

Angioembolization followed by nephrectomy for giant renal angiomyolipoma in a 30-year-old woman: a case report

Akhmad Miftahudin Fazri¹, Her Bayu Widyasmara², Indra Raymond³



pISSN: 0853-1773 • eISSN: 2252-8083
<https://doi.org/10.13181/mji.cr.268210>
Med J Indones. 2026;35:141–6

Received: May 21, 2025
Accepted: February 19, 2026
Published online: May 18, 2026

Authors' affiliations:

¹Department of Urology, Faculty of Medicine, Universitas Padjajaran, Hasan Sadikin Hospital, Bandung, Indonesia, ²Department of Urology, Chasbullah Abdulmadjid Hospital, Bekasi, Indonesia, ³Department of Vascular and Endovascular Surgery, Chasbullah Abdulmadjid Hospital, Bekasi, Indonesia

Corresponding author:

Akhmad Miftahudin Fazri
 Department of Urology, Faculty of Medicine, Universitas Padjajaran, Hasan Sadikin Hospital, Jalan Pasteur No. 38, Bandung 40161, West Java, Indonesia
 Tel/Fax: +62-22-2034953/
 +62-22-2032216
E-mail: akhfazri@gmail.com

ABSTRACT

Renal angiomyolipoma (AML) is a benign renal tumor that can grow significantly and cause complications, such as hemorrhage and pain, necessitating active intervention. Managing giant AML in young women remains challenging, and evidence for multimodal approaches is limited. This case report describes the management of a giant AML by selective renal angioembolization (RAE) followed by total nephrectomy. A 30-year-old woman presented with an 18 × 20 × 22 cm AML, resulting in bleeding and kidney dysfunction. Total nephrectomy was performed after stabilization with RAE. This multimodal approach reduces surgical risk and preserves renal function. Combining RAE with nephrectomy shows promise for treating complex giant AML and warrants further research to optimize the technique and assess the long-term outcomes.

KEYWORDS angiomyolipoma, nephrectomy, women

Renal angiomyolipomas (AMLs) comprise mature adipose tissue, smooth muscle, and dysmorphic blood vessels. AML has an incidence rate of 0.3–3.0%.¹ It can occur occasionally or be linked to sporadic lung lymphangioleiomyomatosis or tuberous sclerosis complex. Although often asymptomatic, giant AMLs (>4 cm) pose significant risks, such as spontaneous hemorrhage, pain, and functional impairment of the kidney.² These risks become pronounced when tumor enlarges rapidly, necessitating timely and effective intervention.³

The management strategies for AMLs include active surveillance, pharmacological therapy, minimally invasive procedures, and surgical interventions. Among these, selective renal angioembolization (RAE) has emerged as a valuable treatment approach for arresting the tumor size

and mitigating hemorrhage risk while preserving renal function. Approximately 10% of AML patients experience hypovolemic shock due to retroperitoneal hemorrhage, also known as Wunderlich syndrome. Fat identified on contrast-enhanced abdominal computed tomography (CT) scans as 20 Hounsfield units (HUs) or less in a renal lesion confirms diagnosis of AML. In certain cases, total or partial nephrectomy may be combined with angioembolization to achieve optimal outcomes, particularly in giant AMLs.^{4,5}

This was an uncommon clinical case wherein the VortX-35 coil was effectively employed for RAE, followed by total nephrectomy, to manage giant renal AML in a 30-year-old woman. This approach differed from those documented in existing literature, which focuses on nonspecific coils or particles.^{6,7} The analysis provided details of the unique aspects of this case

and contextualized it within the current literature. Furthermore, this study aimed to highlight best practices while enhancing the clinical understanding of this pathology in women.

CASE REPORT

A 30-year-old woman presented to our hospital with a sudden lump on the right flank the day before admission. Over the preceding 2 days, she experienced moderate to severe dull pain and reported unusual fatigue while engaging in her daily routine. She did not take any medications and alcohol. The lump was painful with approximately 15 × 20 cm of the area being palpable. She had given birth approximately 17 months ago. She had complaints regarding defecation and urination. Vital sign examination revealed tachycardia and normal blood pressure.

