

Response to reviewers

Dear Editors and Reviewers,

Thank you for your letter and for the reviewers' comments concerning our manuscript entitled "Ureteral- artificial iliac artery fistula: A case report" (Manuscript ID: 79935).

Those comments are all valuable and very helpful for revising and improving our paper. We have studied these comments carefully and have made corrections which we hope meet with approval. The main corrections in the paper and the response to the reviewer's comments are as follows.

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REVIEWER 1

Comments: Cases that can occur in abdominal aortic surgery and iliac vessel replacements. Appropriate diagnostic measures can properly diagnose ureteral-iliac artery fistula. Good job.

Question 1: Please be consistent with the use of the word male or man in your manuscript.

**Answer to question 1: Thank you very much for your suggestion. According to your suggestion, we have used the word "male" in the manuscript (page 6, line7), (page 4,line 9).**

Question 2:How long did the author follow up on this patient? There is a different statement between Abstract and Outcome and follow-up.

**Answer to question 2:Thank you for your suggestion. We have followed up this patient for 6 months, and we have corrected the time in Abstract and Outcome and follow-up.(page4, line 11)**

Question 3. Is the final diagnosis sufficient by cystoscopy? Should ureteroscopy be performed to determine the cause of massive hematuria?

**Answer to question 3:Thank you for your question, we believed that the operation of ureteroscopy may cause exudation of flushing fluid and an increase of renal pelvis pressure, which may induce severe urinary tract infection on the basis of bleeding. In order to avoid subsequent complications, we only did a cystoscopy. The CT and DSA provide us with more straight evidence.**

Question 4. Please explain why the author performed endovascular stent implantation in this patient! What are the advantages of other surgical procedures? Please discuss in the discussion section.

**Answer to question 4:Thank you for your question, The patient had previous arterial intimal lesions, and the vascular lumen was severely narrowed, affecting**

1 the blood supply of tissues, He had had an intravascular stent before this  
2 admission. In this case, we just did the intravascular embolization. The  
3 advantages of open surgery include more intuitive operation and accurate  
4 hemostasis effect of suture, we have discussed the advantages of open surgery in  
5 the new manuscript.(page 12,line 2-3)

6  
7 Question 5. Please state the limitations of your case report.

8  
9 **Answer to question 5: Thank you for your question, the limitation of this case**  
10 **includes we did not have a first-time cystoscope and ureterscope to determine**  
11 **where the bleeding occurred.**

12  
13 Question 6. Please provide detailed information for each figure!

14 **Answer to question 6: Thank you very much for your suggestion. According to**  
15 **your suggestion, we have detailed information for each figure in the new**  
16 **manuscript.**

17  
18 Question 7. Please make the conclusion subheadings brief and clear!

19 **Answer to question 7: Thank you very much for your suggestion. According to**  
20 **your suggestion, we have shortened the conclusion as follow:**

21 **In addition to a history of local ureteral surgery and associated radiotherapy**  
22 **history, the ureteral fistula should be considered when inconspicuous hematuria with**  
23 **previous iliac vessels is detected. Angiography in combination with CTA**  
24 **can be effective in determining a diagnosis. A rapid endovascular approach is**  
25 **recommended for fistula identification, which requires collaboration among urologists,**  
26 **vascular surgeons, and interventionists. Due to the rarity of the ureteral arterial fistula,**  
27 **the type and frequency of complications following an endovascular repair**  
28 **are unknown. Therefore, patients' vital signs should be closely monitored**  
29 **after surgery and rigorous follow-up should be considered.**

30 REVIEWER 2

31 A rare complication, well managed and documented There are a few grammatical  
32 errors like ureteral calculus mentioned as urethral calculus.

33 **Answer to question: Thank you very much for your suggestion. According to**  
34 **your suggestion, we have replaced urethral calculus by ureteral calculus (page 4,**  
35 **line 19).**

36 With best regards,

37 Junli Wei

38 Corresponding authors

**Name of Journal: World Journal of Clinical Cases**

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**Manuscript Type: CASE REPORT**

**Ureteral- artificial iliac artery fistula: A case report**

Wei et al. Ureteral- artificial iliac artery fistula

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## Abstract

### BACKGROUND

Ureteral-iliac artery fistula is a rare disease resulting from the pathological connection between the ureter and iliac artery, with artificial iliac artery-ureteral fistula being rarer. Iliac artery ureteral fistula is challenging to diagnose, and the misdiagnosis and mortality rates are high.

