Case Series

Page Kidney In Kidney Transplantation: A Case Series

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Citation: Sánchez-Marín R, Montero N, Melilli E, Coloma A, Favà A, et al. (2022) Page Kidney In Kidney Transplantation: A Case Series. J Urol Ren Dis 07: 1269. DOI: 10.29011/2575-7903.001269.

Received Date: 15 May, 2022; Accepted Date: 27 May, 2022; Published Date: 30 May 2022

Introduction

The phenomenon called Page Kidney (PK) refers to the compression of the renal parenchyma. It is frequently the result of a subcapsular hematoma or a mass that leads to the activation of Renin-Angiotensin-Aldosterone System (RAAS) and resulting in arterial hypertension [1]. There have been described more than 150 cases of PK [2], however, in Kidney Transplantation (KT) the cases described do not reach 40. We present four cases diagnosed in our center.

Cases

Patient #1

A 70-year-old male with hypertension, ischemic cardiac disease and a chronic kidney disease due to membranous nephropathy, received a KT from a controlled cardiac death donor. He received as an induction therapy basiliximab, and as a maintenance immunosuppression tacrolimus, mycophenolate mofetil, and prednisone. The following days after KT, the patient presented delayed graft function (creatinine (Cr) 575 μ mol/L) with need of hemodialysis and he also presented refractory hypertension (persisting arterial pressure over 140/90mmHg although treatment with 3 or more antihypertensive drugs). An ultrasound was performed in the following 24 hours, showing a subcapsular hematoma of 89x26mm in the graft (Figure 1A) with elevated parenchyma resistances (0.86-0.96). An abdominal scan revealed a generalized renal hypoperfusion without involvement of the renal vessels, ruling out active bleeding. It was orientated as a subcapsular hematoma with parenchymal compression probably originated at the point of preimplantation renal biopsy. We decided together with Urology Department to follow a conservative strategy. After 12 days, the urine output increased, kidney function ameliorated progressively allowing discontinuation of dialysis and we proceeded with discharge. After 3 months, in the outpatient consult, the patient achieved levels of serum creatinine of 177 μ mol/L, a reduction of the subcapsular hematoma (69x27mm) (Figure 1B) and a well-controlled hypertension with 3 antihypertensive drugs (doxazosin, amlodipine and losartan).
Figure 1: Patient #1 Doppler- ultrasounds. A) At diagnosis: hematoma subcapsular of 95.6x25.8mm (superior image) and Doppler showing resistance indices of 0.87 (inferior image). B) At 3 months: hematoma subcapsular de 69.7x27.6 mm.

Patient #2

A 69-years-old female with a chronic kidney disease due to immune-complexes mediated membranoproliferative glomerulonephritis, well-controlled hypertension, moderated aortic stenosis and chronic hepatitis C treated and cured, received a KT. She achieved Cr of 140 μ mol/L in the outpatient follow-up. Eight years after KT, she presented to the emergency room with acute pain in the kidney graft area and hypertension of 188/99mmHg. She denied any history of trauma or other symptoms. Laboratory evaluation showed a serum creatinine of 336μmol/L and blood loss resulting in a decrease in hemoglobin concentration of -1.3g/L. An ultrasound showed a subcapsular hematoma of 70x48mm, resistances of 1 and absence of diastolic flux. Conservative strategy was decided. Seventy-two hours after this, the patient developed oligoanuria. An abdomen scan was performed revealing an extense hematoma (70x48mm) and decortication involving almost the entire cortex with signs of hypoperfusion (Figure 2A). The patient was started on hemodialysis. Forty days after dialysis initiation, in the outpatient visit, the patient noticed an increase of urine output. Laboratory tests confirmed renal function improve with serum creatinine 130μ mol/L allowing hemodialysis discontinuation. Three months after the diagnosis, an ultrasound showed a decrease of the hematoma size (9.2mm). However, the patient had persistent arterial hypertension controlled by treatment with four drugs (doxazosin, lecarnidipine, losartan, and furosemide).

Figure 2: Patient #2 CT scan and Ultrasound. A) CT scan showing hematoma (70x48mm), that involves and compresses kidney cortical. B) Kidney Ultrasound after 3 months showing partial resolution (9mm).