Laboratory examination revealed a hemoglobin (Hb) level of 10.8 g/dl, leukocytes of 15,700 cells/ μ l, and platelets of 333,000 cells/ μ l. The urea and creatinine levels were 34 mg/dl and 0.71 mg/dl, respectively. She underwent hematologic re-examination 3 days later. The Hb level dropped to 6.8 g/dl, and the hematocrit level was 20.3%. Leukocyte and platelet levels were 9,600 cells/ μ l and 832,000 cells/ μ l, respectively. Hemodynamic stability and normal Hb levels were achieved because of an overall improvement in her condition and previous blood transfusions. She received a transfusion of packed red blood cell totaling approximately 450 ml, after which the laboratory results showed an Hb value of 9.9 g/dl, leukocytes of 7,300 cells/ μ l, and platelets of 697,000 cells/ μ l. Subsequent abdominal ultrasonography revealed a suspected solid heterogeneous mass in the caudal right

kidney extending into the lower right abdominal cavity, along with minimal right perirenal ascites (Figure 1).

Contrast-enhanced abdominal CT was performed for further evaluation. The imaging results revealed a solid mass with a dominant fat composition (a diameter of 18 cm) in the lower pole of the right kidney (30 HU). The mass pressed the surrounding organs and abdominal aorta to the left side, and was suspected to be a renal AML. Contrast-enhanced abdominal CT revealed findings consistent with a right renal AML (Figure 2). Laboratory results were normal, with an Hb level of 10.5 g/dl, leukocyte count of 7,300 cells/ μ l, and platelet count of 721,000 cells/ μ l. She underwent contrast-enhanced abdominal CT post RAE with the impression that the size and shape of the tumor remained the same, as shown in Figure 2.

She was diagnosed with a giant right renal AML and underwent selective RAE with a VortX-35 7 × 5.5 mm coil in the interlobar and inferior branches of the renal artery. No pseudoaneurysms were observed postoperatively (Figure 3).

She was scheduled for right total nephrectomy within a week after embolization, which seemed clinically feasible. Preoperative laboratory examination revealed an Hb level of 12.6 g/dl, leukocytes of 4,800 cells/ μ l, and platelets of 389,000 cells/ μ l. The urea and creatinine levels were 18 mg/dl and 0.70 mg/dl, respectively. Consequently, a chevron incision was made. To facilitate easy access to the renal pedicle, the mass was mobilized and delivered completely outside the belly, while maintaining intact vascularity. With a blood loss of approximately 150 cc, the renal pedicle was separated which was surrounded by a vascular loop. Preoperative angioembolization is critical to minimizing intraoperative bleeding and facilitating

