Lithiases urinaires chez les donneurs potentiels de rein et don du rein

Management of urolithiasis in living kidney donors

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RÉSUMÉ

But : Les lithiases découvertes chez des donneurs volontaires au cours de la préparation à un don de rein pour transplantation rénale intra-familiale ne contre-indiquent pas systématiquement le don du rein. Sur 252 donneurs préparés durant la période 2008-2015, nous avons recensé 8 cas de lithiases urinaires. Notre étude a inclut 8 donneurs (3.17%). de rein dont l'âge moyen est de 40,12 ans avec un sex-ratio M / F à 0,3. Nous avons noté, dans le cadre du bilan pré-greffe rénale, une lithiase urinaire sur des radiographies dans un cas, sur des échographies rénales dans un cas et sur une angiotomodensitométrie rénale dans 5 cas. Dans un cas, aucune lithiase n'a été détectée mais une analyse urinaire chimique a été effectuée en raison de l'histoire de la pierre rénale familiale. Nous avons effectué des analyses de l'urine de 24 heures, en étudiant le PH, le calcium et l'oxalate urinaires. On a objectivé chez les donneurs de rein, un pH acide, une hypercalciurie et une hyperoxalurie dans tous les cas associés à la weddelite dans 3 cas. Dans un cas, nous avons noté une carence en vitamine D liée à l'hyperparathyroïdie. La transplantation rénale a été réalisée dans deux cas. Après un suivi moyen de 11,25 mois (27-84), aucune complication urologique n'a été notée. Auparavant, les donneurs avec des lithases urianires asymptomatiques n'étaient pas considérés comme des candidats au don du rein en raison du risque présumé de morbidité pour le donneur et pour le receveur. De nos jours, les études montrent de plus en plus que ces risques étaient surestimés. Le tri minutieux ainsi que le suivi régulier des donneurs de rien constituent des aspects essentiels pour garantir le succès d'une transplantation rénale.

Mots-clés
Donneur de rein, transplantation rénale, lithiases

SUMMARY

Background : Kidney donors with asymptomatic stones were previously excluded from the kidney donation list because of a potential increased morbidity risk for both the recipient and the donor. Currently, recent studies tend to consider these risks as overestimated.
Aim : The aim of this study was to analyze our experience in the management of urolithiasis in potential donors.
Methods : We conducted a retrospective analysis during the period (2008-2015). We included donors with urilithiasis or a family history of urolithiasis whom had urinary biochemical analysis of urolithiasis. We identified the exact location, size, and anatomy of the kidney bearing the stone were identified.
Results: Among 252 potentially proposed living kidney donors (LKD) in two renal transplantation centers, we noted urinary lithiasis in 8 patients (3.17%). The mean age was 40,12±20 years old with a sex-ratio M/F at 0,3. We noted urinary lithiasis on radiographs in one case, on echographs in one case and on computerized tomography kidney angiography in 5 cases. All are not obese and without any medical history. In one case, there was no lithiasis detected but chemical urinary analysis was performed because of family renal stone history. We performed a 24-hours urine test, and examined PH, calcium and oxalate. The urine analysis, showed acidic pH and hypercalciuria in all cases associated to weddelite in 3 cases, hyperoxaluria in all cases. In one case, we noted vitamin D deficiency related hyperparathyroidism. Renal transplantation has been achieved in two cases. After a mean follow up of 11,25 months [range :27-84], no urological complications were noted.
Conclusion : Urinary lithiasis may occur in proposed living kidney donors and may not contraindicate this donation.

Key-words
Living Kidney donor; Kidney transplantation; lithiasis.

INTRODUCTION

Urolithiasis in potential living kidney donors (LKD) is a relatively uncommon clinical entity and has an annual incidence of less than 1% (1).Two decades ago, urolithiasis within the potential LKD was deemed an absolute contraindication for donation as this was theoretically associated risk of postoperative allograft dysfunction due to urolithiasis when transplanted into the recipient (2). From the donor's perspective, there is also an additional risk of future stone formation in the remaining kidney which could lead to possible sequelae of urolithiasis such as obstruction uropathy, urinary tract infections (UTI), sepsis, and end-stage renal disease. Thanks to the increasing use of computerized tomography, the screen for asymptomatic nephrolitiasi has become more easy. The risk of calcic stone related morbidity in both recipients and donors was evaluated in some series of literature, as high given its association to other metabolic disorders such as hypercalciuria, hypocitraturia, and hyperoxaluria (3). Is the presence of Oxalate calcium stone in potential LKD before transplantation should make them unselected for kidney donation? The aim of this study was to analyze our experience in the management of urolithiasis in potential LKD.

