

“Non-functioning” Kidneys in Excretory Urography: Caution is the word!

Ajape AA¹, Kura M², Ibrahim AG² Affiliation: 1- Division of Urology, Department of Surgery, University of Ilorin Teaching Hospital, Ilorin 2- Department of Surgery, Federal Medical Centre, Gombe. Corresponding author: Dr. Abdulwahab A Ajape P.O. Box 4850, Ilorin. Kwara state. E-mail: ajsnrkudimoh@yahoo.co.uk, ajsnrkudimoh@gmail.com

Summary

Significant loss of renal function is objectively diagnosed with radioisotope renal scintigraphy. In many developing countries radioisotope study is not readily available and the diagnosis of non-functioning kidney is often based on intravenous urography. We retrospectively reviewed the case notes of three patients that were diagnosed with 'non-functioning' kidneys based on intravenous contrast renal imaging but had salvage procedure for the renal moiety. In the absence of radioisotope study, some restraint is advocated for nephrectomy, for 'non-functioning kidney', based solely on the result of intravenous urography.

Introduction

The kidneys, eliminate waste products of metabolism in the form of urine (1). The loss of the kidney function may result from many causes including obstructive uropathy.

The degree of the damage that occurs depends on several factors that have been well documented (2-4).

Non-invasive radiological investigations, such as ultrasonographic scan and urinary biomarkers, are invaluable in the diagnosis of the cause and effect of obstructive uropathy (5). Instrumental and advanced radiologic evaluations play complementary role. The intravenous urography (IVU) is available in most centres although its discriminatory ability with respect to the functional reserve in the kidney is only qualitative (6). Differential renal function evaluation using radioisotope renal scintigraphy is the gold standard for confirmation of diagnosis, for determining the residual function of hydronephrotic kidney at presentation, for follow up of function over time and, most importantly, for the timing of intervention in the patient (7).

Isotopic scanning is not available for most areas in our environment. Many nephrectomies have thus been performed for “non-functioning” kidneys based on the findings on IVU (8,9). Three case series are hereby illustrated to sound a cautionary note on the practice.

Case Reports

Case 1

A 52-year-old Hausa farmer was referred from a peripheral

hospital on account of recurrent right loin pain of 5 years duration. The pain was colicky and radiated to the inner aspect of the right thigh. There was no history of fever, chills or rigor; loin swelling, haematuria or lower urinary tract symptoms (LUTS). He had mild renal angle tenderness.

Abdomino-pelvic ultrasound revealed normal position and size of both kidneys with moderate hydronephrosis of the right kidney and fairly preserved cortico-medullary differentiation. The lower ureter could not be visualized. An IVU showed prompt excretion on the left upper urinary system and normal structural outline, the cystogram phase was normal and no significant residual on the post-micturation film. There was no excretion on the right even after delay series were taken [figure 1a]. A diagnosis of “non-functioning” right kidney was made radiologically. Other relevant biochemical and haematological investigations were within normal ranges of limit and the urine culture for acid alcohol fast bacilli (AAFB) was negative.

In view of the consistent findings of hydronephrosis (with clear fluid and no internal echoes within it) and fairly preserved cortico-medullary differentiation on ultrasound, and the non-availability of isotopic scanning to confirm the initial verdict of non-functioning kidney on IVU, the patient was counselled for right kidney exploration with or without nephrectomy.

A 10-cm right sub-costal incision was used to access the right renal fossa and the findings included; normal size kidney with significant perinephric adhesion, adequate renal parenchyma tissue and dilated ureter down to the bladder. No stone was appreciated intra-operatively. The initial inci-

sion was closed in layers and the patient was then prepped in supine position. A modified Gibson's incision [figure 1b] was used to access the right pelvic ureter which was then excised and extra-vesically re-implanted to the bladder in the manner of Lich-Gregoir technique. The patient did well post-operatively and the stented right ureter was functioning for the two week period it was in place.

A repeat IVU, done 3 months post operation, revealed function in both kidneys [figure 1c].

Case 2

A 35-year-old house-wife presented with recurrent left loin pain of 3 years duration. The pain was colicky and radiated to the suprapubic region, no associated loin swelling, haematuria or constitutional and lower urinary tract symptoms. The clinical examination was essentially normal.

