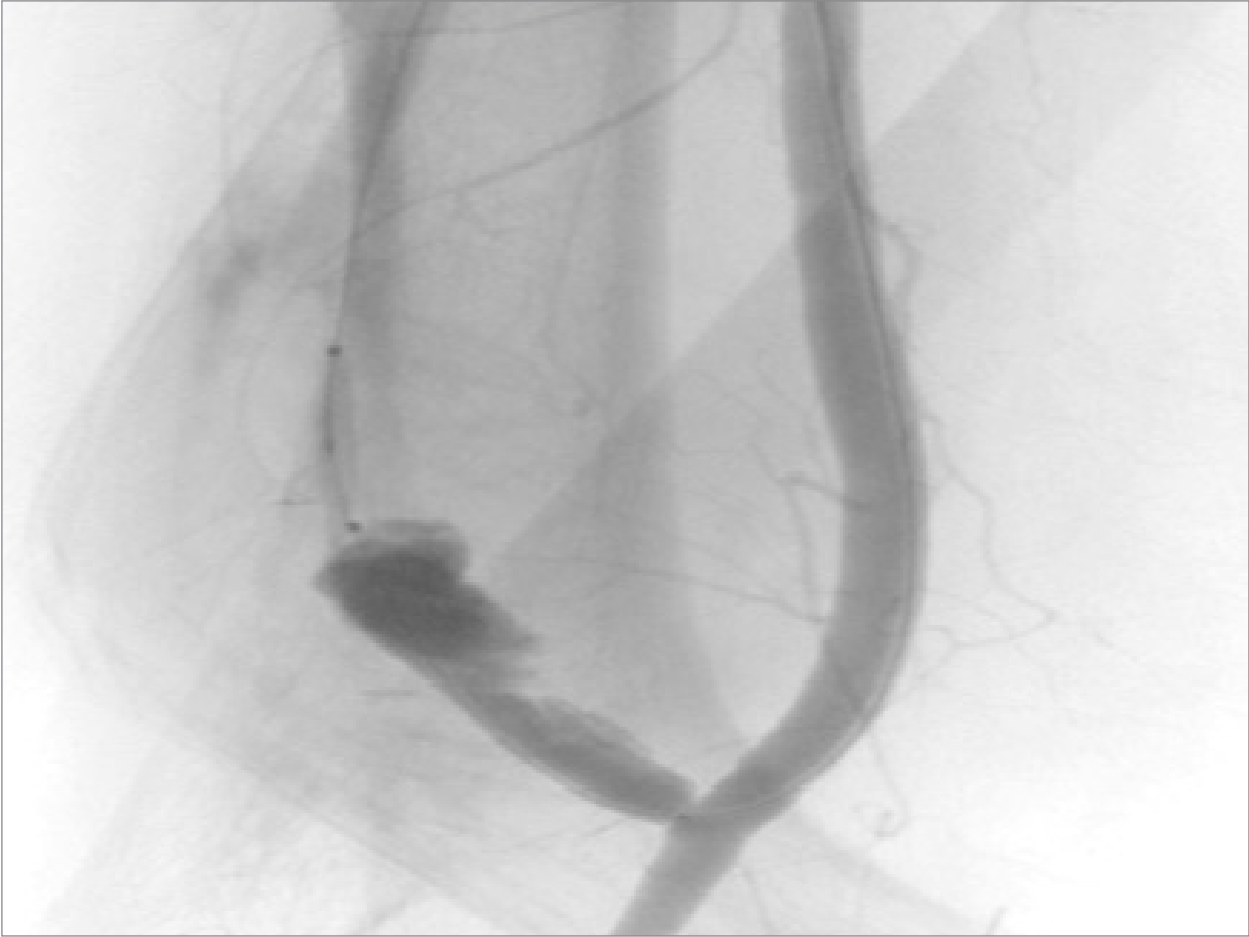
In our case the fistula was patent for only 3 months so probably cephalic vein was not arterialized enough for balloon inflation with pressure. Injury with low pressure might be due to the uncompleted arterialization process of the vein, since arterialized veins are more resistant to rupture at high pressure.

Percutaneous interventions should be administered more carefully to avoid complications such as rupture. PTFE graft interposition is a treatment option for venous outflow injury which maintains the function of the fistula.

As in our case, rupture at venous part of a arteriovenous fistula can be seen nearly 5.6% of all patients during percutaneous interventions (8). Although this complication can be treated with percutaneous techniques again, sometimes surgical correction is needed for maintenance of the fistula.

## REFERENCES

1. S.O. Trerotola, A. Kwak, T.W. Clark, et al; Prospective study of balloon inflation pressures and other technical aspects of hemodialysis angioplasty. *J Vasc Interv Radiol*, 2005; 16:1613
2. J.A. Bittl, R.L. Feldman; Cutting balloon angioplasty for undilatable venous stenoses causing dialysis graft failure. *Catheter Cardiovasc Interv*, 58 2003; 58:524-26



**Figure 2:** The rupture of the vein after the balloon intervention.

3. T.M. Vesely, J.B. Siegel; Use of the peripheral cutting balloon to treat hemodialysis-related stenoses. *J Vasc Interv Radiol*, 2005;16:1593-1603

4. C.C. Wu, S.C. Sen; Cutting balloon angioplasty for resistant venous stenoses of dialysis access: immediate and patency results. *Cathet Cardiovasc Interv*, 2008;71: 250-54

5. J.A. Bittl; Venous rupture during percutaneous treatment of hemodialysis fistulas and grafts. *Catheter Cardiovasc Interv*, 2009;74:1097-1101

6. Gray RJ, Sacks D, Martin LG, et al.; Reporting standards for percutaneous interventions in dialysis access. *J Vasc Interv Radiol*, 2003;14:433-44

7. Miller GA1, Hwang W, Preddie D, Khariton A, Savransky Y. ;Percutaneous salvage of thrombosed immature arteriovenous fistulas. *Semin Dial*. 2011;24:107-114

8. Kornfield ZN, Kwak A, Soulen MC, Patel AA, Kobrin SM et al: Incidence and management of percutaneous transluminal angioplasty-induced venous rupture in the "fistula first" era. *J Vasc Interv Radiol*,2009;6:744-51