### CASE SUMMARY

A case of artificial iliac artery ureteral fistula was reported in this paper. The patient was a 69-year-old male with paroxysmal painless hematuria. The artificial iliac artery ureteral fistula was diagnosed by angiography. The hematuria was stopped after intravascular embolization, and no bleeding occurred after 6 months of follow-up.

### CONCLUSION

Ureteral arterial fistula should be considered when inconspicuous hematuria with previous iliac vessels is encountered in addition to local ureteral surgery history. A rapid endovascular approach is recommended for fistula identification.

**Key Words:** artificial iliac artery; ureteral fistula; case report.

## Core Tips

Ureteral-iliac artery fistula is a rare disease resulting from the pathological connection between the ureter and iliac artery, with artificial iliac artery-ureteral fistula being rarer. We reported a case of an artificial iliac artery ureteral fistula. The artificial iliac artery ureteral fistula was diagnosed by angiography. The hematuria was stopped after intravascular embolization. In the future, artificial iliac artery replacement surgery should reduce the local normal anatomy of the excessive dissociation and direct contact between the ureter and the ureter iliac artery, to reduce the occurrence of artificial iliac artery ureteral fistula.

## INTRODUCTION

Iliac-ureteral fistula is a rare disease resulting from a pathological connection between the ureter and iliac artery. This usually results in hematuria after blood vessels, aneurysms, or artificial blood vessels connect with the urinary collection system. The occurrence of the iliac artery-ureteral fistula is often associated with degenerative iliac artery disease or any previous involvement of artery reconstruction surgery. Additionally, its occurrence is also closely related to pelvic surgery (malignant tumor resection, urinary diversion, radiotherapy, **ureteral** stent implantation, etc.)<sup>[1, 2]</sup>.

Unfortunately, the disease is difficult to diagnose, resulting in a high misdiagnosis rate and a mortality rate as high as 38% <sup>[3]</sup>. Furthermore, cases of ureteral- artificial iliac artery fistula are exceedingly rare. This report represents the only case

1 encountered in our hospital. In this case report, we describe our angiography  
2 observation to improve our understanding of the disease, avoid misdiagnosis, and  
3 provide evidence for clinical treatment.

## 5 **CASE PRESENTATION**

### 6 **Chief complaints**

7 A 69-year-old male presented to our hospital with intermittent painless gross  
8 hematuria for 3 days.

### 10 **History of present illness**

11 Gross haematuria was observed in the urine and presented as bright red, accompanied  
12 by blood clots, intermittent attacks, frequent micturition, no urgency, pain and  
13 discomfort, no cramping pain, no fever, and chills. On the third day after admission,  
14 the patient's haematuria suddenly became worse, and the color was bright red for a  
15 total volume of about 500ml. The bladder was continuously washed.

### 17 **History of past illness**

18 He had a history of “abdominal aortic stenosis.” Therefore, abdominal aorta and iliac  
19 vessel replacements were performed in 2011, and the patient has taken aspirin  
20 regularly. Following the operation, left hydronephrosis was caused by artificial blood  
21 vessel compression, and a left ureteral stent was implanted, during which the ureteral

1 stent was replaced regularly. In 2020, transureteral ureteroscopy holmium laser  
2 lithotripsy for left ureteral calculi was performed “left ureteral calculi.” The surgical  
3 records showed that the calculi were located at the junction of the ureter and iliac  
4 artery. A holmium laser fiber lithotripsy was performed, with a small amount of  
5 bleeding occurring during the operation, and the ureteral stent was indwelling after the  
6 operation.

7  
8 **Personal and family history:**The patients denied any family history of similar  
9 diseases.