A clinical diagnosis of ureteric colic was suspected. The abdomino-pelvic ultrasound revealed left renal pelvis calculi that measures 3X3X2.5 cm in dimensions with moderate hydrocalycosis and showed good cortico-medullary differentiation; the right kidney was of normal size, shape and position. An IVU confirmed the presence of radio-opaque material within the region of the left renal pelvis which took the shape of the renal pelvis and also some tiny radio-opaque lesions in the lower calyces [figure 2]. There was prompt excretion and outline of the contra-lateral renal moiety and the ureter. No request was made of isotope scan since it was not available.

The patient consented for left kidney exploration, with or without nephrectomy, which she had via a left subcostal incision. The findings included marked perinephric adhesion, normal size kidney parenchyma tissue and palpable staghorn pyelolithiasis. Pyelolithotomy was performed with an on-table evidence of some urine output from the renal moiety, a modified Culp pyelo-ureteroplasty was done which was stented with fenestrated paediatric feeding tube and brought out through a stab wound in the flank. The urine output from the left kidney was sustained post operatively and IVU done 3 months after surgery showed function in both the kidneys.

Case 3

A 22-year-old student presented to our facility with a recent onset of right side flank swelling. He had recurrent dull, colicky pain which radiated to the suprapubic region on the same side for over five years which had abated. No history of fever, other constitutional symptoms, haema-

turia or weight loss was elicited. Examination findings revealed right loin fullness with mild tenderness. Relevant biochemical renal evaluations and haematological profile were within normal limits. Abdomino-pelvic ultrasound revealed right hydrocalycosis with clear fluid without internal echoes and a preserved cortico-medullary differentiation, the IVU showed a non-functioning right renal moiety even after the delayed radiographs.

The patient was counselled for right kidney exploration which revealed a hydronephrotic extra-renal pelvis with obstruction at the uretero-pelvic junction, moderate perinephric adhesion and good quality renal parenchyma tissue. He had modified Culp pyelo-uretero-plasty, the function in the right renal moiety was sustained throughout the post operation period and the subsequent IVU showed return of function in the right kidney [figure 3].

Discussion

Chronic kidney disease (CKD) is an enormous health care burden of public health significance especially in the developing world (10,11). The contribution of obstructive uropathy to the causes of CKD among Nigerian patients, like other indigenous African patients, is significant (12).

A progressive renal dysfunction is the usual sequel of unrelieved bilateral ureteric obstruction. In patients with unilateral ureteric obstruction, the differential renal function (DRF) is assessed using radioisotope renal scintigraphy to determine the appropriate management for such renal moiety. A DRF of less than 10% has been universally accepted as indicative of poorly functioning kidney; however the management of such kidney still remains a subject of continued debate (2,13).

There is no physiological basis for keeping a kidney without any inherent ability to recover its function and this capability needs to be determined pre-operatively. Several factors affect the recovery and the methods of predicting such capability have been reviewed extensively (14).

Many patients lack access to radioisotope scans in our environment. Decisions to remove non-functioning kidneys are therefore solely on IVU (8,9). Although IVU is a primary diagnostic procedure, it remains a qualitative tool which does not accurately predict recovery in obstructive uropathy. Many cases of non visualization of the kidneys on IVU regained reasonable function after reconstructive procedures (15,16). These case series further affirmed these earlier documentations.

It has been hypothesized that poor renal function docu-

CASE REPORT

“Non-functioning” Kidneys in Excretory Urography: Caution is the word

Ajape AA , Kura M, Ibrahim AG



Figure 1a: Showing the 30-minute film of an IVU of a patient 'non-functioning kidney'. Subsequent films in the series showed no 'function'.



Figure 1b: Shows the healed initial loin incision and the modified Gibson's incision used for ureteric re-implantation.



Figure 1c: A 30-minute IVU film in same patient, showing function in both kidney moieties, three months after ureteric re-implantation.



Figure 2: Shows left sided staghorn calculi in a patient with ipsilateral 'non-function' renal moiety on IVU.



Figure 3: Post pyelo-ureteroplasty IVU film, in a patient with sonographic evidence of hydronephrosis but with 'non-functioning' ipsilateral renal moiety on IVU, showing bilateral function.

mented by renography may not reliably predict the recoverability of useful renal function in the presence of obstruction (2), thus the need for a period of therapeutic trial using percutaneous nephrostomy (PCN) for an average of four weeks. The facility for PCN is not readily available in our setting. The use of enzymuria, urinary biomarkers and Doppler ultrasound to estimate the resistive index (RI) in predicting the recoverability of obstructed kidneys are not commonly practice in our setting and experience is lacking. Routine retrograde ureteropyelography is said not to be practiced due to the improvements in non-invasive diagnostic modalities; however, it is often indicated to provide anatomical details of the ureter (14). Retrograde pyelography was not done in any of the patients; as performed it is also non-available.