Patient #3

A 59-year-old male with a chronic kidney disease due to focal segmental glomerulosclerosis, hypertension and chronic hepatitis C treated and cured, received a left KT. Although there were no intraoperative complications, in the first 24 hours the patient presented a haemorrhagic shock resulting in a decrease in hemoglobin concentration of -4g/L. An abdominal scan was performed showing a subcapsular hematoma of 13mm in the graft and decortication of the middle-lower third of the anterior part of lower renal pole, with several active arterial bleeding points. This retroperitoneal and perirenal hematoma of 80 x 70 x 85 mm was probably secondary to a probable rupture of the renal subcapsular hematoma. The patient required six red cell concentrates. His hemodynamic situation was stabilized but the patient remained with delayed graft function with anuria during twelve days. We decided together with Urology Department to follow a conservative strategy without any intervention. During the follow-up, we performed three doppler ultrasounds that showed a progressive diminution of the hematoma size (from 17cc four days after the surgery to 10 cc twenty-three days after the surgery) (Figure 3). Levels of blood pressure were high with high doses of antihypertensive treatment during the first three weeks, but later the recipient presented good control by treatment with three drugs. The urine output increased progressively and kidney function ameliorated achieving levels of serum creatinine of 497 μ mol/L the day of the Hospital discharge (30 days after KT). The last serum creatinine in outpatient control 6 weeks after KT was of 267 μ mol/L.
Patient #4

A 70-year-old male with hypertension, ischemic cardiac disease, stroke and chronic kidney disease due to diabetic nephropathy, that initiated haemodialysis when he was 67 years-old, received a KT. There were no intraoperative complications. His induction immunosuppression was basiliximab, and maintenance immunosuppression was tacrolimus, mycophenolate mofetil, and prednisone. After nine days of hospitalization, he was discharged with serum creatinine levels of 170 μmol/L. After one month, just one week after having removed ureteral catheter, the patient came to Emergency Department with heart failure, decreased urine output and renal disfunction with a serum creatinine of 588 μmol/L. He needed a hemodialysis session. An ultrasound was performed showing a grade II pyelocaliceal ectasia and a drainage by position a nephrostomy was tried. As a complication of the puncture, the patient developed a PK due to a subcapsular hematoma of 30mm (Figure 4). Conservative strategy was decided and the recipient needed to maintain hemodialysis three times a week. After one month of the iatrogenic bleeding, the patient increased diuresis and hemodialysis was not necessary even more. An ultrasound with doppler showed a decrease of the hematoma size (7mm), maintaining resistive indices mildly increased ranging from 0.86 to 0.88 throughout the transplant kidney. Kidney function presented a slow improvement with serum levels of creatinine of 160 μmol/L in the last outpatient visit, three months after KT.

Discussion

Page kidney phenomenon or "Page Kidney" was first described in 1939 by Dr. Irvine Page [1,3]. He was able to induce a hypertensive response after compressing canine kidneys by wrapping them in cellophane. Hypoperfusion and microvascular ischemia activate the RAAS developing arterial hypertension. Although this activation can be quantified by measuring plasma renin, the measurement of which was not possible in these four cases. The typical presentation is hypertension and pain with or without kidney dysfunction. In KT, this phenomenon may lead to terminal kidney disease. Multiple causes have been described: hematomas (due to trauma, intervention, spontaneous...), neoplasms, cysts, lymphoceles, renal pathology... [4,5]. Possible clinical presentations and most frequent causes that have already been described in the literature are summarized in Table 1.
Table 1: Summary table of main causes and clinical presentations in the 37 cases published in the literature.