#### 10 11 **Physical examination**

12 Upon admission, physical examination demonstrated that vital signs were stable, and  
13 no obvious abnormality was found in the cardiopulmonary physical examination.

#### 14 15 **Laboratory examinations**

16 Hemoglobin was 130g/l on admission on April 11, platelets and white blood cells  
17 were within the normal range, and urine routine showed red blood cell 92/HPF. At  
18 06:55 on April 14, hemoglobin dropped to 98g/L, and the hemoglobin concentration  
19 rose to 104g/L after interventional therapy.

#### 20 21 **Imaging examinations**

1 The results of contrast-enhanced computed tomography of the urinary system,  
2 computed tomography urography(CTU), and computed tomography Angiography  
3 (CTA) examination showed that the left renal pelvis and left ureter were dilated, and  
4 patchy high-density shadow could be seen inside (Figure 1). However, no  
5 enhancement was found in the enhanced scan, except for the possibility of bleeding.  
6 At the same time, clots were considered due to the high-density shadow in the bladder.  
7 Dilatation and pseudoaneurysm may be seen in the lower abdominal aorta.  
8 Cystoscopy showed bright red blood spraying from the left ureteral orifice.

9

## 10 **FINAL DIAGNOSIS**

11 The final diagnosis was the Ureteral- artificial iliac artery fistula.

12

## 13 **TREATMENT**

14 Due to the progressive decrease of hemoglobin concentration in patients,  
15 interventional embolization was performed with local anesthesia. There was no  
16 obvious abnormality in the left renal artery conventional angiography intraoperative,  
17 and the contrast extravasated in the left common iliac artificial blood vessel (Figure 2).  
18 An intravascular embolization was given, and no sign of contrast extravasation was  
19 found in re-angiography (Figure 3), consistent with the rupture of the left common  
20 iliac artificial blood vessel.

21



## 1    **OUTCOME AND FOLLOW-UP**

2    The hematuria of the patients was diminished immediately after the operation, and the  
3    blood routine test showed no apparent change in hemoglobin concentration compared  
4    with before. After being treated for 3 days, the patients were discharged from the  
5    hospital and had no recurrence after 6 months of follow-up.

## 6    **DISCUSSION**

7    As early as 1908, Moschcowitz reported the first case of iliac artery-ureteral fistula,  
8    which occurred after bilateral ureteral calculi<sup>[4]</sup>. The pathogenesis of this disease is  
9    often due to the pathological changes in iliac vessels and complications related to  
10   local radiotherapy and surgery between iliac vessels and ureter, leading to the  
11   pathological connection between the ureter and iliac artery. The patient in this report  
12   has a history of previous abdominal aortic and iliac vascular replacement, long-term  
13   replacement of ureteral stent after the operation, and transureteral holmium laser  
14   lithotripsy for left ureteral calculi, having two risk factors mentioned above. Some  
15   studies suggest that most iliac arterial ureteral fistulas are caused by the mechanical  
16   force of arterial pulsation on the ureter where the stent is placed, which leads to  
17   necrosis of the artery and ureteral wall, and finally forms ureteral arterial fistula<sup>[3]</sup>. For  
18   this patient, according to the author's analysis, on the one hand, the direct injury of the  
19   local ureter and artificial blood vessels is caused by long-term ureteral stent  
20   replacement and holmium laser lithotripsy. In contrast, when an artificial iliac blood  
21   vessel is replaced, the dissociation and reconstruction of the ureter and iliac artery

1 junction during operation leads to normal local anatomical changes. However, the  
2 friction between the artificial blood vessel and ureter is increased compared with  
3 human own blood vessels, thus further increasing the risk of the disease.

