**Research Article**

# EPIDEMIOLOGY AND CT ASPECTS OF CONGENITAL ABNORMALITIES OF KIDNEYS AND URINARY TRACT

**[1,2] *BAKO DI, [2]Mahamat H.T, [2]ADO-ISSA NB, [1,3]SANI R, [4]SIDIBE T, [5]BAKA K**

[1]Faculté des Sciences de la Santé/Université Abdou Moumouni Diofo de Niamey
[2]Service de Radiologie et ImagerieMédicale/HôpitalGénéral de Référence
[3]Service de Chirurgie A/Hôpital National de Niamey
[4]Service de Radiologie et ImagerieMédicale/Centre National de Lutte contre le Cancer
[5]Service d'Urologie/HôpitalGénéral de Référence

**ABSTRACT**

**Aim of the study:** Our study aimed to evaluate the importance of CT in the diagnosis of congenital abnormalities of kidneys and urinary tract (CAKUT). **Material and methods:** This is a retrospective and prospective study focused on CAKUT. The study took place in the radiology and medical imaging department of the General Reference Hospital of Niamey over a period of 40 months from December 29, 2017 from April 28, 2021. **Results:** In 40 months, we recorded 106 cases of CAKUT, which makes a frequency of 31.8 cases/year. The average age of our patients was 40.8±19.8 years. The most represented age group was 16 to 30 years old and comprised 25.5% (n=27) of patients. There was a slight male predominance at 51.9% (n=47). The malformations were one-sided in 75.5% (n=80) of cases and were located on the left side in 58.8% (n=47) of cases. The pyelo-ureteral jonctionsyndrom (PUJS) was the most common type with 45.3% (n=48) of cases. In 50.9% (n=54) the malformations were suspected on ultrasound, they were discovered by a reaveling sign in 18.9% (n=20) of cases. Low back pain was the most common telltale sign in 17% (n=18) of cases. Urolithiasis were the most frequent complication in 19 patients. **Conclusion:** CAKUT are frequent in Niger. Delay in diagnosis of these conditions can lead to complications that may affect the fonctional prognosis of the urinary system. Hence the interest in emphasizing early detection and regular monitoring of these malformations.

*Keywords:* CAKUT, computered tomography, General Reference Hospital of Niamey.

## INTRODUCTION

Congenital malformative uropathies are anatomical and functional anomalies of the urinary system due to a defect in the development of the kidneys and excretory pathways. These are extremely varied anomalies of varying severity, ranging from simple positional defects to the most complex malformations.Their prevalence is estimated at 10% worldwide, ranking third after cardiovascular and orthopedic malformations [1].

The diagnosis of congenital malformative uropathy can be clinical from birth. However, some of these anomalies are sometimes overlooked due to their insidious evolution. They are then diagnosed late in adulthood following a complication or discovered incidentally during a routine imaging examination. These asymptomatic forms require particular attention both in their diagnosis and in the development of a follow-up and/or treatment plan. Medical imaging in general and CT scanning in particular play a crucial role in this decision-making because it allows a precise diagnosis of malformations and a prognosis to be established.

In Niger, we have little data on this subject. It is in this sense that we proposed to make our contribution to the study of congenital malformative uropathies in CT in order to allow a better diagnostic and therapeutic approach to these anomalies.

## METHODOLOGY

This was a 40-month prospective study from December 29, 2017 to

*Corresponding Author: BAKO DI,
1Faculté des Sciences de la Santé/Université Abdou Moumouni de Niamey
2Service de Radiologie et ImagerieMédicale/HôpitalGénéral de Référence.

April 28, 2021 and involving 106 cases of congenital malformative uropathy with CT diagnosis recorded at the Radiology and Medical Imaging Department of the Niamey General Reference Hospital. All patients whose CT scan included exploration of the abdomen and/or pelvis and revealed congenital malformative uropathy were therefore included in the study. For data collection, we used pre-established survey sheets which included the variables: age; gender; type of CT examination performed, clinical information, discovery of a congenital urological malformation, incidental/non-accidental discovery/ultrasound suspicion, type of malformation found, associated complications, associated malformations.

## RESULTS

The average age of our patients was 40.8±19.8 years with extremes of 2 months and 84 years. The most represented age group was 16 to 30 years old and comprised 25.5% (n=27) of patients. The pediatric population represented 10.4% (n=11) of the total population (fig.1).
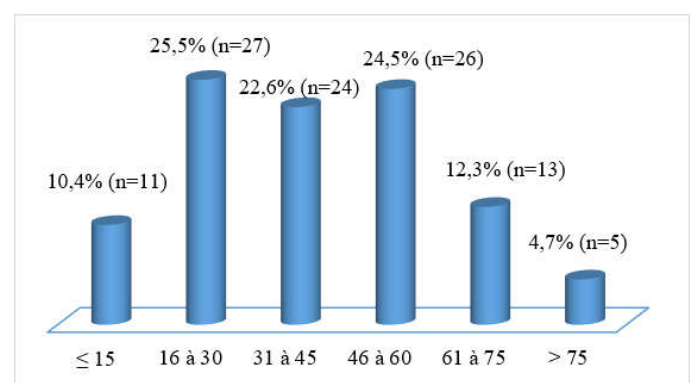


**Figure 1:** Distribution of patients according to age group

There was a slight male predominance at 51.9% (n=47), i.e. a sex ratio of 1.1. We recorded 13 types of congenital malformative uropathy and the pyélo-ureteral junction syndrome was the most common with 45.3% (n=48) of cases (table I).

