BJCR
Brazilian Journal of Case Reports

PCAA
Publicações Científicas de Acesso Aberto

Case Report

Renal artery pseudoaneurysm after renal biopsy: case report

André Frizon [1,*], Rodrigo Bello [2], Mauricio Macagnan [1], Larissa Voss [1], Esther Schaffel [2]

[1] Department of Radiology, Hospital de Clínicas Ijuí, Ijuí, Rio Grande do Sul, RS, Brazil.
[2] Department of Radiology, University of Iowa Hospitals and Clinics, Iowa City, United States.

* Correspondence: andre.frizon@gmail.com.

Abstract: Renal artery pseudoaneurysm (RAP) is a rare and potentially serious complication that can occur after renal biopsy procedures. We present the case of a 37-year-old patient who developed RAP after a renal biopsy, presenting signs of hypovolemic shock shortly after the procedure without signs of hematuria. A computed tomography scan of the abdomen was performed which revealed a significant perirenal hematoma and RAP formation. The patient underwent endovascular embolization, which successfully controlled the hemorrhage. After 6 months of evolution, a small degree of renal atrophy was identified, a known complication following embolization. This case report highlights the importance of early recognition and appropriate management of RAP following renal biopsies and provides information on diagnostic and treatment approaches for this uncommon complication.

Keywords: Renal artery pseudoaneurysm; Renal biopsy; Percutaneous procedures; Embolization.

Citation: Frizon A, Bello R, Macagnan M, Voss L, Schaffel E. Renal artery pseudoaneurysm after renal biopsy: case report. Brazilian Journal of Case Reports. 2024 Oct-Dec;04(4):12-17.

Received: 4 September 2023
Accepted: 8 February 2024
Published: 9 February 2024

1. Introduction

Kidney biopsies play a fundamental role as a diagnostic tool for various kidney conditions, ranging from glomerulopathies to tumors, nodules, and cysts [1, 2]. Although they provide accurate information, these procedures are not free from complications, with aneurysms and pseudoaneurysms emerging as relevant concerns. These complications, identified by the formation of pulsatile hematomas in communication with the arterial wall, represent significant clinical challenges [3].

The incidence of renal artery pseudoaneurysm (RAP) varies between 3.5% and 5.5%, showing an increasing trend due to the increasing use of renal interventions. The direct consequence of this increase is the more frequent observation of complications, which range from small bleeding in the renal parenchyma to intra-abdominal hemorrhages [3]. To effectively address these complications, it is imperative to have accurate diagnostic methods. In this context, advanced techniques such as color Doppler ultrasound, computed tomography and magnetic resonance imaging play a crucial role in the early detection of renal artery pseudoaneurysms. When necessary, angiography emerges as the gold standard for diagnosis and treatment, offering high success rates in the management of this complex condition [4].

This article aims to present a case report of post-biopsy RAP while also providing an approach to the signs and symptoms, current diagnostic methods and therapeutic techniques used to treat. The crucial importance of early recognition and the application of appropriate interventions is highlighted, aiming to prevent potential complications and preserve renal function.

2. Case Report

Female patient, 37 years old, white, with a history of arterial hypertension that has been under control for 3 years, showing signs of chronic nephropathy in addition to microscopic hematuria for at least 6 months. She had also been experiencing episodes of recurrent cystitis and sporadic pain in her flanks and was referred to the nephrology service. Laboratory tests revealed loss of renal function (creatinine 2.1 mg/dl) and a normal coagulation profile. A diagnostic renal biopsy was requested, which was performed percutaneously under ultrasound guidance. An 18 Gauss needle was used and 4 fragments of the cortex of the right kidney were obtained: 2 fragments for anatomopathological analysis and 2 fragments for immunohistochemical analysis.