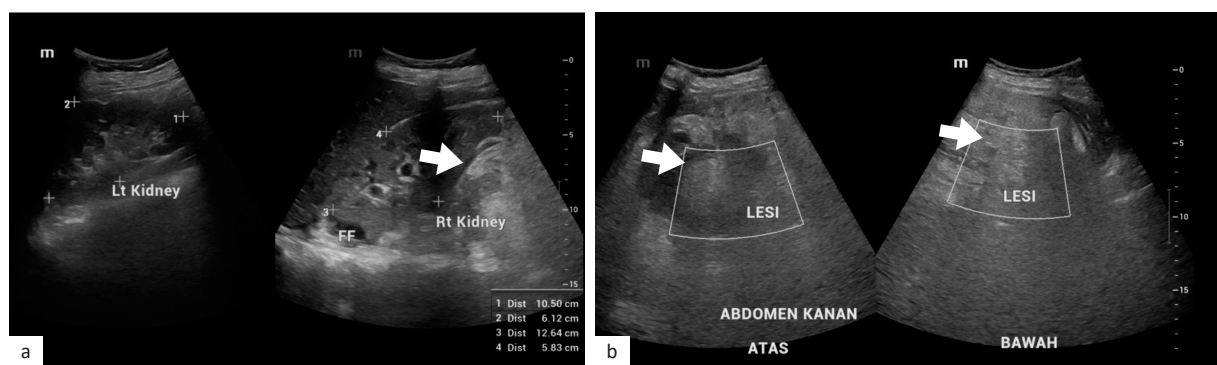


Figure 1. Abdominal ultrasonography. (a) The shape and size of the left kidney were normal, and there was a suspected solid heterogeneous mass in the caudal right kidney (white arrow); (b) suspected solid heterogeneous mass extending to the lower right abdominal cavity (white arrows)

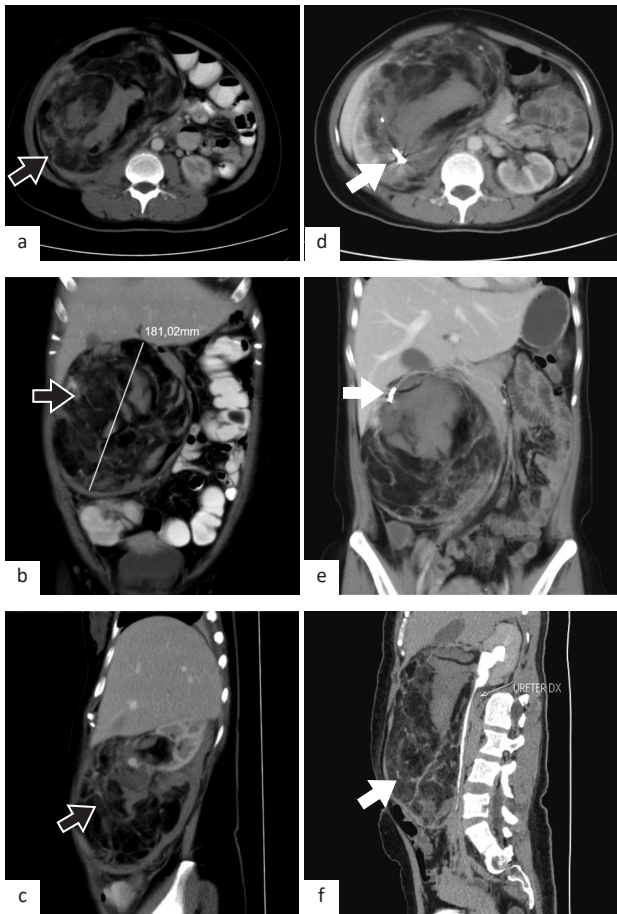


Figure 2. Contrast-enhanced abdominal CT scan showed right renal AML pre- and post-RAE. Pre-RAE imaging showing a large hematoma replacing the lower pole of kidney (black arrows), size 18 × 20 × 22 cm, pressing the abdominal aorta to the left side in: (a) axial; (b) coronal; (c) sagittal plane. Post-RAE imaging includes axial and coronal CT scans (d, e) showing a metallic coil at the right renal artery branch (white arrows); (f) sagittal showed a giant AML measuring about 18 × 20 × 22 cm at the inferior pole of the right kidney; there was no pseudoaneurysm after coils insertion (white arrow). AML=angiomyolipoma; CT=computed tomography; RAE=renal angioembolization

safe tumor mobilization, owing to the vascular nature of the lesion. The excised mass was subjected to histopathological examination, which validated the renal AML diagnosis (Figure 4). The postoperative course was uneventful, renal function remained stable, and she was discharged in a stable condition. At outpatient follow-up, she remained asymptomatic with no evidence of recurrence or impaired renal function. Verbal and written consent of this case report was obtained from the patient.