The diagnosis can be made by Doppler-ultrasound (observing absent or reverse venous flow and increased resistance indices together with an intra or perirenal space occupying lesion), computed tomography (CT) scan or selective arteriography [6] showing hypoperfusion, compression or ischemia of kidney parenchyma. In our four cases, Doppler-ultrasound and later CT scan, which showed subscapular hematomas and revealed renal ischemia, made the diagnosis. In the published cases, the average size of the hematomas that leads to PK was of 57 ± 13mm. There are different therapeutic approaches in KT: some clinicians wait that the compression resolves spontaneously (reabsorption or evacuation of a hematoma) [7-9], others indicate intervention, specially in case of larger collections or those that increase in size (surgical drainage or nephrectomy). In all of our four cases, conservative management was chosen, however, in the literature, the authors showed more interventionist attitudes (32/36 cases) (Table 2). Regarding the results, complete resolution of PK was found in only 66% of the cases with conservative treatment [7-9] compared to 89.2% of the cases with interventional management (28 capsulotomies [4,10-30], 3 drainages [9,31-34] and 1 nephrectomy [35]) (Table 2). Blood pressure was corrected after interventionism in nine cases that reported this result. Sixty-three percent of the procedures were performed immediately after diagnosis with a 95.2% success rate. In the cases in which the procedure was delayed (15%), the success rate was lower, with 80% of cases with a complete renal response. No capsulotomy-related complications were described in the reviewed cases. In our case series all cases resolved spontaneously.

| Author          | Age | Gender | Time after KT | Cause            | Arterial pressure (mmHg) | Creatinine(μ mol/L) | Diagnos- | Intervention | Time before intervention | Results |
|-----------------|-----|--------|---------------|------------------|--------------------------|---------------------|-----------|--------------|--------------------------|---------|
|                 |     |        |               |                  |                          |                     | At diag-   | Interven-    |                           |         |
|                 |     |        |               |                  |                          |                     | nstic     | tion         |                           |         |
|                 |     |        |               |                  |                          |                     | After      | After         |                           |         |
|                 |     |        |               |                  |                          |                     | treatment | inter-        |                           |         |
|                 |     |        |               |                  |                          |                     | Before     | vention      |                           |         |
|                 |     |        |               |                  |                          |                     | at         |               |                           |         |
|                 |     |        |               |                  |                          |                     | diagnostic | diagno-      |                           |         |
|                 |     |        |               |                  |                          |                     | After       | sis          |                           |         |
|                 |     |        |               |                  |                          |                     | treatment  |               |                           |         |
|                 |     |        |               |                  |                          |                     | At         |               |                           |         |
|                 |     |        |               |                  |                          |                     | diagnostic |               |                           |         |
|                 |     |        |               |                  |                          |                     | After       |               |                           |         |
|                 |     |        |               |                  |                          |                     | intervention|               |                           |         |
|                 |     |        |               |                  |                          |                     | Time       |               |                           |         |
|                 |     |        |               |                  |                          |                     | before      |               |                           |         |
|                 |     |        |               |                  |                          |                     | intervention|               |                           |         |
|                 |     |        |               |                  |                          |                     | Results    |               |                           |         |
|                 |     |        |               |                  |                          |                     | CR         |               |                           |         |
|                 |     |        |               |                  |                          |                     | CR         |               |                           |         |
|                 |     |        |               |                  |                          |                     | CR         |               |                           |         |

Cromie et al 1976 [16] 35 M 10d Post KT bleeding 194/100 140/80 124 124 Kidney scan, Doppler Capsulotomy 2d CR

Figueroa et al 1988 [17] 40 F 11m Biopsy 184/104 168 415 203 Arteriography, CT scan Capsulotomy 30h CR