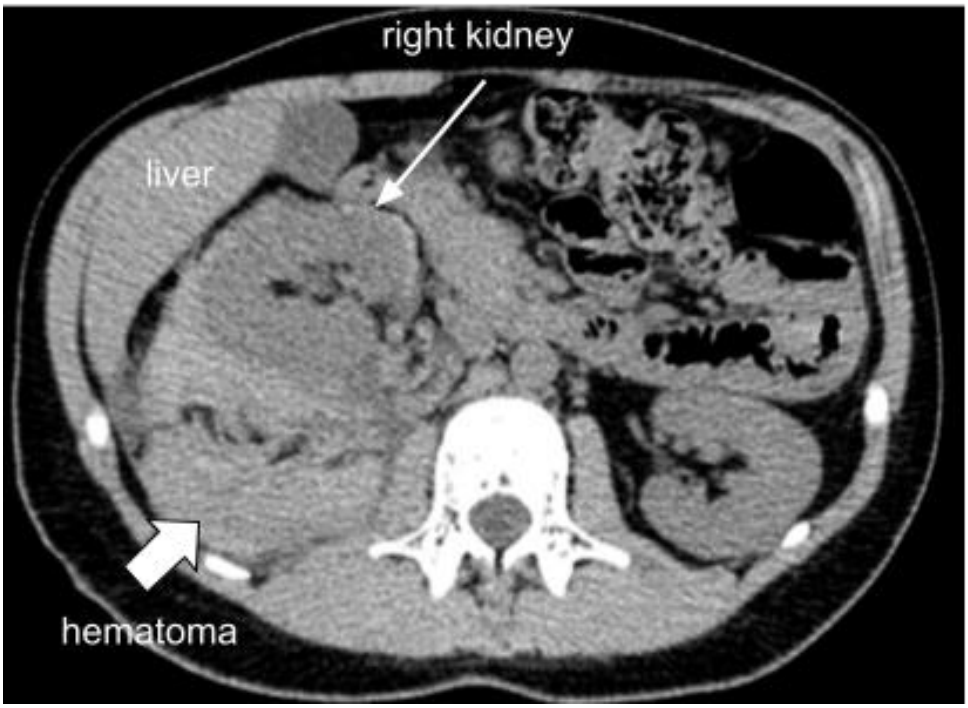

Figure 1: Axial computed tomography scan demonstrating perirenal hematoma determining anterior displacement of the kidney.

One hour after the procedure, the patient presented significant pain in the right flank, paresthesia in the hands and feet, progressive dyspnea, chest tightness and hypotension. A computed tomography scan was performed which revealed a retroperitoneal hematoma with an estimated volume of 300 ml and signs of active bleeding (Figure 1). In tomography images in the arterial phase, the formation of a RAP with a diameter of 1.2 cm was demonstrated in the central region of the kidney (cortico-medullary transition). The patient was referred for angiography and catheterization of the right posterior segmental renal artery was performed, using a metal coil and intravascular thrombin, with immediate interruption of perirenal hemorrhage and control of hypotension (Figures 2 to 4).

3. Discussion and conclusion

Renal artery pseudoaneurysm (RAP) is an uncommon clinical condition that can arise after several events, including renal biopsy, renal surgery, renal transplantation, penetrating or blunt renal trauma [1–5]. The signs and symptoms associated with RAP may appear immediately after the triggering event or present later. Hematuria appears as a common symptom related to RAP, resulting from the erosion of the pseudoaneurysm into the adjacent renal collecting system, generally occurring 2 to 4 weeks after the injury [6].

Figure 2: Renal angiography demonstrating a pseudoaneurysm in the central artery measuring 1.2 cm.

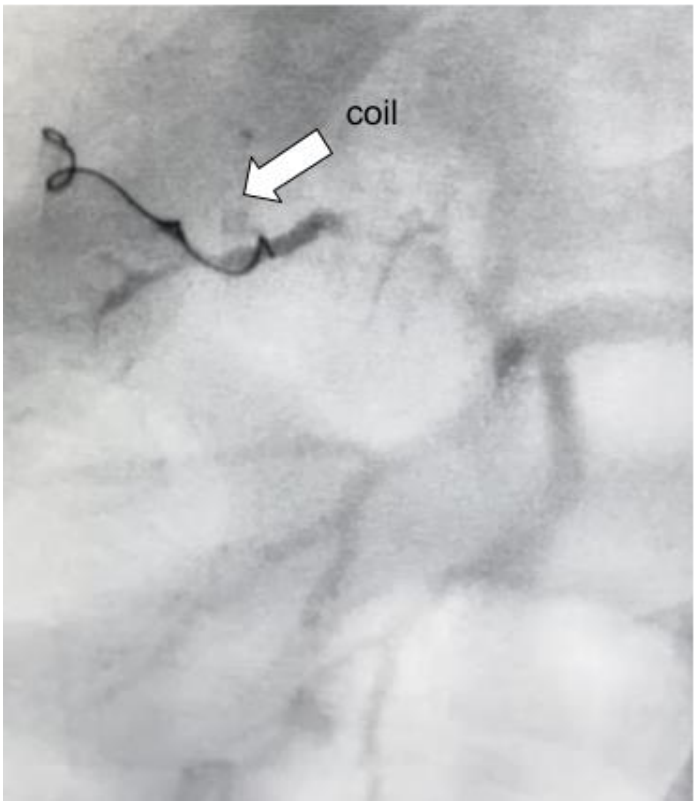

Figure 3: Arterial embolization with uncontrolled coil causing obliteration of arterial flow.

