Childhood Nephrectomy Indications: A Changing Profile

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Changement du profil des indications de la nephrectomie chez l'enfant.

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RÉSUMÉ

But : Etudier le changement du profil des indications de la néphrectomie chez l'enfant dans le sud Tunisien durant les 2 derniers décénies.

Méthodes: Quarte vignt quatorze enfants ont eu une néphrectomie pendant les 27 dernières années (1982–2007). Ces enfants ont été classés en 2 groupes en fonction de la période d'étude: le premier groupe (G1) : période 1982 - 1994 : 55 enfants néphrectomisés parmi 511 hospitalisations. Le deuxième (G2) : période 1995–2007 : 39 enfants néphrectomisés parmi 382 hospitalisations. Le test K2 a été utilisé pour l'analyse statistique, une valeur $p < 0,05$ a été considérée comme statistiquement significative.

Résultats: l'âge moyen a été de 7 ans. Les étiologies les plus fréquentes au sain de la totalité du groupe était la lithiase rénale (42,5%) suivie par les tumeurs de WILMS (21,3%) et le syndrome de jonction pyélourétéral (13,8%). L'indication de la néphrectomie a été dominée par la lithiase rénale dans G1 (54,5%, $p<0,005$) et par la tumeur de WILMS dans G2 (33%, $p<0,005$). En comparant les deux groupes, le taux de néphrectomie pour lithiase a significativement baissé dans G2 ($p=0.005$). Cependant, il n'existe pas de différence significative entre ces 2 groupes pour les étiologies tumeur de WILMS ou syndrome de jonction pyélourétérale.

Conclusion: Le profile des indications de la néphrectomie chez l'enfant en Tunisie tend actuellement à mimer celui des pays industrialisés avec regression de la pathologie lithiasique évoluée au profil de la pathologie tumorale grâce au diagnostic précoce et aux progrès de prise en charge de la pathologie lithiasique.

Mots-clés

Lithiase urinaire, enfant, néphrectomie, indication.

SUMMARY

Aim : To assess the changing profile of children's nephrectomy indications in the south of Tunisia during the last two decades.

Methods: There were 94 children who underwent nephrectomy between 1982 and 2007. They were classified into two groups. The first group included 55 out of 511 hospitalized children between 1982 and 1994, the second included 39 out of 382 hospitalized children between 1995 and 2007. K2 (Chi-squared) test was used for this statistical analysis. A P value of < 0.05 was considered statistically significant.

Results: The average was 7. Pathologies leading to nephrectomies were dominated in both groups by 3 main aetiologies: urolithiasis (42.5%), Wilm's tumors (21.3%) and pelvi-ureteric junction (13.8%). While in the first group, urolithiasis was found to be the major indication of nephrectomy (54.5%, $p<0.05$), in the second group, kidney tumors had become the major indication (33%, $p<0.05$) followed by urolithiasis (25.6%). So, the rate of nephrectomies performed due to urolithiasis had clearly decrease ($P = 0.005$), but there were no statistical differences observed between the rates of nephrectomies performed due to tumors or upper urinary tract malformations in the two groups.

Conclusion: The profile of children's nephrectomy indications in Tunisia stretches currently to be similar to the one of the industrialized countries, with regression of evolved kidney lithiasis leaving place to the tumorous pathologies, because of early detection, improvement and appropriate treatment of urinary lithiasis.

Key-words

Urolithiasis, children, nephrectomy, indication.

تغيّرات دواعي ءاستئصال الكلية عند الطفل.

الباحثون : كمال شبشوب ،حمّادي فخفاخ ،سوسن كانون ،علي بهلول ،محمّد نبيل المهيري.