DISCUSSION

The diagnosis and management of a patient with giant renal AML demonstrate that even benign tumors can pose life-threatening hemorrhagic risks, necessitating a holistic treatment strategy that combines selective RAE with definitive nephrectomy, rather than relying on a single-modality treatment strategy. AML is present in 0.6% of women and 0.28% of men.⁸ According to Prasad et al,⁹ middle-aged women are more likely to have renal AML. According to historical records, AML affects women more often than males, with a 2:1 sex ratio. In this case, the patient presented with the triad of right flank pain, a palpable mass, and hematuria. This profile, along with a tumor size >4 cm, categorized the patient as at high risk for recurrent spontaneous hemorrhage. Therefore, urgent intervention was warranted instead of mere observation. Venous invasion in AML is uncommon but can occur, leading to complications such as thrombus formation in the renal vein and inferior vena cava.¹⁰ This underscores the importance of a comprehensive and strategically aggressive treatment plan.

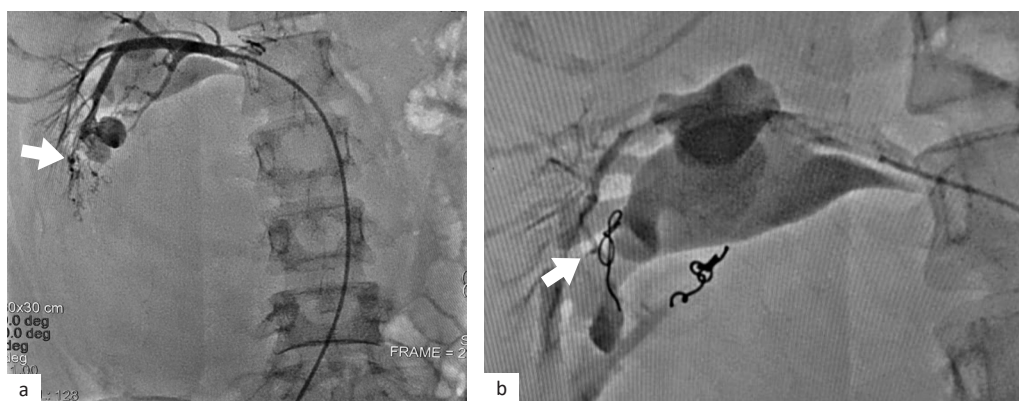


Figure 3. RAE of the inferior and middle right renal arteries. (a) Right renal artery angiography showed a pseudoaneurysm with active blush in the middle and lower pole (white arrow); (b) selective arteriography and coils in the proximal of the pseudoaneurysms (white arrow)

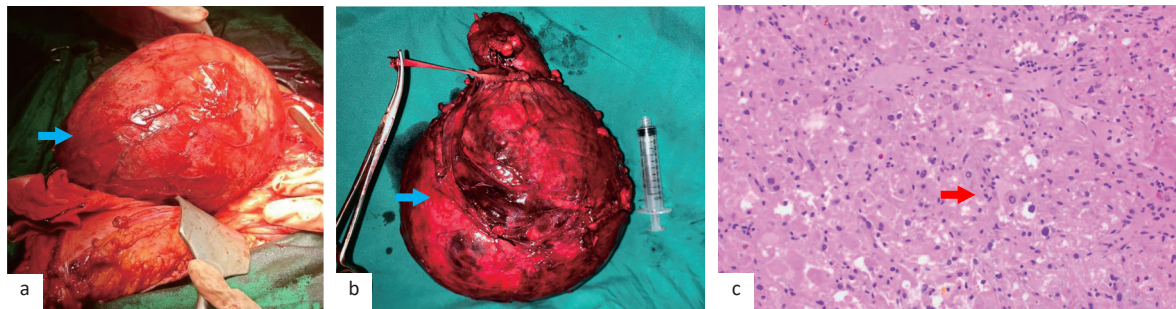


Figure 4. Intraoperative and histopathological findings of a giant renal angiomyolipoma (AML). (a, b) Intraoperative findings showed a giant right AML (blue arrows); (c) the histopathology shows the proliferation of blood vessels, fat, and a small amount of muscle tissue, interspersed with fibrous connective tissue and infiltration of histiocyte cells as well as multinucleated cells at the tumor margins, confirming the diagnosis of AML (red arrow)

