

temperature normalized the next day. Urine production ceased almost completely. Serum albumin level increased within 1 week to 3.5 g/dL. The patient eventually received a second renal transplant 1 month after the procedure.

In the second case, an 11-year-old girl with ESRD secondary to FSGS who was undergoing peritoneal dialysis had two episodes of posterior reversible encephalopathy syndrome and presented with blurry vision and hypertension beginning 2 weeks earlier. Blood pressure was 162/112 mm Hg. Serum albumin level was low at 1.6 g/dL. Because medical nephrectomy could not be achieved with an angiotensin-converting enzyme inhibitor, a decision was made to embolize the renal arteries to control the hypertension and proteinuria. Bilateral RAE was performed with a 1:5 solution of NBCA and Lipiodol (Guerbet, Roissy, France; **Fig 2**). Low-grade fever developed, likely as a result of postembolization syndrome, and body temperature normalized the next day. Urine production ceased almost completely. Serum albumin level increased within 1 week to 2.1 g/dL. During follow-up, the patient's blood pressure improved while she was receiving antihypertensive medications. The patient eventually received a renal transplant 3 months after the procedure.

In the third case, a 15-year-old boy with ESRD secondary to FSGS who was receiving peritoneal dialysis presented with NS combined with hypertension. Serum albumin level was low at 1.6 g/dL as a result of proteinuria. Right RAE was performed with a 1:5 solution of NBCA and Lipiodol (**Fig 3**). Left RAE was performed by infusing 2 mL of dehydrated alcohol mixed with 1 mL of Lipiodol because the length of the left renal artery was insufficient for a secure embolization with NBCA. Then, two 3-mm, 0.018-inch microcoils were deployed into the distal aspect of the left main renal artery. Blood pressures improved to the target range (systolic blood pressure of 100–130 mm Hg). However, the patient was still urinating twice per day 1 week after embolization. Three weeks later, collateral or accessory branches to the kidney were evaluated for additional embolization. Right renal and adrenal arteriograms demonstrated persistent flow with collateral flow to the upper pole, and the right renal artery and adrenal collateral vessels were embolized with microcoils. Anuria was achieved after the second embolization. Serum albumin level improved to 2.4 g/dL at 1 month after the second embolization. No complications were seen after the first and second embolization procedures. As of the time of manuscript preparation, the patient was in clinically stable condition and undergoing peritoneal dialysis.

The present report describes RAE in refractory NS secondary to FSGS as an effective means to increase serum albumin levels. Two patients with refractory hypertension showed improved blood pressure after RAE. Although RAE is a well-known method of treatment of vascular malformations and renal tumors, few articles exist in the

literature about the use of RAE for the treatment of refractory NS. FSGS is usually difficult to treat with conventional treatment modalities, as it commonly progresses to treatment-resistant NS (3). The RAE procedure may be more difficult in children than in adults because of their smaller-caliber arteries and the risk of vasospasm. Various embolic agents can be used in RAE: coils, dehydrated alcohol, NBCA, and particles. The goal of RAE in patients with refractory NS is to cease urine output. We would like to emphasize the need to perform a complete embolization to achieve success.

We believe the present letter is the first report describing the use of RAE for the treatment of refractory proteinuria in pediatric patients with FSGS. It appears to be a technically feasible, safe, and effective procedure, and can be a valuable nonsurgical treatment option.

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Large-Volume Percutaneous Balloon Thromboembolism of the Lower-Limb Arteries



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Editor:

Balloon thromboembolism via a surgical femoral cut-down has been the standard of care for arterial emboli to the limbs since the introduction of the Fogarty balloon

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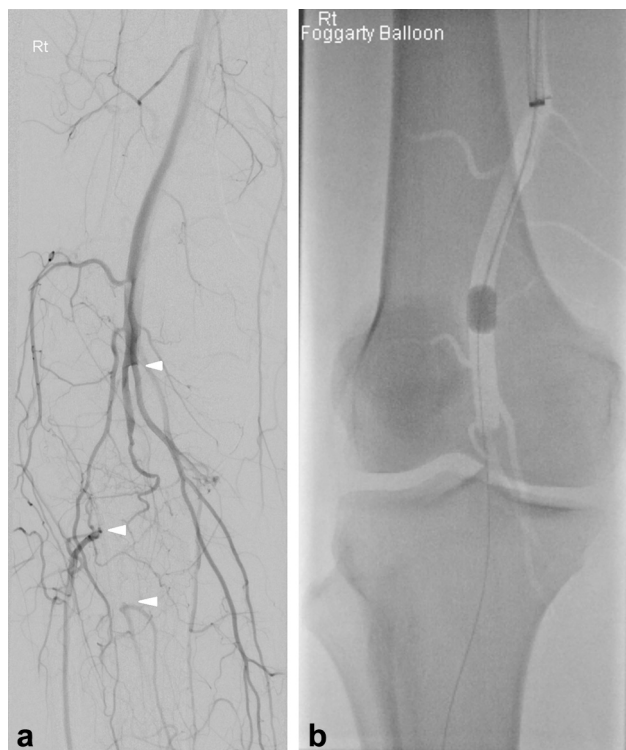