الهدف من هذه الدّراسة ،هو ءابراز تغيّرات دواعي ءاستئصال الكلية عند الطفل خلال السّنوات الأخيرة في الجنوب التونسي .بين جانفي 1982 و نوفمبر 2007، 94 طفل تمّ ءاستئصال كليتهم .هؤلاء الأطفال تمّ توزيعهم على مجموعتين :المجموعة الاولى ،تحتوي على 55 طفلا اللّذين تمّ علاجهم خلال الفترة 1982 - 1994. المجموعة الثّانية ،تحتوي على 39 طفلا اللّذين تمّ علاجهم خلال الفترة 1995 - 2007. تمّ ءاستعمال الإختبار الإحصائي ل2 لمقارنة النّتائج بين المجموعتين. معدّل العمر 7 سنوات .سبابيّات ءاستئصال الكلية في المجموعة عامّة كانت خاصّة الحصات البوليّة)42.5٪(تليها ورم ويلمز)21.3٪(ثمّ ءانسداد الوصل الحوضي الحالبي .)13.8٪(الدّواعي السّائدة لإستئصال الكلية في المجموعة)1(كانت الحصات البوليّة)آ ◁ 0.005 - 54.5٪(و في المجموعة)2(كانت ورم ويلمز)آ ◁ 0.005 - 33٪(بعد مقارنة نتائج المجموعتين ءاستنتجنا ءانخفاض معتدّ في المجموعة)2(لمرض حصات الكلية)آ = 0.005(و من ناحية أخرى لم نجد ءاختلاف معتدّ بين المجموعتين لأمراض ورم ويلمز أو ءانسداد وصل الحوض الحالبي. في الخاتمة نقول أن دواعي ءاستئصال الكلية عند الطفل تغيّرة في تونس .حاليّا هذه الدّواعي أصبحة تشبه الدّواعي الموجودة في الدول المتقدّمة و المتمثّلة خاصّة في أمراض التورّم .و من ناحية أخرى لاحضنا ءانخفاض معتدّ لامراض حصات الكلية المتفاقمة نتيجة التشخيصات الطبيّة المبكّرة و تطور وسائل علاجها

الكلمات الأساسية : الحصات البوليّة ،الطفل ،ءاستئصال الكلية ،دواعي.

Thanks to the improvements in diagnostic assessment and early management of urinary paediatric diseases such as urinary lithiasis, remarkable changes were noted in the treatment modalities. We intent to study herein the effects of such changes on the indications of nephrectomy in our institution and demonstrate that the rate of urolithiasis leading to nephrectomy has decreased in the south of Tunisia during the last years.

PATIENTS AND METHODS

All cases of children's nephrectomies performed between 1982 and 2007 in our institution were reviewed retrospectively. Data were collected regarding age and sex of patients, aetiologies leading to nephrectomy, their clinical presentation and imagings, laboratory and pathological features.

During the period of our study, 893 children aged less than 14, were hospitalized in our institution. Among them, 94 children underwent nephrectomy (10.52%). We intent to compare herein the nephrectromy indications between the following two 12year periods: the first period; from 1982 to 1994 that included 55 of 511 hospitalized children (10.76%) and the second period; from 1995 to 2007 that included 39 of 382 hospitalized children (10.20%). K2 (Chi-squared) test was used for this statistical analysis. A P value of < 0.05 was considered statistically significant.

RESULTS

Pathologies leading to nephrectomy were dominated by three main aetiologies: Urolithiasis, Kidney tumors and Upper urinary tract malformations. Table 1 shows the main nephrectomy indications during the whole period of the study.

The average of patients was 7 (ranging from 9 months to 14 years) Table 2. Most of whom were male (61%). All nephrectomies were performed by open surgery through a lombo-abdominal approach.

Table 1 : The main aetiologies leading to nephrectomy

Uropathies	Number of patients	%
Urolithiasis	40	42.5
Kidney tumors :	22	23.4
Wilms'tumors	20	21.3
Multicystic dysplastic kidney	1	1
Billini carcinoma	1	1
Upper urinary tract malformations :	19	20.2
Pelvi-ureteric junction Obstruction	13	13.8
Vesico-ureteric reflux	3	3.2
Megaureter	3	3.2
Other aetiologies :	13	13.8
Posterior urethral valves	3	3.2
Xanthogranulomatous pyelonephritis	3	3.2
Urinary tuberculosis	2	2.1
Malakoplakia	2	2.1
Congenital hypoplasia	2	2.1
Thrombosis of renal artery	1	1

Table 2 : Ages at children presentation of the three most common aetiologies leading to nephrectomy.

Uropathies	Age (years) / cases			
	< 2	2 - 6	6 – 10	> 10
Urolithiasis	-	5	25	5
Kidney tumors	4	10	6	2
pelvi-ureteric junction obstruction	-	2	7	4
Vesico-ureteric reflux	-	1	1	1
Megaureter	2	1	-	-

Urolithiasis was the major indication of nephrectomy (42.5%). During the first period of the study, the majority of urinary calculi was diagnosed clinically at their complicated aspects; a lumbar mass was present in 17 cases (42.5%), 6 cases had lumbar kidney fistula. Such complications were not observed during the second period. Intravenous urograms, ultrasounds and/or CT scan were performed in all cases showing much kidney damage.

Kidney tumors were found in 22 cases (23.4%) and Wilm's tumor was the predominant lesion (21.3%) (table 1). The main clinical presentation in those patients was abdominal mass (17 cases).