The major clinical complication in AML is spontaneous bleeding from the renal collecting system or retroperitoneum. In this case, a significant drop in Hb levels from 10.8 g/dl to 6.8 g/dl prior to RAE has been linked to Wunderlich syndrome, a condition featuring spontaneous renal hemorrhage, even though the patient may not exhibit obvious hemodynamic instability. This phenomenon may cause hypovolemic shock which then progresses to Wunderlich syndrome. This can be fatal if not treated promptly. This syndrome is particularly common in AMLs >4 cm in size, typically presenting with acute flank pain and signs of internal bleeding. The observed drop in Hb levels serves as an indicator of active internal hemorrhage, making it a crucial consideration in the pre-embolization assessment.¹¹ No hemodynamic disturbances were observed. Reports have suggested that central placement in the right kidney favors venous invasion. This could be explained by the shorter path to the renal vein. Venous invasion is prevalent in all forms of AML.^{12,13}

In this case, selective RAE was chosen as the initial kidney-sparing procedure to control acute hemorrhage and mitigate intraoperative risk. In the RAE, the VortX coil is preferred because of its superior structural and mechanical properties, including predictable deployment and effective anchoring. Its synthetic fibers enhance thrombogenicity, enabling faster occlusion, and its design ensures a high packing density, minimizing the risk of recanalization. The controlled delivery system reduces coil migration, which is crucial for high-flow vessels such as the renal artery branches. Unlike liquid or particulate agents such as absolute ethanol and polyvinyl alcohol (PVA), particles produce diffuse ischemia that can initiate renal shrinkage ranging

from 26% to 34% of the parenchymal volume in follow-up studies. VortX coils ensure reliable occlusion and are user friendly, rendering them effective in managing renal hemorrhage and vascular lesions. These coils allow for controlled deployment within segmental or lobar arteries, thereby preserving the integrity of the surrounding tissue.^{14,15}

After RAE, surgical intervention is usually required when symptoms persist and bleeding recurs. Adhesions usually form within 72 hours after injury and are more extensive, from 10 days to 2 weeks.¹⁶ Renal exploration prioritizing nephrectomy preparation is warranted to prevent further clinical deterioration. Renal AML >4 cm is indicated for treatment with nephrectomy as adjuvant therapy.² If definitive nephrectomy is not performed, it may lead to hypovolemic shock, Wunderlich syndrome, and continuous bleeding.¹¹

Unlike many studies that reported mean diameter reductions of approximately 2 cm (approximately 25–30%) within 1–2 years after embolization, this patient showed no significant decrease in tumor size on follow-up imaging. This procedure typically result in significant tumor size reduction, as demonstrated by meta-analyses reporting a mean tumor diameter reduction of 2.09 cm, which translates to approximately 30% decrease (95% confidence interval: 16–44%).¹⁷ Long-term follow-up studies spanning 20.5 months have confirmed an average tumor size reduction of 26.2%.¹⁸ Our patient did not achieve the expected decrease in tumor size. Several factors may have contributed to these findings. The embolic agent used in this case may not have been the most effective for this specific tumor type. Ethanol-lipiodol emulsion, for example, had been shown to cause a shrinkage of $34.2 \pm 3.4\%$,

while PVA particles lead to a shrinkage of $26.3 \pm 3.0\%$. Notably, maximum shrinkage, typically a 30% median diameter decrease, is usually achieved after 2.2 years of follow-up.¹⁹ Individual biological variations in the tumor's response to embolization could also impact effectiveness.