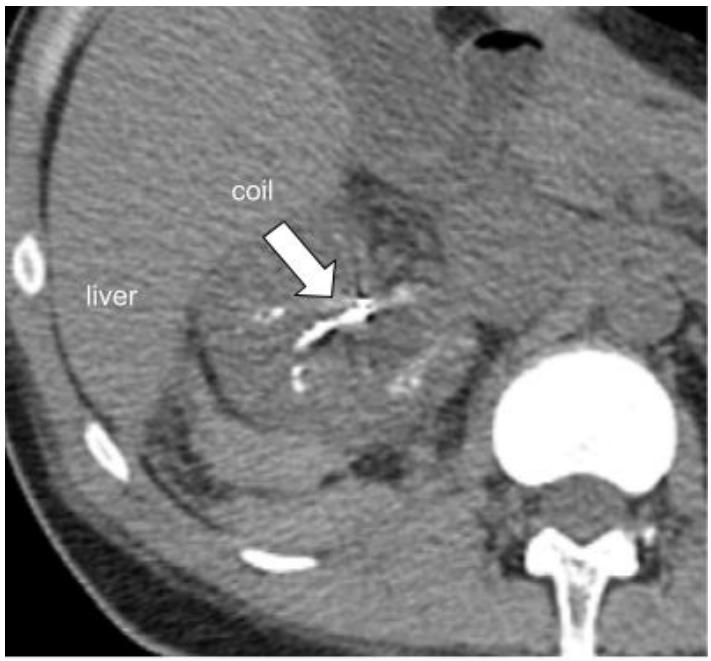

Figure 4: CT post endovascular procedures and hemorrhage control – coil with metallic density.

In scenarios of acute kidney injury, bleeding may not occur immediately due to factors such as hypotension, local formation of clots and pressure exerted by adjacent tissues [7, 8]. The formed clot can subsequently dissolve, allowing recanalization between the intravascular and extravascular spaces and culminating in the formation of the pseudoaneurysm. Although angiography has traditionally been the standard tool for diagnosing RAP, non-invasive methods such as CT angiography, color Doppler ultrasound, or magnetic resonance angiography may be preferable when the patient is stable. Due to its ability to image the entire urinary tract, CT angiography has become the gold standard for monitoring urinary tract conditions. Distinctive features of RAP, such as high attenuation with similar density to adjacent arterial vessels, can be identified using these diagnostic methods. Color Doppler ultrasound, in turn, offers valuable insight, highlighting the characteristic turbulent flow within the lesion [8, 9].

In the therapeutic context, angiography remains crucial, especially when the patient's stability allows the choice of less invasive methods. Embolization, with success rates greater than 90%, has emerged as an effective approach for treating RAP. However, considerations for embolization include the potential risk of generalized ischemia due to thrombosis of a major vascular branch and the possibility of permanent renal damage [5, 9–13].

The option for endovascular intervention in our case was determined by the size of the pseudoaneurysm (1.2 cm) and central location in the kidney, factors that make percutaneous embolization difficult under ultrasound guidance [9]. Bagheri et al. [9] describe 29 cases of pseudoaneurysms treated transcutaneous using a mixture of autologous blood and oxidized reactive cellulose as a hemostatic agent, achieving great therapeutic success, low cost and absence of loss of renal function. In this study, exclusion criteria for percutaneous treatment were also included: pseudoaneurysm larger than 3 cm or very small (not identified by Doppler ultrasound), location in the central or extracapsular renal artery with intense hemorrhage. As in our case the biopsy was performed in a center with availability of an angiograph and a team with experience in endovascular treatment, the least aggressive treatment with a greater probability of preserving renal function was chosen. If the endovascular approach failed, the patient would undergo nephrectomy as the last therapeutic option, due to intra and postoperative risks in addition to organ loss [1, 14, 15].

This case highlights the importance of conducting interventional procedures in specialized centers, with trained staff to face possible life-threatening complications. Severe cases in young patients such as the one described here are even more relevant as it is a small pseudoaneurysm that is difficult to manage. Unlike most cases described in the literature, hematuria was not identified, and greater attention is needed to the initial signs of hypovolemic shock immediately after the biopsy. The anatomopathological examination of this patient demonstrated focal and segmental glomerulosclerosis, which underwent clinical treatment and reversed the loss of renal function, maintaining normal levels of urea and creatinine throughout an 18-month follow-up. A contrast-enhanced computed tomography revealed a small renal atrophy, affecting approximately 20% of the parenchyma at the site of the vascular segment of the coil. This complication is also documented and in agreement with the literature in post-embolization management [3, 8, 12, 13].

The case report type of study presents limitations inherent to the method itself and does not have the ability to make quantitative or qualitative population inferences. However, rare situations as mentioned here have valuable descriptive importance and can contribute to guiding new population studies and deepening knowledge on the topic. One of the hypotheses could be the prophylactic use of a low-cost, high-viscosity coagulating agent applied to the puncture site, right after the biopsy, which could maintain intra-tissue pressure during the period of tissue regeneration, thus preventing the formation of pseudoaneurysm.