Yussim et al 1988 [33] 40 F 5m Post KT scar 190/110 140/80 141 575 221 Kidney scan Capsulotomy Not known RP
| Kliewer et al 1991 [35] | 56 | F | 2s | Biopsy | | IRC | Doppler CT scan | Nephrectomy | Not known | GL |
|------------------------|----|----|----|--------|--------|--------|----------------|-------------|-----------|----|
| Dempsey et al 1993 [19] | 19 | F | 2a | Biopsy | | 619 | 194 | Doppler | Capsu- | Imme- | CR |
| Ben Hamida et al 1993 [36] | 32 | M | 7m | Heparin induced bleeding | | | | Doppler | Conservative | | |
| Nguyen et al 1994 [20] | 26 | M | 12h | Post KT bleeding | | 170/95 | 112/52 | 1282 | 893 | 177 | Kidney scan | Capsu- | Imme- | CR |
| Machida et al 1996 [7] | 32 | M | 4m | Biopsy | | 170/100 | 190/115 | 168 | 283 | 133 | Doppler CT scan, Kidney scan | Conserva- | | CR |
| Vanwalleghem et al 1997 [31] | 59 | F | 2a | Lymphocele | | 160/90 | 120/70 | 168 | 151 | | MRI | Drainage | Not known | CR |
| Rea et al 2000 [10] | 34 | M | 3a | Biopsy | | 245 | 447 | 248 | | | Doppler CT scan, Capsu- | Imme- | | CR |
| Gibney et al 2005 [21] | 32 | M | 1a | Biopsy | | 190/89 | 150/85 | 124 | 592 | 124 | Doppler | Capsu- | Imme- | CR |
| Patel et al 2007 [24] | 69 | M | 7a | Biopsy | | 180/100 | 142/84 | 133 | 248 | 141 | Doppler | Capsu- | Imme- | CR |
| Chung et al 2008 [25] | 27 | F | 11d | Biopsy | | 689 | 131 | | | | Doppler CT scan, Capsu- | Imme- | | CR |
| Chung et al 2008 [25] | 39 | F | 7d | Biopsy | | 195/105 | 265 | 82 | | | | | | |
| Chung et al 2008 [25] | 35 M 4d Biopsy | 180/100 | 498 | 588 | IRC Doppler, CT scan | Capsu- | Imme- | PR |
|----------------------|----------------|----------|------|------|----------------------|--------|--------|----|
| Chung et al 2008 [25] | 33 F 9m Biopsy | 200 | 89 | 243 | 158 | Doppler, CT scan | Capsu- | Imme- | CR |
| Heffernan et al 2008 [26] | 64 M 4m Biopsy | 160/70 115/70 | 123 | 388 | 160 | Doppler, CT scan | Capsu- | Imme- | CR |
| Kamar et al 2009 [8] | 47 M 1a Biopsy | 170/110 | 159 | 283 | 177 | Doppler, CT scan | Capsu- | Imme- | CR |
| Kamar et al 2009 [8] | 59 M 1a Biopsy | 160/90 | 106 | 380 | 124 | Doppler, CT scan | Capsu- | Imme- | CR |
| Amezquita et al 2009 [27] | 60 M 1m Nephrostomy | Normal | Normal | Normal | 760 | Doppler, CT scan | Capsu- | Not known | CR |
| Posadas et al 2010 [28] | 55 M 3m Biopsy | 200/100 130/60 | 62 | 292 | 71 | Doppler, CT scan | Capsu- | Imme- | CR |
| Butt et al 2010 [1] | 61 F 24d Spontaneous | 162/667 | 106 | 522 | 88 | CT scan | Capsu- | Imme- | CR |
| Maurya et al 2011 [29] | 30 M 7d Biopsy | 106 | 520 | 177 | Doppler, CT scan | Capsu- | Imme- | CR |
| Okechukwu et al 2011 [30] | 32 M 8d UreteralStent | 176.8 | 424 | 124 | Doppler, CT scan | Capsu- | Imme- | CR |
| Gandhi et al 2012 [22] | 46 M 17a Spontaneous | 185/110 | 170 | 605 | 180 | Doppler, CT scan | Capsu- | Imme- | CR |
| Hamidian et al 2013 [9] | 19 M 5s ArterialStent | 170 | 512 | 164 | Doppler, Drainage | 6h | CR |
| Authors                        | Age (y) | Sex | Days (d) | Procedure           | Preop SBP/DBP | Preop DBP/PP | Postop SBP/DBP | Postop DBP/PP | Imaging | Drainage | Duration | Outcome |
|-------------------------------|---------|-----|----------|--------------------|---------------|--------------|----------------|--------------|---------|----------|----------|---------|
| Adjei-Gyamfi et al 2014 [11]  | 12      | M   | 7s       | Biopsy             | 71            | 526          | 61             | Doppler, CT scan | Capsulotomy | Immediate | CR       |
| Adjei-Gyamfi et al 2014 [11]  | 18      | F   | 1a       | Biopsy             | 114           | 325          | 109            | Doppler       | Capsulotomy | Immediate | CR       |
| Sedigh et al 2015 [12]        | 67      | M   | 13a      | Trauma             | 110/70        | 62           | 241            | 72            | Doppler       | Capsulotomy | 12h      | CR       |
| Kapoor et al 2016 [32]        | 42      | F   | Not known| Biopsy             | 210/110       | 130/70       | 292            | 371           | 274      | CT scan, Doppler | Drainage | Not known | CR       |
| Kumar et al 2017 [32]         | 66      | M   | 4a       | Trauma             | 196/90        | 83           | 453            | 99            | Doppler       | Capsulotomy | Immediate | CR       |
| Takahashi et al 2017 [34]     | 67      | M   | 12a      | Trauma             | 163/54        | 176.8        | 477            | IRC           | CT scan, Doppler | Capsulotomy | 3d       | GL       |
| Ay et al 2017 [13]            | 50      | M   | 1d Post KT bleeding | Biopsy         | 400           | 400          | 165            | Doppler       | Capsulotomy | Immediate | CR       |
| McFadden et al 2018 [14]      | 63      | M   | 6m       | Biopsy             | 177/102       | 120/88       | 116            | 394           | 158      | Doppler       | Capsulotomy | Immediate | CR       |
| Zvavanjanja et al 2018 [18]   | 42      | M   | 5m       | Biopsy             | 161/96        | 194          | 1317           | 194           | Doppler       | Capsulotomy | Immediate | CR       |
| Hori et al 2018 [15]          | 66      | M   | 2d Post KT bleeding | Biopsy         | 145/80        | 530          | 150            | Doppler       | Capsulotomy | Not known | CR       |