The decision for surgical exploration, which had proved useful in previous report (15), is what we are left with in our setting. This practice can be complemented with pre-operative grey scale ultrasound which is available, non-invasive and with readily available expertise. The presence of clear fluid within the hydronephrotic renal pelvis and significant renal parenchyma tissue in the renal moiety, of our patients with non visualization on excretory urography, made us suspect, albeit subjectively, that the unilaterally obstructed renal moiety of our patients may recover; hence, the option for reconstructive procedure aiming at salvaging the kidney rather than an ablative surgery. The intermediate-term results from these patients are encouraging and justified the current policy of salvaging the kidney in selected patients.

Conclusion

In conclusion the policy being advocated, which is to salvage the renal moiety in selected cases of 'non-functioning' kidney (based on IVU), would be of paramount importance in other resource-poor environment like ours, where the facility and economic support for kidney replacement is lacking. Thus, no kidney should be removed without being absolutely indicated.

References

1. Anderson JK, Kabalin JN, Cadeddu JA. Surgical Anatomy of the Retroperitoneum, Adrenals, Kidneys and Ureters. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA (Eds): Campbell-Walsh Urology, 9th Edition, Philadelphia (USA), Saunders Elsevier 2007: 102-105

2. Gupta DK, Chandrasekharam VVSS, Srinivas M, Percutaneous nephrostomy in children with ureteropelvic junction obstruction and poor renal function. *Urology*. 2001; 57: 547-550
3. Stathopoulos L, Merrot T, Chaumoitre K, et al. Prenatal urinoma related to ureteropelvic junction obstruction: poor prognosis of the affected kidney. *Urology*. 2010; 76: 190-194
4. Uluocak N, Ander H, Acar O, et al. Clinical and radiological characteristics of patients operated in the first year of life due to ureteropelvic junction obstruction: significance of renal pelvis diameter. *Urology*. 2009; 74: 898-902
5. Shokeir AA. Role of urinary biomarkers in the diagnosis of congenital upper tract urinary obstruction. *Indian J Urol* 2008; 24: 313-319
6. Platt JF. Urinary obstruction. *Radiol clin North Am*. 1996; 34: 1113-1129
7. Khan J, Charron M, Hickeson MP, et al. Supranormal function in unilateral hydronephrotic kidney can be avoided. *Clin Nucl Med*. 2004; 29: 410-414
8. Badmus TA, Salako AA, Sanusi AA, et al. Adult nephrectomy: our experience at Ile-Ife. *Niger J Clin Pract*. 2008; 11: 121-126
9. Eke N, Echem RC. Nephrectomy at the University of Port Harcourt Teaching Hospital: a ten-year experience. *Afr J Med Med Sci*. 2003; 32: 173-177
10. Schieppati A, Remuzzi G. Chronic renal disease as a public health problem: Epidemiology, social and economic implications. *Kidney Int* 2005; 68(Suppl 98): S7-S10
11. Akinsola W, Odesanmi WO, Ogunniyi JO, et al. Diseases causing renal failure in Nigerians – A prospective study of 100 cases. *Afr J Med Med Sci* 1989; 18: 131-137
12. Arogundade FA, Barsoum RS. CKD Prevention in Sub-saharan African: A call for Governmental, Nongovernmental, and Community Support. *Am J Kidney Dis* 2008; 51: 515-523
13. Dhillon HK. Prenatally diagnosed hydronephrosis: the Great Ormond Street experience. *Br J Urol*. 1998; 81(suppl 2): 39-44
14. Shokeir AA, Provoost AP, Nijman RJM. Recoverability of renal function after relief of chronic partial upper urinary tract obstruction. *BJU Int*. 1998; 83: 11-17
15. Bassiouny IE. Salvage pyeloplasty in non-visualizing hydronephrotic kidney secondary to ureteropelvic junction obstruction. *J Urol* 1992; 148: 685-687
16. Lome LG, Pinsky S, Levy L. Dynamic renal scan in the non-visualizing kidney. *J Urol* 1979; 121: 148-152