

# External Iliac Arterial Obstruction Caused by Satinsky Atrauma Forceps in Renal Transplantation

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## ABSTRACT

*External iliac arterial obstruction is relatively rare in renal transplantation, and may cause surgical failure and ipsilateral leg ischaemia. Prompt diagnosis and management of this kind of complication is essential to rescue the patient and allograft. Four patients with external iliac arterial obstruction caused by Satinsky atrauma forceps in renal transplantation were analysed and summarized. In case one, the obstruction of the external iliac artery distal to the renal allograft caused ipsilateral leg ischaemia. After surgical fixation of the endarterium, the patient recovered from the lower limb ischaemia. In case two, the obstruction of the external iliac artery was located proximal to the renal allograft. Since the endarterial rupture was not found and fixed in time, the renal allograft was lost. The third case was similar to the second. Based on the previous experience, we fixed the endarterium promptly, and transplanted the kidney back successfully. In case four, there was endarterial rupture with atherosclerosis located around the anastomosis stoma. After taking out the atherosclerotic plaque and fixing the endarterium, the blood supply of kidney and lower limb was good. External iliac arterial rupture and obstruction caused by Satinsky atrauma forceps in renal transplantation is rare, but may cause severe and depressing outcome. The critical step is to find and fix the impaired endarterium as early as possible.*

**Keywords:** Arterial obstruction, renal transplantation, Satinsky atrauma forceps

# Obstrucción Arterial Iliaca Externa Causada por Fórceps Satinsky Atrauma en el Trasplante Renal

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## RESUMEN

*La obstrucción arterial iliaca externa es relativamente rara en el trasplante renal, y puede causar fracaso quirúrgico e isquemia ipsilateral de la pierna. Un pronto diagnóstico y tratamiento de este tipo de complicación es esencial para salvar al paciente y el aloinjerto. Los casos de cuatro pacientes con obstrucción arterial iliaca externa causada por fórceps Satinsky atrauma en el trasplante renal, fueron analizados y resumidos. En el primer caso, la obstrucción de la arteria iliaca externa distal al aloinjerto renal, causó una isquemia ipsilateral de la pierna. Después de la fijación quirúrgica del endarterio, el paciente se recuperó de la isquemia de la extremidad inferior. En el segundo caso, la obstrucción de la arteria iliaca externa fue localizada proximal al aloinjerto renal. Como que la ruptura endarterial no fue detectada y corregida a tiempo, se perdió el aloinjerto renal. El tercer caso fue similar al segundo. Basado en la experiencia anterior, fijamos el endarterio rápidamente, y trasplantamos el riñón de nuevo con éxito. En el cuarto caso, hubo una ruptura endarterial con aterosclerosis situada alrededor del estoma de la anastomosis. Después de sacar la placa aterosclerótica y fijar el endarterio, el suministro de sangre del riñón y del miembro inferior fue bueno. La ruptura arterial iliaca externa y la obstrucción causada por fórceps Satinsky atrauma en el trasplante renal ocurren raramente, pero pueden traer consigo un resultado severo y deprimente. El paso fundamental es encontrar y fijar el endarterio dañado lo antes posible.*

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**Palabras claves:** Obstrucción arterial, trasplante renal, fórceps Satinsky atrauma

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## INTRODUCTION

Renal transplantation is the preferred therapeutic option for end-stage renal disease (1). Despite the advances in surgical techniques and immunosuppressive therapies, vascular complications during and after operation remain common, occurring among 3%–15% of all the renal transplant patients (2, 3). In the past 10 years, we have completed and gained experience in 1217 cases of renal transplantation. Even though most of the recipients had satisfactory outcomes, some surgical problems such as ureteral and vascular complications were encountered. External iliac arterial obstruction is relatively rare, which may cause surgical failure and ipsilateral leg ischaemia. Prompt diagnosis and management of this kind of complication is essential to rescue the patient and allograft (4, 5). Among the 1217 patients, only four cases were confirmed with external iliac arterial obstruction caused by Satinsky atrauma forceps. In this paper, we summarized and evaluated these cases to improve the surgical success rate of renal transplantation.