Several case-specific factors could explain this discrepancy. First, coil-only embolization, while mechanically effective for hemostasis, may yield less volumetric shrinkage than more penetrative agents like ethanol-lipiodol or fine PVA particles, particularly in large, heterogeneous AML having complex vascular networks.¹⁵ Second, giant AML often possess substantial mature fat and thick-walled vessels; consequently, while devascularization may reduce bleeding risk, it may not induce significant radiologic changes within the relatively short follow-up period.²⁰ Third, maximum volume reduction typically occurs after more than 2 years, and since the follow-up period for this patient was significantly shorter, the absence of early shrinkage does not necessarily indicate a technical failure but rather reflects the time-dependent nature of post-embolization remodeling.²¹ Lastly, persistent high-risk morphology and symptoms after technically successful RAE suggested that the structural response of the lesion was limited, prompting the decision to proceed with nephrectomy despite adequate immediate hemostasis.²²

Coil embolization offers precise vessel occlusion and better preservation of the surrounding renal tissue but has distinct advantages and limitations. Technical success rates are impressive, reaching 95%, with a reduced risk of recanalization and strong thrombogenic effects. However, some drawbacks remain, particularly the higher costs associated with detachable coils and technical limitations such as coil migration risk and difficulties in vessel re-access if needed.²³

Currently, partial and total nephrectomy, angioembolization, and observation are the available therapeutic options.⁵ According to Oesterling et al,²⁴ symptomatic tumors <4 cm should be routinely monitored with CT or ultrasound, whereas those >4 cm should undergo angiography and may require surgery or arterial embolization. RAE is a minimally invasive procedure that involves occlusion of the blood supply to specific areas of the kidneys. In the context of giant AML, RAE serves several crucial purposes: reducing the vascularity of the tumor, minimizing the risk of hemorrhage during subsequent surgery, potentially

shrinking the tumor size, allowing for precise control over which areas of the kidney are affected, and potentially preserving healthy tissue.^{15,23} Performing nephrectomy within the first week after RAE is beneficial due to immature adhesions, reduced blood loss, shorter operation times, and lower morbidity and mortality risks. Delaying surgery to 10–14 days after RAE can lead to encountering mature adhesions, making the procedure more complex and increasing the risk of complications.²⁵

In severe renal hemorrhage or vascular injury, partial nephrectomy may be considered given the source of bleeding is accurately localized. This approach ensures sufficient viable renal parenchyma is preserved. However, total nephrectomy is preferred over partial resection in many clinical scenarios. This preference stems primarily from partial nephrectomy requiring the precise localization of the bleeding site and preservation of the remaining renal vasculature. In cases with massive hemorrhage, multiple lacerations, or diffuse parenchymal ischemia after embolization, attaining hemostasis while preserving adequate renal function is often technically infeasible. Partial resection under such circumstances poses a significant risk of persistent bleeding, postoperative urinoma, and impaired renal recovery. Following RAE, the renal parenchyma distal to the embolized vessel frequently becomes nonviable due to infarction. The devascularized tissue is susceptible to necrosis, infection, and delayed hemorrhage. In this setting, nephron-sparing surgery provides no functional advantage, as the majority of the renal parenchyma is already compromised.^{26,27}

Combining RAE with nephrectomy offers several potential advantages.²⁶ By decreasing the tumor's vascularity preoperatively, RAE can significantly mitigate the risk of intraoperative bleeding during total nephrectomy.^{4,5} This is particularly crucial for giant AML, which are markedly vascular. Reduced tumor size and vascularity following RAE can allow for more precise tumor excision during total nephrectomy, potentially leading to better preservation of healthy kidney tissue.²⁸ This approach enhances renal function preservation through RAE initiated tumor burden reduction, followed by nephron-sparing surgery, which may lower the risk of postoperative complications, such as Wunderlich syndrome.^{1,2,29}

In summary, we report the case of a young woman with a giant renal AML who was treated successfully

with selective RAE followed by total nephrectomy, demonstrating an innovative and promising approach to manage these complex tumors. This strategy integrates the advantages of both minimally invasive and traditional surgical techniques and has the potential to improve clinical outcomes, reduce surgical risks, and preserve renal function. However, this single-case report limits generalizability, and the short follow-up period prevents firm conclusions regarding long-term outcomes and recurrence risk. Future research should focus on refining this approach, establishing patient selection criteria, and conducting long-term follow-up studies to elucidate its role in the management of giant AML and complex renal tumors.

