Fibromuscular dysplasia (FMD) is a nonatherosclerotic vascular disease that most commonly affects the renal, carotid, and vertebral arteries. Renal FMD is associated with renovascular hypertension, and patients may be referred for revascularization, generally with balloon angioplasty. We report a series of 2 patients with renal artery FMD who developed stent fracture.

Patient 1
A 16-year-old girl was seen for a second opinion on renal FMD. Hypertension was diagnosed at the age of 13 years and initially treated medically; however, bilateral renal artery angioplasty was subsequently performed for poorly controlled blood pressure. She subsequently underwent placement of a drug eluting stent in the right renal artery for restenosis. Although she initially improved, there was gradual worsening of her blood pressure control. Noninvasive testing was consistent with severe restenosis of the right renal artery stent. Renal arteriography revealed a severe stenosis estimated at 80% in the right renal artery (Figure 1). There was severe narrowing noted at the ostium, resulting in a 70 mmHg gradient across the lesion. Intravascular ultrasound confirmed stent fracture as the cause of narrowing (Figure 2). The patient was referred for aorto-renal bypass grafting with venous conduit and did well postoperatively.

Patient 2
A 41-year-old woman was seen for a second opinion on renal FMD and multidrug-resistant hypertension. She developed hypertension at the age of 30 years, requiring multiple medications. Because of poor blood pressure control, she ultimately underwent angiography, which demonstrated medial fibroplasia for which angioplasty with overlapping stent placement was performed (Figure 3). Blood pressure improved initially, but gradually worsened during the following year with recordings as high as 220/130 mmHg on 6 medications. Duplex ultrasound revealed markedly elevated velocities within the right renal artery. Selective right renal angiography demonstrated 2 areas of significant narrowing and deformity of the stents (online-only Data Supplement). Intravascular ultrasound confirmed these findings and a likely stent fracture in the middle and distal segments of the stents (Figure 4). The patient underwent aorto-renal bypass grafting with venous conduit with improved control of her blood pressure, although she required subsequent endovascular procedures for bypass graft restenosis.

Discussion
We report on 2 patients with renal FMD who developed complications of renal artery stenting, namely restenosis and stent fracture, ultimately requiring surgery. Both patients had long...
segment renal artery stents placed and had marked right renal artery mobility as contributing factors to restenosis and stent fracture.

The renal arteries are frequently involved in FMD, affecting ≈80% of FMD patients who undergo renal imaging studies. Renovascular hypertension related to FMD is common, and treatment of hypertension with balloon angioplasty may be effective in curing or better controlling blood pressure in select patients. Anecdotal case reports have reported stent fracture because of the compression of the renal artery by musculotendinous fibers originating from the diaphragm. Another contributing factor is significant mobility of the kidney (nephroptosis). Although this can occur in all patients, severe nephroptosis has been shown to be more common among patients with renal FMD. Increased kinetic stress applied over the stent struts may lead to both reactionary intimal hyperplasia and metal fatigue resulting in-stent restenosis and fracture.

Balloon angioplasty remains the mainstay of endovascular therapy for renal FMD, in contrast to severe atherosclerotic renal artery stenosis for which stenting has become the standard approach. For patients with renal FMD, stenting is generally reserved for cases in which angioplasty has failed or when required to manage renal artery dissection. If renal artery stenting is required, the potential for nephroptosis with subsequent mechanical stress on the stent should be considered in determining revascularization approach. Long areas of stenting should generally be avoided. Surgical revascularization remains a viable therapeutic option for patients with renal FMD with extensive disease not amenable to angioplasty.

Disclosures
Dr Gornik is a volunteer member of the medical advisory board of Fibromuscular Dysplasia Society of America, a nonprofit organization. The other authors have no conflict to report.

References

KEY WORDS: angiography • fibromuscular dysplasia • renal artery stenosis • stent fracture
Renal Artery Stent Fracture in Patients With Fibromuscular Dysplasia: A Cautionary Tale
Manjunath G. Raju, Christopher T. Bajzer, Daniel G. Clair, Esther S.H. Kim and Heather L. Gornik

Circ Cardiovasc Interv. 2013;6:e30-e31
doi: 10.1161/CIRCINTERVENTIONS.113.000193

Circulation: Cardiovascular Interventions is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2013 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-7640. Online ISSN: 1941-7632

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circinterventions.ahajournals.org/content/6/3/e30

Data Supplement (unedited) at:
http://circinterventions.ahajournals.org/content/suppl/2013/06/17/CIRCINTERVENTIONS.113.000193.DC1

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation: Cardiovascular Interventions can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation: Cardiovascular Interventions is online at:
http://circinterventions.ahajournals.org//subscriptions/
Supplemental Material

Patient 2: Digital subtraction arteriography in a 41-year-old female performed at our institution. Movie clip demonstrates respirophasic mobility of the right renal artery with deformity of the stent at its mid segment consistent with stent fracture.