## CASE REPORTS

The renal allografts for all the four recipients were from living donors. This study was conducted in accordance with the Declaration of Helsinki and with approval from the Ethics Committee of Qingdao University. Written informed consent was obtained from all participants. Patient information is shown in the Table.

The renal allograft was transplanted into the right iliac fossa. The renal artery was connected to the external iliac artery with end-to-side anastomosis, and the renal vein was connected to the external iliac vein also with end-to-side anastomosis. The ureter was connected to the bladder with exact mucosa suture.

Four patients with external iliac arterial obstruction caused by Satinsky atrauma forceps in renal transplantation are reported below.

### Case 1

The surgical process of renal transplantation was smooth. After surgery, the urine volume per hour was normal. In the second day, the patient complained of right lower limb pain with unpalpable dorsal arterial pulse of the right foot. The colour Doppler ultrasound showed that the renal arterial blood flow was good with slightly higher resistive index, but the blood flow of the right femoral artery was undetectable. The obstruction of the external iliac artery distal to the renal allograft was then found in the subsequent emergency operation. The external iliac artery was blocked. The blood vessel was opened in the obstructive part and an endarterial rupture was found. After fixation of the endarterium, the arterial pulse of the foot was palpable. The patient survived with good renal function and good blood supply of the right lower limb.

### Case 2

During the renal transplantation operation, urine was produced from the ureter within one minute after the Satinsky atrauma forceps was released and blood flow returned. However, the allograft started to become soft and dark 10 minutes later. At the same time, the renal artery pulse was not palpable. The position of the allograft was adjusted and we tried to recover the blood flow, but failed. The graft was removed, refilled with perfusate and then transplanted back to the original position, with no success. The allograft was removed and discarded. Later, we extended the incision of the external iliac artery, and found an endarterial rupture proximal to the anastomotic stoma

Table: Patient information

	Case 1	Case 2	Case 3	Case 4
Age (years)	42	59	62	48
Gender	Male	Female	Male	Male
Original disease	Chronic glomerulonephritis	Diabetic nephropathy	Diabetic nephropathy	Chronic glomerulonephritis
Blood coagulation	Normal	Normal	Normal	Normal
Lymphocytotoxicity assay (PRA)	2%	1%	4%	3%
ABO blood type	Match	Match	Match	Match
Perioperative treatment	MMF 1.0 g orally; methylprednisolone 1.0 g intravenously	MMF 1.0 g orally; methylprednisolone 1.0 g intravenously	MMF 1.0 g orally; methylprednisolone 1.0 g intravenously; ALG 250 mg intravenously	MMF 1.0 g orally; methylprednisolone 1.0 g intravenously; ALG 250 mg intravenously

MMF: mycophenolate mofetil; ALG: antilymphocyte globulin

(in the previous Satinski forceps position). After fixation of the endarterium, the blood supply of the right lower limb was good. But the patient had to depend on haemodialysis to survive.

### Case 3

In the operation, urine was produced from the ureter 75 seconds after the renal blood flow opening. However, four minutes later, we encountered similar conditions as with Case 2. Based on the previous experience, we resected the graft and refilled again with perfusate on ice. We extended the incision of the external iliac artery, and found an endarterial rupture proximal to the anastomotic stoma. We fixed the endarterium, and transplanted the kidney back by connecting the renal artery and vein to the internal iliac artery and vein with end-to-side anastomosis. After surgery, the renal function and blood supply for the right lower limb were good.

### Case 4

On the second day after transplantation, the urine volume per hour gradually reduced. At the same time, the patient complained of pain of the right lower limb, with unpalpable dorsal arterial pulse of the foot. Colour Doppler ultrasound showed that the blood flow was weak in the renal artery, and undetectable in the right femoral artery. In the emergency operation (Figure), we blocked the external iliac artery, and refilled the allograft with perfusate. The external iliac artery was opened and an endarterial rupture was found with atherosclerosis in the anastomosis area. The atherosclerotic plaque was removed and the endarterium fixed carefully. After closing the artery, the blood supply of kidney and lower limb was good.

