Int. j. adv. multidisc. res. stud. 2025; 5(1):254-256

Received: 24-11-2024
Accepted: 04-01-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Right Renal Artery Stenosis in a 55-Year-Old Woman: A Case Study and Review of Literature

Phan Thai Hao
Pham Ngoc Thach University of Medicine, Ho Chi Minh City, Vietnam

DOI: https://doi.org/10.62225/2583049X.2025.5.1.3648
Corresponding Author: **Phan Thai Hao**

Abstract
Right renal artery stenosis (RAS) is a significant cause of secondary hypertension and renal dysfunction. This case report highlights the clinical presentation, diagnostic evaluation, and management of a 55-year-old woman diagnosed with right renal artery stenosis. A comprehensive review of the literature focuses on pathophysiology, diagnostic imaging, therapeutic approaches, and prognosis. This article aims to enhance understanding and emphasize early recognition to prevent complications and improve outcomes.

Keywords: Sustainability, Corporate Governance, Environmental and Agency Cost

Introduction

Renal artery stenosis (RAS) is a common vascular disorder that leads to narrowing of the renal arteries, causing reduced blood flow to the kidneys. This condition can result in renovascular hypertension and ischemic nephropathy, which are significant contributors to morbidity and mortality worldwide. RAS accounts for approximately 1% to 5% of cases of hypertension and is a leading cause of secondary hypertension, particularly in older adults [1, 2].

RAS is most commonly associated with atherosclerosis, which is responsible for about 90% of cases, especially in individuals over 50 years of age [3]. Fibromuscular dysplasia (FMD) represents a less common cause, affecting younger individuals, predominantly women [4]. The pathophysiology involves decreased renal perfusion, activation of the renin-angiotensin-aldosterone system (RAAS), and subsequent sodium retention and vasoconstriction, contributing to sustained hypertension and potential renal damage. Early identification and appropriate intervention are essential to prevent irreversible renal dysfunction and cardiovascular complications.

The clinical presentation of RAS can vary widely, ranging from asymptomatic cases detected incidentally during imaging studies to severe hypertension resistant to pharmacologic therapy [5]. Diagnosis often requires a combination of clinical assessment, laboratory evaluation, and imaging modalities such as Doppler ultrasonography, computed tomography angiography (CTA), magnetic resonance angiography (MRA), and digital subtraction angiography (DSA) [6].

This article discusses the case of a 55-year-old woman with right renal artery stenosis, emphasizing the importance of early recognition, accurate diagnosis, and a multidisciplinary approach to management. In addition, we provide a comprehensive review of the literature to aid in understanding the epidemiology, diagnostic tools, treatment options, and outcomes associated with RAS.

Case presentation

A 55-year-old woman presented with a 9 months felt unwell. She reported dizziness, and mild fatigue. Her medical history included hyperlipidemia. Family history was insignificant for cardiovascular disease.

Physical examination revealed a blood pressure of 128/88 mmHg and mild abdominal bruits on auscultation. Laboratory investigations showed elevated serum creatinine (86 µmol/L) and reduced estimated glomerular filtration rate (eGFR) of 56 mL/min/1.73 m². Serum lipid profile demonstrated hypercholesterolemia with low-density lipoprotein (LDL) at 3.87 mmol/L.

Diagnostic imaging

Renal ultrasonography showed right kidney atrophy with 77 x 23 mm. Renal Doppler ultrasonography identified elevated velocities in the right renal artery, raising suspicion for stenosis. Computed tomography angiography (CTA) confirmed a 95% narrowing of the proximal right renal artery (Fig 1). Digital subtraction angiography (DSA) was used for definitive evaluation (Fig 2).

Fig 1: Renal artery CT Angiography showed proximal right renal artery stenosis 90-95% with plaque and right renal atrophy

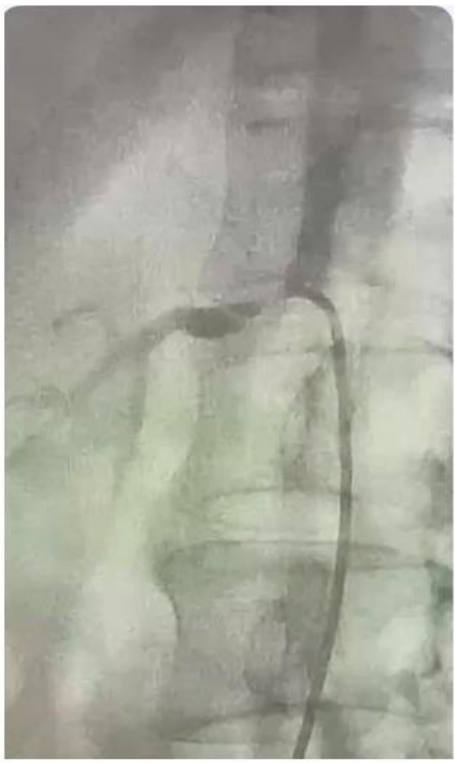

Fig 2: Digital subtraction angiography displayed proximal right renal artery stenosis 90%

Pathophysiology and Risk Factors

Renal artery stenosis leads to reduced perfusion, activating the renin-angiotensin-aldosterone system (RAAS) and causing vasoconstriction and sodium retention. Chronic ischemia may result in renal atrophy. Risk factors include:

- **Atherosclerosis:** Most common in older adults.
- **Fibromuscular Dysplasia:** Typically affects younger women.
- **Hypertension and Hyperlipidemia:** Accelerate vascular damage.
- **Smoking:** Promotes endothelial dysfunction and plaque formation.