Figure 1. (a) Angiography showing embolus in the mid-popliteal artery, extending into the origins of three calf arteries (arrow heads). (b) Balloon thromboembolectomy.

catheter in 1963 (1). When a thrombus is within the distal popliteal artery or at the level of the infrapopliteal trifurcation, transfemoral embolectomy success rates are reduced and surgical exposure of the popliteal trifurcation may be required, resulting in a longer and more complex procedure. Furthermore, surgical embolectomy alone may result in incomplete clot retrieval and unsatisfactory outcomes (2).

This report was exempted from institutional review board approval. Three cases are presented here in which percutaneous balloon embolectomy was successfully used to remove large-volume thromboemboli from the popliteal arteries. Three female patients, aged 62, 67, and 85 years, with a history of atrial fibrillation, presented with acute lower limb ischemia. In all cases, arterial Doppler and CT angiography showed popliteal artery occlusions extending to origins of calf arteries. All patients underwent specialist vascular surgical review, and a consensus decision was made to proceed to percutaneous thromboembolectomy.

All patients were heparinized prior to and during the procedure. Under conscious sedation with local anesthetic and aseptic technique, antegrade common femoral arterial access was secured under ultrasound guidance. Digital subtraction angiography confirmed a popliteal artery embolus in the three cases: two in the distal (P3) segments extending to the origins of three calf arteries

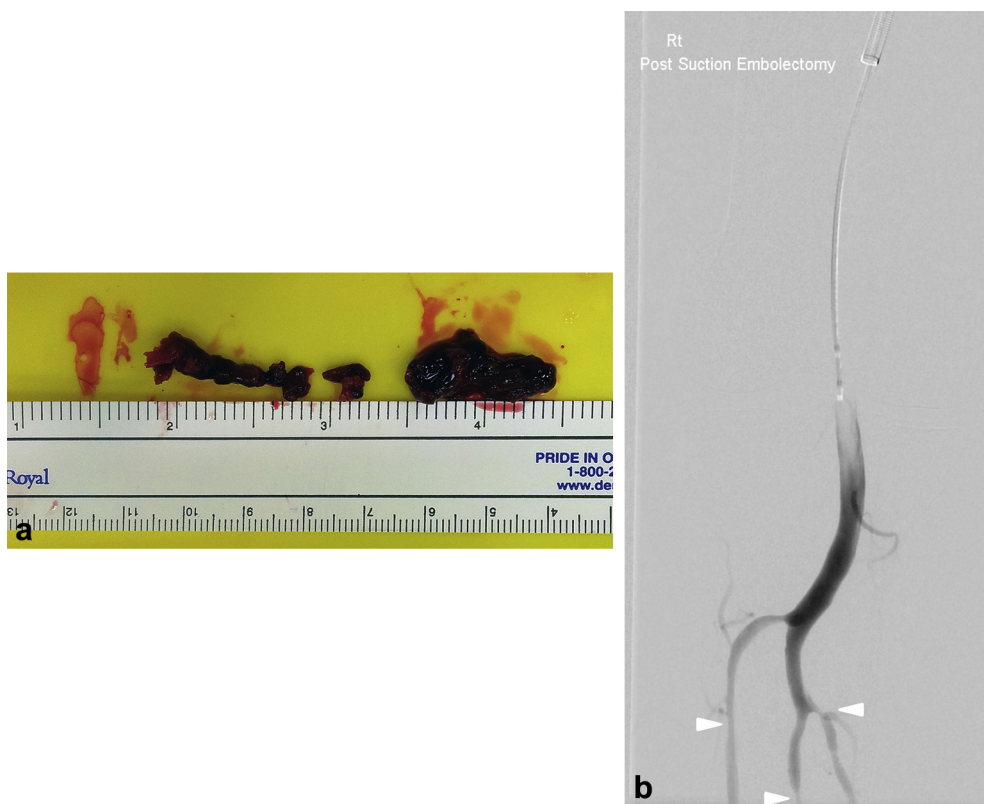


Figure 2. (a) Clot retrieved. (b) Post-thromboembolectomy restored patency. Proximal tibioperoneal vessels show patency but narrowing after clot removal, likely due to spasm internal damage from balloon thrombectomy.

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