Pelvi-ureteric junction obstruction accounted for 13 cases (13.8%). Morphology assessment of the abnormal kidney was performed by ultrasounds and intravenous urogram or CT scan in all cases. There was a non-functioning Kidney in 9 cases; the remaining 4 patients had a marked renal function loss (less than 10% in radio nucleotide imagings). In addition, we found that the number of children hospitalization had markedly decrease during the second period. However, nephrectomy rate did not show any particular change between the two periods (10.76% versus 10.20%) ($P > 0.05$). On the other hand, the rate of nephrectomies performed among hospitalized children who suffered from urolithiasis showed significant decrease between the two periods of the study as it dropped from 54.5 % to 25.6% ($P = 0.005$). Alternatively, no significant statistical differences were observed between the nephrectomies rates as far as renal tumors or upper urinary tract malformations were concerned ($P > 0.05$) (table 3).

Table 3 : Nephrectomies rate among total children admissions in our institution between 1982 and 2007

Uropathies	1st period (1982-1994)		2nd period (1995-2007)	
	Children admission cases	Nephrectomy cases	Children admission cases	Nephrectomy cases
Urolithiasis	235	30 (54.5%)	148	10 (25.6%)
Kidney tumors	9	9 (16.36%)	13	13 (33%)
Upper urinary tract malformation	68	9 (16.36%)	116	10 (25.6%)
Other etiologies	199	7 (12.7%)	105	6 (15.38%)
Total	511	55 (100%)	382	39 (100%)

So we can conclude that the related proportions of the three main indications of nephrectomy (Urolithiasis, Kidney tumors and Upper urinary tract malformations) had changed markedly between the two periods of our study. During the first period, urolithiasis was the major indication of nephrectomy (54.5% - $p < 0.05$), whereas during the second period, Kidney tumors became the major indication of nephrectomy (33% - $p < 0.05$) followed by upper urinary tract malformations then urolithiasis.

DISCUSSION

In literature, children's nephrectomy indications were dominated by three main aetiologies: kidney tumors, upper urinary tract malformations then urolithiasis (1,2,3). Frequencies of such aetiologies varied according to children's ages and their geographical origin.

Kidney tumors were more frequently observed between the age of 1 and 5 (4,5) with an incidence peak at the age of 3 - 4 for wilms' tumors (6,7). Furthermore, the incidence of non-wilms' tumors in children with renal masses seemed to vary according to the age presentation; children less than 6 months old were more likely to have congenital mesoblastic nephroma, those aged 1 to 5 years neuroblastoma, kidney sarcoma or lymphoma, and children aged more than 5 years were more likely to have renal cell carcinoma, lymphoma, or angiomyolipoma (4). In addition, upper urinary tract malformations seemed to be the first cause of nephrectomy in children aged less than one month (8,9,10). Urolithiasis seemed to be the last aetiology in terms of frequency (1,2). However, in our study, we found that urolithiasis which was diagnosed especially in children 6 and 10 years old, was the major aetiology leading to nephrectomy and recently this aetiology has showed a clear tendency to regression.

Indeed, twenty years ago in Tunisia, upper urinary tract lithiasis used to be secondary to malformatives pathologies and/or dietary deficiencies (11). This epidemiological profile of urinary stones in Tunisian children is considered as intermediate between their profile in developing countries, where dietary deficiencies are the main cause, and industrialized countries, where infectious and/or metabolic calculi are usually observed (12). Nowadays such aetiologies seemed to decline, mainly because of early diagnosis and better treatment of malformatives pathologies and improvement of the socio-economic living conditions (11). In addition, early screening of urolithiasis and improvement of non invasive means of treatment of urinary lithiasis could explain such significant decrease. Extracorporeal shok wave lithotripsy has markedly modified treatment of upper urinary tract stones especially in children (13). Moreover, it is now considered as the first-line treatment for even large urinary stones in children (3,14,15). However, children would require significantly fewer and lower energy shock waves then adults to achieve equivalent clearance rates (14).

The overall stone free rate at discharge could reach almost 90% without major complications nor kidney damage (15,16). Lastly, percutaneous and open surgery should have currently less frequent indications (16,17). On the other hand, in our study kidney tumors seemed to represent a major indication of nephrectomy during the second period (33%), which is in agreement with recent data reported in the literature. BOUHAFAS et al; reported a series of 80 children who underwent nephrectomy with average age of 5. They found that nephroblastoma was the principal aetiology (62.5%) (1). According to the study of HAMMAD et al, whose average age patients at nephrectomy was 57 months, multicystic dysplastic kidney was the first aetiology, followed by Wilms' tumors then vesico-ureteric reflux (2). In our series, we believe that the changing profile of nephrectomy indications between the two periods of the study could be explained by the significant decrease of the urolithiasis prevalence and not because of possible increase in kidney tumors frequency.