Table 2: Summary of KT PK cases described in the English literature.
Conclusions

Page kidney is a rare disease in kidney transplantation with characteristic clinical features. Although different therapeutic schemes have been published in the literature with more frequent interventionalist approaches, in our experience, conservative management obtained favorable results, avoiding the risks associated with interventional management.

Acknowledgment

We thank CERCA Programme / Generalitat de Catalunya for institutional support.

References

1. Irvine H. Page (1939) The production of persistent arterial hypertension by cellophane perinephritis. JAMA 113: 2046-2048.
2. McCune TR, Stone WJ, Breyer JA (1991) Page Kidney: Case Report and Review of the Literature. Am J Kidney Dis 18: 593-599.
3. Sone B, Nadeau J, Elevins LS (2002) Hypertension in an adolescent boy. The American Journal of the Medical Sciences 323: 227-230.
4. Butt FK, Seawright AH, Kokko KE, Hawxby AM (2010) An unusual presentation of a page kidney 24 days after transplantation: Case report. In: Transplantation Proceedings 2010.
5. Dopson SJ, Jayakumar S, Carlos J, Velez Q (2009) Page Kidney as a Rare Cause of Hypertension: Case Report and Review of the Literature 42: 4291-4294.
6. Freed TA, Travel FR (1976) Diagnosis and surgical treatment of page kidney: Selected aspects. Urology 7: 330-333.
7. Wada Y, Kawabata K, Ueda S (1996) Subcapsular Hematoma and Hypertension Following Percutaneous Needle Biopsy of a Transplanted Kidney. Int J Urol 3: 22-230.
8. Kamar, Federico Sallusto LR (2009) Acute Page Kidney After a Kidney Allograft Biopsy: Successful Outcome From Observation and Medical Treatment. Transplantation 87: 452-453.
9. Hamidian Jahromi A, Fronek J, Kessaris N, Bydawell G, Patel U, MacPhee IA (2013) Acute page kidney complicating kidney transplant artery stenting: Presentation of a case and novel management. Iran J Kidney Dis 7: 352-355.
10. Rea R, Anderson K, Mitchell D, Harper S, Williams T (2000) Subcapsular haematoma: a cause of postbiopsy oliguria in renal allografts. Nephrol Dial Transplant 15: 1104-1105.
11. Adjei-Gyamfi Y, Koffman G, Amies T, Easty M, Marks SD, et al. (2014) Reversible acute anuric kidney injury after surgical evacuation of perinephric hematoma as a complication of renal transplant biopsies. Pediatr Transplant 18: E262-265.
12. Sedigh O, Lasaponara F, Dalmasso E (2017) Subcapsular hematoma causing anuria after renal graft trauma. Exp Clin Transplant 15: 576-580.
13. Ay N, Beyazit U, Alp V (2017) Rupture of a subcapsular hematoma after kidney transplant: Case report. Exp Clin Transplant 15: 358-360.
14. McFadden JD, Hawksworth JS (2018) Page Kidney: An Unusual Complication of a Renal Transplant Biopsy. Case Rep Urol 2018: 8768549.
15. Horm S, Tomizawa M, Maesaka F (2018) Unexpected presentation of allograft dysfunction triggered by page kidney phenomenon immediately after kidney transplantation: A case report. BMC Nephrol 19: 59.
16. Cromie WJ, Jordan MH, Leapman SB (1976) Pseudorejection: the Page kidney phenomenon in renal allografts. J Urol 116: 658-659.