**Table I: Distribution of patients according to malformation**

| Type of malformation | Number | Percentage |
|---|---|---|
| SJPU | 48 | 45,3 |
| Renal ectopia | 22 | 20,8 |
| Unilateral renal hypoplasia | 13 | 12,3 |
| Polycystosis | 11 | 10,4 |
| Unilateral renal agenesis | 8 | 7,5 |
| Bilateral renal rotation abnormality | 4 | 3,8 |
| Unilateral renal rotation abnormality | 4 | 3,8 |
| Unilateral-multicystic renal dysplasia | 3 | 2,8 |
| Right pyélo-ureteralbifidity | 2 | 1,8 |
| Right pyélo-ureteral and left pyelic duplicity | 1 | 0,9 |
| Leftmegaureter | 1 | 0,9 |
| Right retro-cavalureter | 1 | 0,9 |
| Left-ureterocele | 1 | 0,9 |
| Megacalicose | 1 | 0,9 |

**Table II: Distribution of patients according to associated complications**

| Associated complication | Number | Percentage |
|---|---|---|
| Renal lithiasis | 19 | 52,8 |
| Renal failure | 6 | 16,7 |
| Kidneyatrophy | 4 | 11,1 |
| Mute kidney | 2 | 5,6 |
| Hematuria | 1 | 2,8 |
| Renal failure + renal lithiasis | 1 | 2,8 |
| Dumbkidney + renal lithiasis | 1 | 2,8 |
| Delayedexcretion | 1 | 2,8 |
| Uretero-hydronephrosis + intra-ureterocelelithiasis | 1 | 2,8 |
| **Total** | **36** | **100,0** |

Two types of non-urological malformations were associated with UM in two patients; these were spina bifida and situs inversus.

**Table III: Distribution of patients according to non-urological malformations associated with malformative uropathy**

| Associated malformations | Number | Percentage |
|---|---|---|
| Situs inversus | 1 | 50 |
| Spina Bifida | 1 | 50 |
| **Total** | **2** | **100,0** |

In 50.9% (n=54) the malformations were suspected on ultrasound; they were discovered incidentally in 30.2% (n=32) and revealed by a clinical sign in 18.9% (n=20) of the case. Lower back pain was the most common presenting sign in 17% (n=18) of cases. The malformations were unilateral in 75.5% (n=80) of cases and located on the left in 58.8% (n=47) of cases. Congenital malformative uropathy was complicated in 36 patients (fig.2).
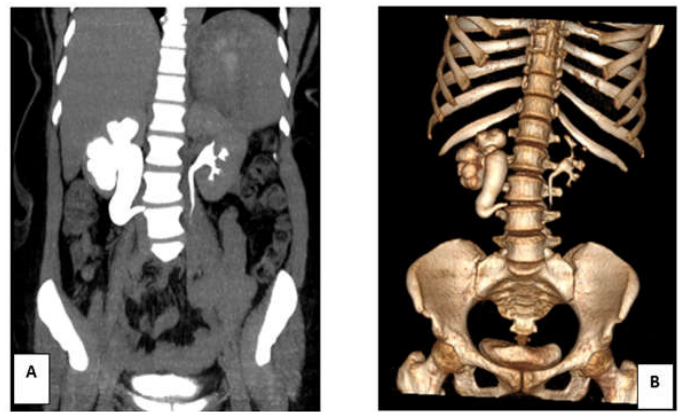


**Figure 2: A)** Uro-CTin multiplanar reconstruction (MPR) of a right retrocaval ureter (inverse "j" shaped appearance of the ureter); B) Uro-CTin volume rendering (VR) of the retrocaval ureter **(Images from the Radiology and Medical Imaging Department of the General Reference Hospital of Niamey)**



**Figure 3:** Uro-CTin volume rendering (VR). We note a left renal ectopy with an anomaly of rotation of the hilum **(Image from the Radiology and Medical Imaging Department of the Niamey General Reference Hospital)**

Urolithiasis and renal failure were the most frequent with respectively 52.8% (n=19) and 16.7% (n=6). Two types of non-urological malformations were associated with UM in two patients; these were spina bifida and situs inversus. CT examination was the means of diagnostic confirmation and prognostic evaluation of congenital malformative uropathy in our study.