The incidence of nephrectomies due to upper urinary tract malformations showed an important decrease mainly because of antenatal screening (2,18). Indeed, antenatal imagings might allow early detection of upper urinary tract dilatations and permit appropriate follow up to prevent ultimate kidney damage. In our series upper urinary tract malformations were classified as third major indication for nephrectomy in children, which is in agreement with literature data (2). However, in both periods of our study we didn't observe any significant changing in the proportions of nephrectomies performed for upper urinary malformation.

CONCLUSION

In our study, urolithiasis, Wilms' tumors and congenital upper tract urinary anomalies, especially pelvi-ureteric junctions, were the main childhood nephrectomy indications. However we noticed an important decrease of urolithiasis nephrectomy during the last period of the study. This new profil stretches currently to be similar to the one of the industrialized countries which dominated by the tumorous pathologies. This is because of early detection, improvement and appropriate treatment of urinary lithiasis in Tunisia.

Références

1. Bouhafs A, Dendane A, Azzouzi D et al. Total nephrectomy in children: 11 years of experience in 80 cases. Ann Urol. 2003; 37 : 43-46.
2. Hammad Ft, Upadhyay V. Indications for nephrectomy in children: What has changed? J Pediatr Urol. 2006; 2 : 430-435.
3. Kit Lc, Filler G, Pike J et al. Pediatric urolithiasis: experience at a tertiary care pediatric hospital. Can Urol Assoc J. 2008; 2 : 381-386.
4. Miniati D, Gay An, Parks Kv et al. Imaging accuracy and incidence of Wilms' and non-Wilms' renal tumors in children. J Pediatr Surg. 2008; 43 : 1301-1307.
5. Mhiri Mn, Turki L, Smida L. A propos des masses lombo-abdominales de l'enfant : des étiologies à ne pas méconnaître. Revue tunisienne de pédiatrie. 1987; 8 : 87- 90.
6. Lonergan Gj, Martinez-Leon Mi, Agrons GA et al. Nephrogenic rests, nephroblastomatosis, and associated lesions of the kidney.

Radiographics. 1998; 18 : 947-968.
7. Charles Ak, Vujanic Gm, Berry PJ. Renal tumours of childhood. Histopathology. 1998; 32 : 293-309.
8. Nahal L. Épidémiologie des masses abdominales palpables de l'enfant au Maroc, à propos de 1084 cas. Tunis Méd. 1986; 64: 69 - 74.
9. Argueso Lr, Ritchey Ml, Boyle ET et al. Prognosis of children with solitary kidney after unilateral nephrectomy. J Urol. 1992; 148: 547-551.
10. Bourkia Pa, Jaby O, Lottmann H. Méga-uretère primitif obstructif. Ann Urol. 1998; 4: 197-201.
11. Mhiri Mn, Letaief Y, Smida ML. Aspects de gravité de la lithiase réno-urétérale de l'enfant (à propos de 100 cas). Tunis Med. 1989; 67 : 159-164.
12. Jallouli M, Jouini R, Sayed S et al. Pediatric urolithiasis in Tunisia: A multi-centric study of 525 patients. J Pediatr Urol. 2006; 2 : 551-554.
13. Soygur T, Arikan N, Kilic O et al. Extracorporeal shock wave lithotripsy in children: Evaluation of the results considering the need for auxiliary procedures. JPediatr Urol. 2006; 2 : 459-463.
14. Kurien A, Symons S, Manohar T et al. Extracorporeal shock wave lithotripsy in children: An equivalent clearance rate to adults is achieved with fewer and lower energy shock waves. BJU Int. 2009; 103 : 81-84.
15. Arifi M, Halim Y, Bouhafs Mel A et al. Extracorporeal lithotripsy of upper urinary tract stones in children. Prog Urol. 2006; 16 : 594-597.
16. Holman Cd, Wisniewski Zs, Semmens JB et al. Changing treatments for primary urolithiasis: impact on services and renal preservation in 16,679 patients in Western Australia. BJU Int. 2002; 90 : 7-15.
17. Zargooshi J. Open stone surgery in children: is it justified in the era of minimally invasive therapies? BJU Int. 2001; 88 : 928-931.
18. Capolicchio G, Leonard Mp, Wong C et al. Prenatal diagnosis of hydronephrosis: impact on renal function and its recovery after pyeloplasty. J Urol. 1999; 162: 1029-1032.