Conflict of Interest

The authors affirm no conflict of interest in this study.

Acknowledgment

We would like to express our gratitude to the Department of Urology, Faculty of Medicine, Universitas Padjajaran, and Hasan Sadikin Hospital, Bandung, West Java, Indonesia, as well as the Department of Urology, Chasbullah Abdulmadjid General Hospital, Bekasi, for their support in this study. We also extend our heartfelt thanks to the patient who participated in this research and her family.

Funding Sources

None.

REFERENCES

- Al-Hajjaj M. Giant renal angiomyolipoma: a case report. *Urol Case Rep.* 2021;38:101736.
- Gora BS, Singh S, Babu A, Lakhera KK, Patel P, Singhal PM, et al. Giant renal angiomyolipoma: a rare and formidable challenge: a case report. *Indian J Surg Oncol.* 2024;15(Suppl 3):456–9.
- Combes A, McQueen S, Palma CA, Benz D, Leslie S, Sved P, et al. Is size all that matters? New predictors of complications and bleeding in renal angiomyolipoma. *Res Rep Urol.* 2023;15:113–21.
- Restrepo JC, Millan DA, Sabogal CA, Bernal AF, Donoso WD. New trends and evidence for the management of renal angiomyolipoma: a comprehensive narrative review of the literature. *J Kidney Cancer VHL.* 2022;9(1):33–41.
- Fernández-Pello S, Hora M, Kuusk T, Tahbaz R, Dabestani S, Abu-Ghanem Y, et al. Management of sporadic renal angiomyolipomas: a systematic review of available evidence to guide recommendations from the European Association of Urology Renal Cell Carcinoma Guidelines Panel. *Eur Urol Oncol.* 2020;3(1):57–72.
- Ahmadov J, Çay F, Eldem G, Akdoğan B, Bilen CY, Aki FT, et al. Endovascular management of renal angiomyolipomas: do coils have a benefit in terms of clinical success rates? *Diagn Interv Radiol.* 2022;28(6):597–602.
- Koesbandono, Sidipratomo P, Utomo R, Tansol C, Kurniawan YC. Transarterial embolization in Wunderlich syndrome due to recanalization of giant renal angiomyolipoma pseudoaneurysm: a case report and literature review. *Egypt J Radiol Nucl Med.* 2024;55(132).
- Bouaziz H, Ghalib M, Tounsi N, Riahi N, Bouzaïene H, Ziadi J, et al. A renal angiomyolipoma with a challenging presentation: a case report. *J Med Case Rep.* 2021;15(1):477.
- Prasad SR, Surabhi VR, Menias CO, Raut AA, Chintapalli KN. Benign renal neoplasms in adults: cross-sectional imaging findings. *AJR Am J Roentgenol.* 2008;190(1):158–64.
- Abdessater M, El Khoury J, Kanbar A, Kheir P. Renal angiomyolipomas with inferior vena cava invasion. *SN Compr Clin Med.* 2020;2:2870–82.
- Gaffoor N, Mysorekar VV, Gunadal S, Divyashree BN, Sandeepa S, Murali N. Wunderlich syndrome: a rare case associated with bleeding renal angiomyolipoma (AML). *Indian J Nephrol.* 2024;34(3):271–3.
- Gürsoy D, Seçinti İE, Hakverdi S, Görür S. Renal angiomyolipoma: a clinicopathological study of seven cases and review of the literature. *Bull Urooncol.* 2020;19(3):118–23.
- Vos N, Oyen R. Renal angiomyolipoma: the good, the bad, and the ugly. *J Belg Soc Radiol.* 2018;102(1):41.
- Tsauo J. Embolization coils: materials, designs, and future directions. *International J Gastrointest Interv.* 2025;14(3):93–7.