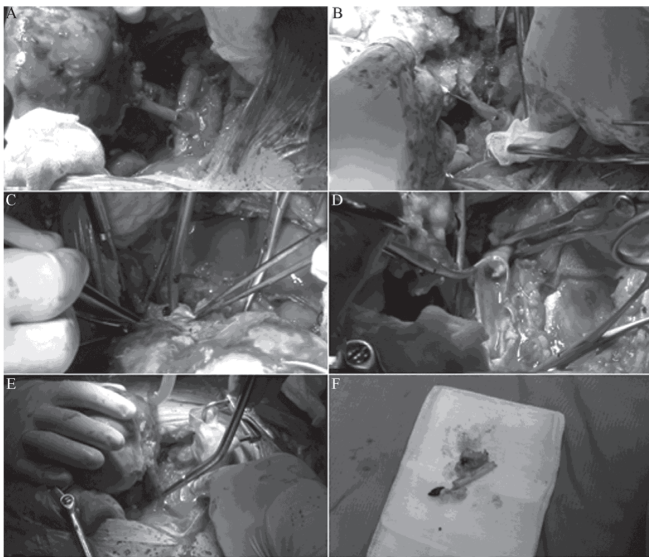


Figure: The surgical process of endarterial fixation.

**A.** Expose the transplanted kidney vessels. **B.** Block the external iliac artery, and refill the allograft with perfusate. **C.** Detach the renal artery, open the external iliac artery, and take out the atherosclerotic plaque. **D.** Fix the proximal and distal endarterium carefully. **E.** Connect the renal artery to the external iliac artery and close the arterial incision. **F.** Picture of the resected atherosclerotic plaque.

## DISCUSSION

Since the first successful isograft transplantation between identical twins in 1954 and the first successful allograft transplantation from a cadaveric donor in 1962 (6), renal transplantation has become the first option for end-stage renal diseases. External iliac arterial obstruction and renal arterial obstruction, with an incidence of 1%–2%, are severe complications in renal transplantation, which may cause functional failure of the renal allograft or ischaemia of the ipsilateral leg (5, 7). Some causes were reported for this kind of obstruction, such as improper vascular intubation, vascular anastomosis, vascular distortion, atherosclerosis, or immune rejection (1, 8, 9). There is a rare report of arterial obstruction caused by Satinsky atrauma forceps.

In our total 1217 cases, only four cases of arterial obstruction were confirmed to be caused by Satinsky atrauma forceps. These might be related to diabetes mellitus and arteriosclerosis, since two cases of chronic renal failure were as a result of diabetic nephropathy. In those cases, the artery wall thickened as a result of the accumulation of fatty materials, and the endarterium became inelastic or fragile. When using Satinsky atrauma forceps, the damaged endarterium was easy to be broken.

The early complications of external iliac arterial and renal arterial obstructions are mostly caused by the surgical instrument, and the late obstructions are mostly caused by blood hypercoagulation or immune injection (4). In our report, two out of four cases of obstructions occurred during surgery, and two cases occurred on the second day after surgery. Since endarterial rupture is rare and not located in the anastomotic stoma, it is not easy to be noticed and diagnosed. If the arterial obstruction is not diagnosed and managed in time, irreversible damage of the allograft or other severe complications will be inevitable.

In Case 2, we lacked the experience and did not find the cause for the renal ischaemia in time, which resulted in surgical failure of the transplantation. In that case, we found the allograft was becoming soft and dark and the renal artery pulse was not palpable. The late diagnosis of endarterial rupture proximal to anastomotic stoma resulted in the loss of the precious allograft.

In Case 3, based on the profound lessons of Case 2, we firstly ruled out other common possible causes, then made an exploration of the external iliac artery and found the endarterial rupture right away, which rescued the allograft and the patient.

Since arterial obstruction and endarterial rupture are difficult to diagnose, and are often accompanied with disappointing outcomes (7), the prognosis before and during surgery is critical. Before surgery, colour Doppler ultrasonography is necessary to evaluate the external iliac artery (10). During surgery, the external iliac artery should be checked firstly for atherosclerosis. When blocking the blood flow with Satinsky atrauma forceps, it should be performed gently without excessive force, and the clamp time lessened. Other points are also

of importance, such as noting any blood hypercoagulation before surgery, improving the techniques of vascular anastomosis and putting the renal artery in a proper position.

#### AUTHORS' NOTE

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