## DISCUSSION

The frequency of malformative uropathy is assessed differently throughout the world [2, 3]. In our series, their prevalence is estimated at 7.4%. In developed countries, diagnosis is early thanks to antenatal ultrasound, which allows adequate monitoring and care, thus avoiding the occurrence of complications. The average age of our patients at the time of diagnosis was 40.8±19.8 years; Tengue in Togo and Moudafia in Morocco found an average age of 41.6±17 years and 34 years respectively [3]. This diagnostic delay can be explained by the inaccessibility of obstetric ultrasound to all social strata in our context (developing countries). The sex ratio was 1.1 in

our series. There is also a male predominance in various series [3, 4]. However, to date there is no theory that explains this male predominance. The pyelo-ureteral junction syndrome was the majority malformation in our series. This predominance is found in several series [5, 6]. The majority of malformations diagnosed in our series were suspected on ultrasound and then clarified by CT examination, as reported by several authors [7, 8, 9]. Indeed, ultrasound is the first-line imaging test for any urinary manifestation and CT scanning allows a more detailed and precise exploration of the urinary tree, it is the diagnostic confirmation examination. Low back pain was the most common presenting clinical sign [5, 6, 11, 12]. Malformations of the excretory pathways are rare [3]. In our series, their prevalence is estimated at 2.9/1000. We recorded several complications associated with malformative uropathy in our series, the most frequent of which was urolithiasis. These complications are linked to delayed diagnosis and can compromise the functioning of the urinary system.

## CONCLUSION

Congenital malformative uropathy is common in Niger with a male predominance. The delay in the diagnosis of these conditions favors the occurrence of complications that can jeopardize the functional prognosis of the urinary system. Hence the interest in emphasizing the importance of medical imaging, with antenatal ultrasound and CT scanning in the foreground, for early diagnosis.

## BIBLIOGRAPHY

1. **Tengue K, Kpatcha TM, Sewa E.** Les malformations du haut appareilurinaire chez l'adulte au Togo : Diagnostic et traitement. RevAfrUrolAndrol. 2016 Septembre1(6) :6.
2. **Tembely A, Kassogué A, Berthé H, Ouattara Z.** Aspects cliniques et thérapeutiques des anomalies de la jonction pyélo-urétérale au CHU du point G. Pan Afr Med J. 2016 ; 23 :256.
3. **Adamou H, Amadou Magagi I, Halidou M, Diongolé H, Doutchi M, Habou O, et al.** Surgical management of pyelo-ureteral junction syndrome in a resource-limited setting: case of Zinder National Hospital, Niger. BMC Surg. Octobre 2019; 19 (1) :150.
4. **Tengue K, Botcho G, Kpatcha TM, Adabra K, Sewa E, Leloua E, et al.** Priseen charge de l'urete`rerétrocave au Togo: A propos de 3 observations. Afr J Urol. Octobre 2016 ; 22 (4) : 279☐83.
5. **Pradhan SK**. A hospital based cross-sectional study to evaluate the spectrum of congenital anomalies of kidney and urinary tract, and clinico-epidemiological characteristics. J Pediatr Nephrol. Décembre 2019 ;7(4) :8.
6. **Lagou DA, Coulibaly PA, Guei MC, Tia WM, Konan SD, Ackoundou-N'guessan KC, Gnionsahe DA**. L'ectopierénale: à propos de 43 cascolligesen milieu hospitalieren Côte d'Ivoire. Sci Tech SciSanté .Janvier 20 ; 41 (1) : 9☐16.
7. **Van Den Bosch CMA, Van Wijk JAE, Beckers GMA, Van Der Horst HJR, Schreuder MF, Bökenkamp A**. Urological and NephrologicalFindings of Renal Ectopia. J Urol. Avr. Avril 2010 ; 183 (4) : 1574☐8.
8. **Cao Y, Zhang Y, Kang W, Suo N, Cui Z, Luo Y, Jin X.** Crossed-fused renal ectopia with renal calculi: Two case reports and a review of the literature. Medicine (Baltimore). Novembre 2019; 98 (48) : [e18165].
9. **Mudoni A, Caccetta F, Caroppo M, Musio F, Accogli A, Zacheo MD, Burzo MD, Nuzzo V**. Crossed fused renal ectopia: case report and review of the literature. J Ultrasound. Décembre 2017; 20 (4) : 333☐7.
10. **Sadiki R, Sadiq A, Tazi K, Koutani A, Hachimi M, Lakrissa A**. Urétérocèle de l'adulte. A propos de 14 cas. ProgrèsenUrologie. Janvier 2021 ; 5 : 231☐7.
11. **Phillips DIW, Divall JM, Maskell RM, Barker DJP.**A Geographical Focus of Duplex Ureter. Br J Urol . Octobre 1987; 60 (4) : 329☐31.
12. **Abdrahamane D.** Apport de l'Imageriemédicale dans le diagnostic de la polykystoserénale. A propos de 40 patients dans le service de radiologie et de médecinenucléaire du CHU du Point G. Bibliosanté . Mars 2019 ; 1 (6) : 284-88.

*********