METHODS

We conducted a retrospective analysis during the period (2008-2015). We included in this study, adult donors with urilithiasis or a family history of urolithiasis whom had urinary biochemical analysis of urolithiasis. Demographic, clinical presentation, and follow-up variables were collected based on medical observations. We identified donors with renal calculi who have donated or not a kidney. The exact location, size, and anatomy of the kidney bearing the stone were identified.

RESULTS

Among 252 potentially proposed living kidney donors (LKD) in two renal transplantation centers, we noted urinary lithiasis in 8 patients (3.17%). For six recipients. Characteristics of recipients are illustrated in table 1. There were 2 males and 6 females with a median age 40,12 years (range: 24-62). All donors had no medical history and no pathological symptom such as nephretic colic. All donors were not obese. Urinary lithiasis was discovered on computerized tomography kidney angiography in 5 cases, on echographs in one case and on radiographs in one case. In one case, there was no lithiasis detected but chemical urinary analysis was performed because of family renal stone history. Characteristics of donors and lithiasis are summarized in table 2. We performed for all donors investigations for urolithiasis which included 24-hours urine test, and examined PH and urinary biochimical analysis. The blood and urine analyses are summarized in table 3. All donors were diagnosed with asymptomatic urolithiasis present within their left kidney in four cases, right kidney in two cases and bilateral in 1 case. The median size of the renal calculi identified was 4.5mm (range : 2–6). In one case, lithiasis was treated with complete clearance. Among our 8 donors, only 2 were maintained and donate a kidney. In fact, donor n°8 had multiple Sessions of extracorporeal lithotripsys associated with a hyperdiuresis regimen until the stone passage and was able to donate her kidney to her sister. Donor n° 1 donates his right kidney with stone lived in situ to his daughter. No urological complications were noted. After a median follow up of 11,25 months (range : 27-84), both the donor and recipients are stone free. Additionally, there were no complications in the graft function and more importantly no urological complications such as ischemic strictures, anastomotic stenosis, or urinary leak. The other six potential donors were declined because of calculi recurrence in donor 3, 4 and 4bis despite adequate treatment, the existence of bilateral kidney stones in donor 3 and the presence of a family history of stone disease (Table 3).

Table 1: Recipient characteristics

Recipient n°	R 1	R 2	R 3	R 4	R 5	R 6
Gender	F	M	M	M	F	F
Age	34	46	30	46	28	48
Initial Nephropathy	Inters N.	H	Neph	CGN	Neph	Inters N.

R :Recipient ; N. : Nephropathy ; Inters : Interstitial ; H : Hyalinosis ; Neph : Nephronophitisis ; CGN : Chronic glomerular nephropathy

Table 2: Donors and lithiasis characteristics: Clinical and radiographic findings

	D 1	D2	D3	D4	D4bis	D5	D 5 bis	D6
Gender	M	F	F	F	F	M	F	F
Age	62	41	24	31	40	39	41	43
Medical history	-	FSD	-	-	FSD	-	FSD	-
Relationschip with recipient	Father	Sister	Sp	Sister	Sister	Brother	Sister	Sister
Diagnosis lithiasis	CTA	CTA	CTA	US	CTA	R	CTA	NL
Number lithiasis	1	1	2	1	2	1	1	0
Lithiasis site	Right K	Right K	Bil	Left K	Left K	Left K	Left K	-
Lithiasis Size(mm)	3.5	6	4	5	5	2	4	-
Lithiasis aspect	Trans	Trans	Trans	Trans	Trans	Op	Trans	-
Upper tract dilatation	no	no	yes	No	no	no	no	-

D : Donor, FSD : Family stone disease, Sp : Spous, CTA: computerized tomography kidney angiography, US: ultrasonography, R: radiography NL : No lithiasis, K: Kidney, Bil: bilateral, Trans: transparent, Op: opaque, ECS: extracorporeal shock, Scl: stone clearance, Rs: remaining stone.

Table 3 : Donors and lithiasis characteristics: treatment and follow up

		D 1	D2	D3	D4	D4bis	D5	D 5 bis	D6
Treatment		no	no	no	no	no	no	ECS	-
	Rs	yes	yes	yes	yes	yes	yes	No (Scl)	-
Follow-up	Kidney donation/Side	Yes/right	no	no	no	no	no	Yes/left	No

D : Donor, ECS: extracorporeal shock, Rs: remaining stone, Scl: stone clearance

Table 4: Blood analysis in donors

	D 1	D2	D3	D4	D4bis	D5	D5bis	D6
Calcemia (g/l)	98	100	95	102	100	103	94	103
Phosphatemia (mg/l)	30	38	28	26	37	30	29	32
Plasma uric acid (µmol/l)	250	266	320	340	380	420	290	326