4 The clinical manifestations of the iliac artery ureteral fistula mainly include hematuria,  
5 urinary retention, fever, low back pain, and discomfort<sup>[3]</sup>. Among them, gross  
6 hematuria is the most common clinical manifestation of the iliac artery-ureteral fistula,  
7 which often occurs intermittently. Additionally, it may be intermittent with local  
8 thrombosis at the lesion or occlusion of a ureteral stent. In severe cases, a large  
9 amount of gross hematuria may occur, which may result in hemorrhagic shock. The  
10 patient's gross hematuria showed intermittent attacks of bright red color, accompanied  
11 by blood clots. After admission, a large amount of gross hematuria occurred,  
12 accompanied by urinary bladder retention. A blood routine showed that hemoglobin  
13 decreased from 130g/L to 118g/L within 15 minutes, suggesting that there was an  
14 obvious possibility of massive bleeding in the body. Therefore, the formation of iliac  
15 artery-ureter fistula should be highly suspected in patients with sudden unexplained  
16 hematuria, especially those with a history of the iliac vessel and ureter-related surgery.

17 Due to the complex nonspecific and temporary clinical manifestations of ilia-ureteral  
18 fistula, diagnosis can often be delayed, leading to disease progression and life-  
19 threatening conditions. Therefore, awareness and accurate diagnosis are of utmost  
20 importance. Currently, the diagnostic methods are mainly based on CT, CTA, and  
21 selective arteriography, and the diagnostic rate of CT is only 42% ~ 50%<sup>[5]</sup>. The

1 diagnostic rate is further reduced when the arterial and ureteral fistula is small.

2 Simultaneously, blood accumulation above the renal pelvis and fistula may occur if

3 the blood flow pressure of the ureteral fistula is high enough. Consequently, this may

4 result in the illusion of upper urinary tract bleeding, thus misleading clinicians to

5 make an incorrect diagnosis and treatment plan. Due to the CT scan results suggesting

6 dilatation and hematocele of the renal pelvis and ureter, upper urinary tract bleeding

7 was mistakenly advised, and nephrectomy was performed. Therefore, the diagnostic

8 rate of CT alone has substantial limitations. Although angiography is an invasive

9 examination, its diagnostic rate is 72.4% higher than that of CT. On the other hand,

10 when there is a permanent stent or thrombus in the ureter and blockage and leakage,

11 the contrast medium may not enter the ureter<sup>[6]</sup>. CT of the urinary system of this

12 patient also suggested the possibility of bleeding in the left kidney and middle and

13 upper left ureter. Additionally, CTA found no lesion. Further angiography showed no

14 evident leakage of contrast medium in the left kidney but an apparent overflow of

15 contrast medium in the left iliac common artificial blood vessel. Therefore,

16 angiography is preferred for diagnosing the iliac artery and ureteral fistula, and CT

17 and CTA are needed for auxiliary diagnosis.

18 Ureteral arterial fistula is endangered, and severe hematuria can cause hemorrhagic

19 shock. Commonly used treatment methods include: suturing fistula, placing arterial

20 patch or ligation for vascular bypass surgery, endovascular stent implantation or

21 embolization, endovascular stent implantation combined with ureteroscopy, and

1 percutaneous nephrostomy combined with ureteral embolization<sup>[7]</sup>. Although open  
2 surgery is the gold standard for treating ureteral arterial fistula, the advantages of open  
3 surgery include more intuitive operation and accurate hemostasis effect of suture, the  
4 proportion of transvascular interventional treatment of ureteral arterial fistula is  
5 gradually increasing with the rapid development of interventional radiology. The  
6 benefits of its use are that it can improve diagnostic rates and results in a shorter  
7 recovery time since it is a minimally invasive method. In this case, an intravascular  
8 stent was grafted through the left femoral artery under local anesthesia. After the  
9 operation, the patient's hematuria significantly improved, and he was discharged the  
10 third day following the procedure.

## 11 CONCLUSION

12 In addition to a history of local ureteral surgery and associated radiotherapy radiothera  
13 py history ureteral fistula should be considered when inconspicuous hematuria with  
14 previous iliac vessels is detected. Angiography in combination with CTA  
15 can be effective in determining diagnosis. A rapid endovascular approach  
16 recommended for fistula identification, which requires collaboration among urologists,  
17 vascular surgeons and interventionists. Due to the rarity of the ureteral arterial fistula,  
18 the type and frequency of complications following endovascular repair  
19 are unknown. Therefore, patients' vital signs should be closely monitored  
20 after surgery and rigorous follow-up should be considered.