Treatment and Management

Medical Therapy

Initial management focused on controlling blood pressure and lipid levels. Angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) were prescribed cautiously due to the risk of further reducing renal perfusion. Statins and antiplatelet agents were initiated to manage hyperlipidemia and prevent thrombosis.

Interventional Approaches

Given the severity of stenosis and resistant hypertension, the patient underwent percutaneous transluminal renal angioplasty (PTRA) with stent placement (Fig 3). Post-procedure, her blood pressure stabilized at 125/80 mmHg with reduced antihypertensive requirements. Renal function remained stable.

Fig 3: BMS Dynamic Renal 5 x 19 mm was placed over proximal right renal artery

Follow-Up

At 2 days follow-up, the patient demonstrated improved renal function (creatinine: 0.77 mg/dL, eGFR: 91.04 mL/min/1.73 m²) and felt well. She was on Aspirin 81 mg, Clopidogrel 75 mg, Rosuvastatin 10 mg and Metoprolol succinate 25 mg.

Discussion

Renal artery stenosis represents a complex clinical condition that demands careful evaluation and individualized treatment. While medical therapy remains the cornerstone of management, particularly in mild-to-moderate cases, interventional approaches such as percutaneous transluminal renal angioplasty (PTRA) with or without stent placement

are indicated in cases of severe stenosis or resistant hypertension [6].

Several studies have explored the efficacy of revascularization procedures. The ASTRAL trial (2009) suggested that revascularization may not provide significant benefits over optimal medical therapy in patients with mild-to-moderate RAS [3]. Conversely, the CORAL trial (2014) demonstrated that stenting combined with medical therapy effectively lowered blood pressure and cardiovascular events in patients with severe hypertension [2]. These conflicting results highlight the need for individualized treatment decisions based on the severity of stenosis, renal function, and response to medical therapy.

In this case, the patient's severe stenosis and resistant hypertension necessitated intervention. PTRA with stenting resulted in significant blood pressure improvement and preservation of renal function. This outcome supports the role of revascularization in selected patients, particularly those with symptomatic or progressive disease.

Future research should aim to refine criteria for selecting patients most likely to benefit from revascularization, as well as develop newer techniques for imaging and intervention. Long-term follow-up studies are also needed to assess durability and outcomes.

Literature Review

The literature on renal artery stenosis highlights significant debates regarding the efficacy of medical therapy versus revascularization. The ASTRAL trial (2009) concluded that revascularization provided no substantial benefit over optimal medical therapy in patients with moderate RAS [3]. However, critics argue that the trial included patients with less severe disease, which may have biased results against intervention [2].

The CORAL trial (2014) demonstrated that revascularization combined with medical therapy improved blood pressure and cardiovascular outcomes in patients with severe stenosis and resistant hypertension [2]. This finding supports intervention in high-risk groups.

Additional studies have emphasized imaging advances, such as contrast-enhanced MRA and CTA, to improve diagnostic accuracy. Recent data suggest that non-invasive imaging can reliably stratify patients who may benefit most from revascularization.

Overall, a patient-specific approach integrating clinical presentation, imaging findings, and response to medical therapy is critical in deciding the need for intervention. Future studies should focus on refining these selection criteria and developing less invasive techniques.

Prognosis

Prognosis depends on timely diagnosis and intervention. Patients with preserved renal function often achieve better outcomes post-revascularization. Delayed treatment can lead to irreversible renal damage and increased cardiovascular risk.

Conclusion

This case underscores the importance of recognizing renal artery stenosis as a cause of resistant hypertension and renal impairment. Comprehensive evaluation and individualized treatment plans, including medical therapy and interventional procedures, are essential for optimizing outcomes. Future research should focus on refining patient selection criteria for revascularization.

References

1. Textor SC, Lerman LO. Renovascular hypertension and ischemic nephropathy. Am J Hypertens. 2010; 23(11):1159-1169.
2. Cooper CJ, *et al*. CORAL Investigators. N Engl J Med. 2014; 370(1):13-22.
3. Wheatley K, *et al*. Revascularization versus medical therapy for renal-artery stenosis. N Engl J Med. 2009; 361(20):1953-1962.
4. Safian RD, Textor SC. Renal-artery stenosis. N Engl J Med. 2001; 344(6):431-442.
5. Hirsch AT, *et al*. Circulation. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): A collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral Arterial Disease): Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation. 2006; 113(21):e463-e654.
6. Chrysochou C, *et al*. High-risk clinical presentations in atherosclerotic renovascular disease: Prognosis and response to renal artery revascularization. Hypertension. 2014; 63(4):641-646.