17. Figueroa TE, Frenz GD (1988) Anuria secondary to percutaneous needle biopsy of a transplant kidney: A case report. J Urol 140: 355-356.
18. Zvavanjanja RC, Ashton AS (2018) Page kidney secondary to subcapsular hematoma following percutaneous renal allograft biopsy. Radiol Case Reports 13: 702-708.
19. Dempsey J (1993) Acute page Kidney Phenomenon: a cause of reversible renal allograft failure. South Med J 86: 574-577.
20. Nguyen B, Nghiem D, Adatepe M (1994) Page kidney phenomenon in allograft transplant. Clin Nuc Med 19: 361-363.
21. Gibney EM, Wiseman CLEAC (2005) Page Kidney Causing Reversible Acute Renal Failure: An Unusual Complication of Transplant Biopsy. Transplantation 80: 285-286.
22. Gandhi V, Khosravi M, Burns A (2012) Page kidney in a 17-year-old renal allograft. BMJ Case Rep 2012.
23. Kumar A, Wilkie M, Brown PW, Nathan C (2015) Page kidney of renal allograft following blunt trauma. Clin Nephrol Case Stud 3: 5-7.
24. Patel T, Goes N (1982) Page kidney. J Comput Assist Tomogr 6: 839-841.
25. Chung J, Caumartin Y, Warren J, Luke PPW (2008) Acute page kidney following renal allograft biopsy: A complication requiring early recognition and treatment. Am J Transplant 8: 1323-1328.
26. Hefferman E, Zwirewich C, Harris A, Nguan C (2009) Page kidney after renal allograft biopsy: Sonographic findings. J Clin Ultrasound 37: 226-229.
27. González R, Marcén R, Ortúñio J (2009) A Page Kidney Case Report With Diastolic Flow Reversion in Doppler Ultrasonography. Transplantation 87: 303-304.
28. Posadas MA, Yang V, Ho B, Omer M, Battle D (2010) Acute renal failure and severe hypertension from a page kidney post-transplant biopsy. ScientificWorldJournal 10: 1539-1542.
29. Maurya KK, Bhat HS, Mathew G, Kumar G (2011) Page kidney following renal allograft biopsy - early recognition and treatment. Saudi J Kidney Dis Transpl 22: 1012-1013.
30. Okechukwu O, Reddy S, Guleria S (2011) A Page in Transplantation. Saudi J Kidney Dis Transpl 22: 796-798.
31. J. Vanwalleghem W,oosemans, Raat H, M.Waer, Vanrenterghem1 Y (1997) Peritransplant Lymphocele Causing Arterial Hypertension by a Page Kidney Phenomenon. Nephrol Dial Transplant 12: 823-824.
32. Kapoor R, Zayas C, Mulloy L, Jagadeesam M (2016) Recurrence of Acute Page Kidney in a Renal Transplant Allograft. Case Rep Med 2016: 3898307.
33. Yusissim A, Shmueli D, Levy J, Servadio C, Shapira Z (1988) Page kidney phenomenon in kidney allograft following peritransplant lymphocele. Urology 31: 512-514.
34. Kim DY, Kane WJ, Putchakayala KG (2017) Allograft loss from acute Page kidney secondary to trauma after kidney transplantation. World J Transplant 7: 88-93.
35. Kliwer MA, Carroll BA (1991) Ultrasound case of the day. Page kidney phenomenon in a transplanted kidney after biopsy. Radiographics 11: 336-337.
36. Ben Hamida F, Westael PF, Achard JM (1993) Favorable outcome under simple heparin therapy of recurrent anuria due to graft renal vein thrombosis and subcapsular hematoma. Transplant Proc 25: 2341-2342.