21 Conflicts of interest

1 The authors have nothing to disclose

## 2 Acknowledgments

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1   **Footnotes**

2   **Informed consent statement:** Informed written consent was obtained from the  
3   patient for publication of this report and any accompanying images.

4   **Conflict-of-interest statement:** The authors declare that they have no conflict  
5   of interest to disclose.

6   **CARE Checklist (2016) statement:** The authors have read the CARE Checklist  
7   (2016), and the manuscript was prepared and revised according to the CARE  
8   Checklist (2016)

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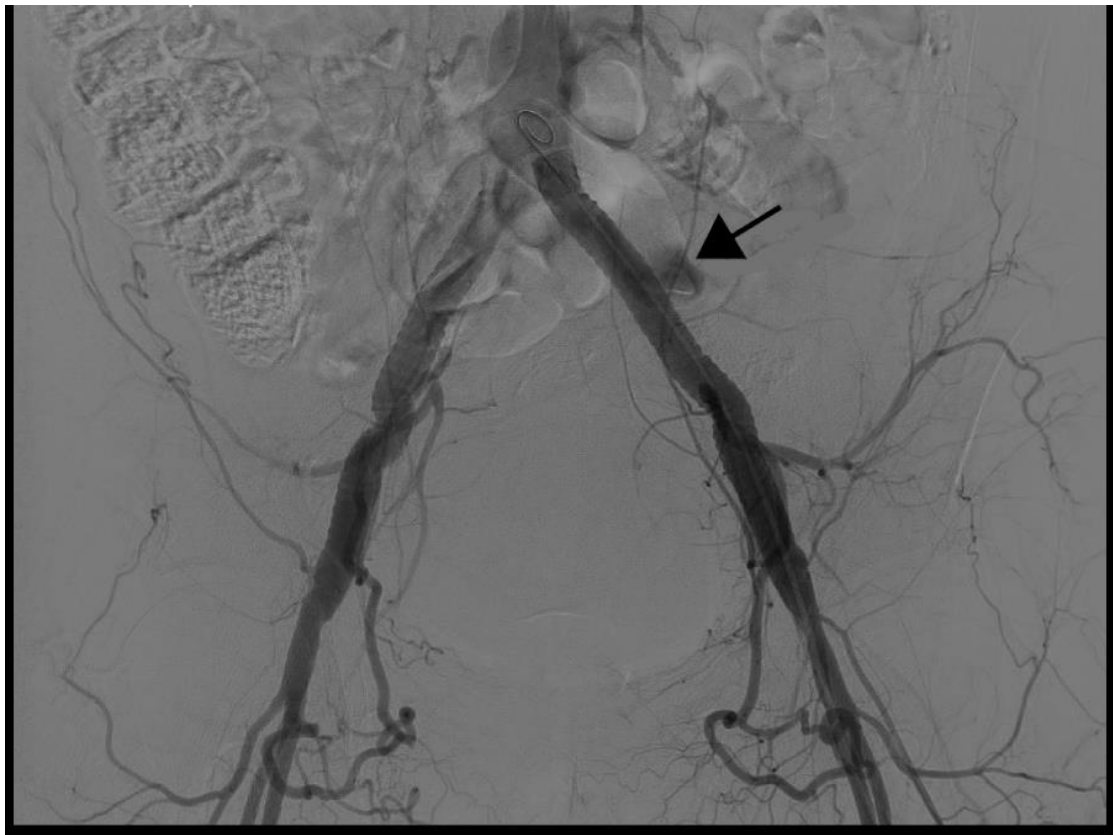
1 Figure.1



2  
3 Figure 1 Contrast-enhanced computed tomography of the urinary system, and CTA  
4 examination showed that the left renal pelvis and left ureter were dilated, and patchy  
5 high-density shadow could be seen inside.



1    Figure.2



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3    Figure 2 DSA showed the contrast extravasated in the left common iliac artificial  
4    blood vessel.

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2 Figure.3



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4 Figure 3 After intravascular embolization was given, DSA showed no sign of contrast  
5 extravasation.