D : Donor, NR: normal rate, Nl: normal

Table 5: Urinary biochemical analysis in donors

Urinary 24 hours volume(ml)	1500	1400	2000	1350	1000	2100	1000	1800
Calciuria/creatinuria (NR <0.5)	0.42	0.5	0.629	0.564	0.295	0.24	0.121	0.818
Oxaluria (NR :0.1-0.5 mmol/24H)	0.34	0.4	0.33	0.54	0.52	0.43	0.231	0.227
Oxaliuria/creati nuria (NR <0,03)	0.02	0.02	0.02	0.035	0.038	0.03	0.02	0.02
Citraturia (NR : 1.5-6 mmol/24H)	3.08	Nl	3.08	3.46	2.05	3.63	1.78	1.51
Uricosuria (NR :1.5-4.2 mmol/24H)	3.8	Nl	3.16	2.59	3.43	4.7	1.9	1.73
Urinary PH	5.6	5.6	5.6	4.6	5.5	6	6.6	5.7
Interpretation of urine biochimical analysis	Nl	Nl	↗calciuria ↘ citraturia	Acidic urine PH ↗calciuria ↗oxaluria ↗Uricosuria Weddellite Whewellite Ia type	↗ oxaluria	↗Uricosuria weddelite	Nl	↗ calciuria Weddellite whewellite

DISCUSSION

Urolithiasis is common and can be asymptomatic in kidney donors. The current literature suggests that there is a high incidence of stone progression in patients with asymptomatic calculi. Burgher et al. (4), reported that among 300 of patients presenting with asymptomatic renal calculi, 26% requiring surgical intervention. However, other co-morbidities were reported to be associated with kidney stones, particularly, hypertension (15%), obesity (30%) and metabolic syndrome (28%) were common (3). In our report, no obesity and no hypertension was noted in all donors. It is important to screen donors with asymptomatic renal calculi in order to correct eventually metabolic abnormalities and to prevent any further risk of renal calculi formation. The donors without a proven risk for recurrent stone formation may be suitable for donating their kidney with renal calculus if the current stone is less than 15mm and the kidney is anatomically suitable for transplantation (4,5). In fact, in our report, two donors (Donor 1 and 5 bis) donate a kidney and the graft was stone free after the transplantation. However, the maximum of safety must be offered to the donor to insure a good renal function with a unique kidney. It is safe to estimate the risk to develop lithiasis, urologic complications and renal failure. Van Gansbeke et al. (6) reported the case of a donor who developed renal failure secondary to renal calculus formation. Qazi et al. had discussed two patients who developed renal calculi. Urological complications could potentially be avoided, in the early postoperative period, if the stones had been removed prior to implantation (7). Rashid et al. (8), described 10 cases of endo-urological methodology of ex vivo ureteroscopy as a treatment of donor calculi. The removed kidney exhibited no longer the normal anatomical narrowing of the ureter at the iliac vessels and the uretero-vesical junction. Furthermore, the kidney could be manipulated in order to allow easier access to all the calices. In their study, all but one stone were successfully treated and/or removed, stone diameters ranging from 1 to 5mm. No intra operative or postoperative complications were experienced and there were no stone recurrence neither in donors [average follow-up of 36.4 months] nor in recipients. Trivedi et al (9), concluded that ex vivo ureteroscopy was technically feasible to render a stone-bearing kidney stone- free without compromising ureteral integrity or renal allograft function. Olsburgh et al (10), reported a prevalence of 5% asymptomatic renal stones among 377 CT angiograms in potential kidney donors. Stones were removed in 10 patients. There were no early or late allograft stone-related complications and no evidence of stones on follow-up imaging as well as no reported stone recurrence in any of the donors. Our study showed that asymptomatic kidney stone formers may not share the same burden of co-morbidities that has been described in symptomatic stone formers. Whereas, various studies had shown that symptomatic stones seem to be more prevalent among older adults and men (11,12). Many studies suggested the existence of underlying physiopathologic mechanisms for stone formation that are different from those explaining stone growth and passage (13-16). Some studies, speculated that a 24-h urine volume < 1000 ml, can predict stone formation, however it was not demonstrated that the low mean urine volume is significantly correlated to the stone formation (17,18). Stone growth was less common in those with upper-pole and middle-pole stones and urine uric acid concentration was correlated positively with the rate of stone growth (4). Only one donor among our population group, was succefully treated for her renal lithiasis before the kidney removal with a good outcome, especially no recurrence of calculi during her follow-up.

CONCLUSION

The studies that have addressed the subject of lithiasis in kidney donors are very few. Rare cases of complications related to urinary lithiasis have been reported for kidney recipients with renal calculus left in situ. We are aware of the limitations of the study, first, this was a retrospective study with a small sample size. Thus, we could not performe a statistical analysis to confirm whether asymptomatic lithiasis in donors were significantly associated to an increased morbidity or not. Second, the retrospective nature of the study may have biased the data regarding post-transplantation outcome. We emphasize the long-term monitoring of both donors and recipients in order to be able to detect at time any inherent complication.

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