- Jin L, Chun HJ, Oh JS, Choi BG, Lee HG, Kim IJ. Selective arterial embolization of renal angiomyolipoma: comparing ethanol-lipiodol emulsion and polyvinyl alcohol particles as embolic agents. *Diagn Interv Radiol.* 2023;29(1):170–4.
- Ding BT, Decruz J, Kunnasegaran R. Time-sensitive ambulatory orthopaedic soft-tissue surgery paradigms during the COVID-19 pandemic. *Int Orthop.* 2020;44:1531–8.
- Lin L, Li X, Guan H, Wang J, Tong X, Yang M, et al. Renal function, complications, and outcomes of a reduction in tumor size after transarterial embolization for renal angiomyolipomas: a meta-analysis. *J Int Med Res.* 2019;47(4):1417–28.
- Bardin F, Chevallier O, Bertaut A, Delorme E, Moulin M, Pottecher P, et al. Selective arterial embolization of symptomatic and asymptomatic renal angiomyolipomas: a retrospective study of safety, outcomes and tumor size reduction. *Quant Imaging Med Surg.* 2017;7(1):8–23.
- Swärd J, Bohlin K, Henrikson O, Lundstam S, Peeker R, Grenabo Bergdahl A. Long-term efficacy of selective arterial embolisation of renal angiomyolipoma. *Scand J Urol.* 2023;58:86–92.
- Jung Y, Choi MJ, Kim BM, Kim YM, Seo Y. Transarterial embolization for sporadic renal angiomyolipoma: patient selection and technical considerations for optimal therapeutic outcomes. *Taehan Yongsang Uihakhoe Chi.* 2022;83(3):559–81.
- Pericas R, Liou C, Aberle D, Gorroochurn P, Anderson CB. Rates of volume reduction after selective arterial embolization for renal angiomyolipoma. *Urol Oncol.* 2025;43(11):662.e17–23.
- Perdana NR, Daulay ER, Prapiska FF. Renal arteries embolization in unresectable clear cell renal carcinoma: first time experience at Haji Adam Malik Hospital. *Open Access Maced J Med Sci.* 2018;6(8):1454–7.
- Para SA, Mehdi S, Malik S, Wani S, Bhat A, Choh N, et al. Safety and efficacy of selective renal artery embolization in the management of postprocedural acute renal bleeding: experience of a tertiary care center. *J Urol Surg.* 2023;10(4):326–33.
- Oesterling JE, Fishman EK, Goldman SM, Marshall FF. The management of renal angiomyolipoma. *J Urol.* 1986;135(6):1121–4.
- Cochetti G, Zingaro MD, Boni A, Allegritti M, de Vermandois JA, Paladini A, et al. Renal artery embolization before radical nephrectomy for complex renal tumour: which are the true advantages? *Open Med (Wars).* 2019;14:797–804.
- Alshehri M, Hakami B, Aljameel N, Alayyaf M, Raheem AA. Sporadic giant renal angiomyolipoma: a case report and literature review of clinical presentation, diagnosis, and treatment options. *Urol Ann.* 2020;12(2):167–71.
- Bréhier G, Bouvier A, Besnier L, Willoteaux S, Nedelcu C, Culty T, et al. Renal function after partial nephrectomy following intra-arterial embolization of renal tumors. *Sci Rep.* 2020;10:21352.
- Kumar GA, Prasad PV, Kumar AR, Sindhuri A, Babu BS. Giant renal angiomyolipoma managed by selective renal angioembolization: a unique case report. *J Sci Soc.* 2020;47(2):126.
- Nebioğlu A, Doruk HE, Gökalep Satıcı FE, Yuyucu Karabulut Y, Özer C. Treatment of recurrent giant angiomyolipoma after nephrectomy with selective arterial embolization: a case report. *J Urol Surg.* 2024;11(2):129–33.