Funding: None.

Research Ethics Committee Approval: We declare that the patient approved the study by signing an informed consent form and the study followed the ethical guidelines established by the Declaration of Helsinki.

Acknowledgments: None.

Conflicts of Interest: None.

Supplementary Materials: None.

References

1. Roman LI, Efel CF, França VT, Merten CM, Dummer CD. Renal artery pseudoaneurysm. J Bras Nefrol 2017;39:458–61. https://doi.org/10.5935/0101-2800.20170080.
2. Salam B, Khandwala K. Lumbar Artery Pseudoaneurysm Following Renal Biopsy. Cureus 2018. https://doi.org/10.7759/cureus.2634.
3. Soares VHL, Filho JE de andrade, Filho FA de CL, Bernhardt GP. Tratamento endovascular embolizante de pseudoaneurisma em rim transplantado. Revista de Medicina Da UFC 2020;60:59–62. https://doi.org/10.20513/2447-6595.2020v60n1p59-62.
4. Ramsay DW, Marshall M. Lumbar artery pseudoaneurysm following renal biopsy: Treatment with ultrasound-guided thrombin injection. Australas Radiol 2002;46:201–3. https://doi.org/10.1046/j.1440-1673.2001.01038.x.
5. Kubal C, Cacciola R, Riley P, Ready A. Internal Iliac Artery Pseudoaneurysm Following Renal Transplant Biopsy Successfully Treated with Endovascular Stenting and Thrombosis: A Case Report. Transplant Proc 2007;39:1676–8. https://doi.org/10.1016/j.transproceed.2007.03.018.
6. Yun GY, Kim SK, Park SK, Moon SJ, Lee JE, Song SW, et al. Asymptomatic renal pseudoaneurysm after percutaneous renal biopsy. Kidney Res Clin Pract 2013;32:87–9. https://doi.org/10.1016/j.krcp.2013.04.006.
7. Hansrivijit P, Gadhiya KP, Zelonis SD, Cinicola JT. Late-Onset Kidney Biopsy-Associated Retroperitoneal Hemorrhage in Lupus Nephritis: A Case Report of Pseudoaneurysm and Microaneurysm Formations. Case Rep Nephrol Dial 2021;11:55–62. https://doi.org/10.1159/000512229.
8. Eman Shawky Geneidi, Nivan Hany Khater, Mostafa Farid, Mohammed Sabry Abdo Attaallah alalfy. Role of renal artery embolization in treatment of iatrogenic renal bleeding. J Pak Med Assoc 2023;73:S305–9. https://doi.org/10.47391/JPMA.EGY-S4-59.
9. Bagheri S, Ghadamzadeh M, Chavoshi M. Percutaneous embolization of renal pseudoaneurysms: A retrospective study. Indian Journal of Urology 2022;38:296. https://doi.org/10.4103/iju.iju_109_22.
10. Yang HK, Koh ES, Shin SJ, Chung S. Incidental renal artery pseudoaneurysm after percutaneous native renal biopsy. BMJ Case Rep 2013. https://doi.org/10.1136/bcr-2012-006537.

11. Chataut D, Maharjan S, Panta O, Ghimire R. A Rare Case of Spontaneous Asymptomatic Renal Artery Pseudoaneurysm Treated with Coil Embolization: A Case Report. Journal of Clinical Interventional Radiology ISVIR 2017;01:056–60. https://doi.org/10.1055/s-0036-1597841.
12. Gorsi U, Soundararajan R, Jugpal TS, Lal A, Shetty SB, Kalra N, et al. Interventional Radiology Management of Renal Pseudoaneurysms: Experience at a Tertiary Care Hospital. Journal of Clinical Interventional Radiology ISVIR 2020;4:083–7. https://doi.org/10.1055/s-0040-1715026.
13. Haochen W, Jian W, Li S, Tianshi L, Xiaoqiang T, Yinghua Z. Superselective renal artery embolization for bleeding complications after percutaneous renal biopsy: a single-center experience. Journal of International Medical Research 2019;47:1649–59. https://doi.org/10.1177/0300060519828528.
14. Mallat SG, Abou Arkoub R, El Achkar B, Saade C, El-Merhi F. Renal pseudoaneurysm formation post allograft biopsy: a case report. BJR|case Reports 2017;3:20150502. https://doi.org/10.1259/bjrcr.20150502.
15. Rafik H, Azizi M, El Kabbaj D, Benyahia M. Angio-embolization of a renal pseudoaneurysm complicating a percutaneous renal biopsy: A case report. Pan African Medical Journal 2015;22:. https://doi.org/10.11604/pamj.2015.22.278.7976.