Abstract

Ultrasound usually detects hydronephrosis in adult and children, while nuclear medicine techniques quantify relative renal function in addition to characterizing the uro-dynamic relevance of hydronephrosis. This prospective study was undertaken to examine the relationship between ultrasound morphological findings and relative renal function, quantified with dynamic 99mTechnetium mercaptotriacetylglycine imaging (99mTcMAG3). Fifty patients with hydronephrosis were enrolled in this study in the period from February 2015 to September 2015 in Mafraq Hospital- Abu Dhabi – UAE. The result of this study showed that the maximum uptake value occurs as the uptake time increases i.e. 11counts/min, the average of maximum uptake was 620.7±378 counts with a mean time scanning 13.8±9.4 min. the mean kidney size, kidney pelvic size and cortical thickness was 27.5±17.4, 0.5±0.2 and 6.7±5.5 respectively; these measured correlated well with the kidney function in the presence of hydronephrosis condition and body characteristics as well. In conclusion Kidney function can be estimated using kidney size where max uptake increase by 10.3 counts/cm2 of the kidney size and the uptake time increases by 0.1 min/cm2 of the kidney size.
الموجات فوق الصوتية غالباً تكتشف استسقاء الكلية في الكبار والأطفال، في حين أن تقنيات الطب النووي تحدد وظيفة الكلى النسبية بالإضافة إلى تمييز أهمية ديناميكية الكلية. نسبة استسقاء الكلية. أجريت هذه الدراسة الإحصائية لدراسة العلاقة بين النتائج المورفولوجية للموجات فوق الصوتية ووظيفة الكلى النسبية، التي تم تحديدها كمية بديناميكية التصور تكنيسيوم 99. أجريت هذه الدراسة على خمسين مريض يعانون من استسقاء الكلية في الفترة من فبراير 2015 إلى سبتمبر 2015 في مستشفى المفرق - أبوظبي بالإمارات العربية المتحدة.

أظهرت نتائج هذه الدراسة أن حدوث قيمة امتصاص أقصى يزيد بزيادة الوقت، أي 11 عدد في دقيقة، وكان متوسط الحد الأقصى للامتصاص 620.7 ± 378 عدد مع متوسط وقت المسح 13.8 ± 9.4 دقيقة. كان متوسط حجم الكلى وحوض الكلى وسمك القشرة 27.5 ± 17.4، 0.5 ± 0.2 و 6.7 ± 5.5 على التوالي. هذه القياسات ترتبط بشكل جيد مع وظائف الكلية في وجود حالة الاستسقاء وخصائص الجسم كذلك. في الختام يمكن تقدير وظيفة الكلية باستخدام حجم الكلى حيث أقصى زيادة امتصاص تزيد ب 10.3 عدد بالنسبة للسم 2 من حجم الكلى ويزيد وقت الامتصاص بنسبة 0.1 دقيقة بالنسبة للسم 2 من حجم الكلى.
Acknowledgment

I would like to extend my appreciation to the many people who helped to bring this research project to fruition.

First of all, I would like to thank my research supervisor, Dr Mohamed Elfadil for his support and encouragement. You provided me with the tools that I needed to choose the right direction and successfully complete my thesis. Without your assistance and dedicated involvement in every step throughout the process, this paper would have never been accomplished.

To the college of (College of Medical Radiologic Science), Khartoum through which I have achieved my goal, I am indebted to you for giving me the opportunity to do my Master’s degree. Therefore, I would like to give my sincere thanks especially to the lecturers of the college who made a great effort to assist us in accomplishing this Master’s degree.

Then there are my colleagues. We were not only able to support each other by reflecting over and discussing our problems and findings, but also happily, by talking about things other than just our papers.
Last, but not least, I must express my very profound gratitude to my husband, Kamal, my children, Gofran, Marwan and Nooran and my brother, Khalid, for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. They were always there for me. This accomplishment would not have been possible without them.

List of contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract (English)</td>
<td>I</td>
</tr>
<tr>
<td>Abstract (Arabic)</td>
<td>II</td>
</tr>
<tr>
<td>Dedication</td>
<td>III</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>IV</td>
</tr>
<tr>
<td>List of contents</td>
<td>V</td>
</tr>
</tbody>
</table>

Chapter one

1.1 Hydronephrosis             1
  1.1.1 Grade I: mild          1
  1.1.2 Grade II: mild         1
  1.1.3 Grade III: mild        2
1.2 Problem of the study       3
1.3 Objectives                4
1.4 Significance of the study  4
1.5 Overview of the study     5

Chapter two

2.1 Anatomy of the kidney      6
  2.1.1 Location               6
  2.1.2 Relationships          8
  2.1.3 Blood Supply           9
  2.1.4 The Nephron            10
  2.1.5 Lymph drainage         11
2.2 Normal variants           12
2.3 Physiology of the Kidneys  15
  2.3.1 Excretion of Wastes    15
  2.3.2 Filtration, Reabsorption, and Secretion 16
  2.3.3 Water Homeostasis      18
2.3.4 Acid/Base Homeostasis 18
2.3.5 Electrolyte Homeostasis 19
2.3.6 Blood Pressure Homeostasis 21
2.3.7 Hormones 22
2.4 Histology of the kidney 24
2.5 Pathology of the kidney 24
  2.5.1 Renal agenesis 25
  2.5.2 Renal dysgenesis 25
  2.5.3 Congenital megacalyectasis 25
  2.5.4 Congenital cystic renal disease 26
  2.5.5 Obstructive renal disease (congenital PUJ obstruction) 28
  2.5.6 Pre tumorous conditions (nephroblastomatosis) 28
    2.5.7 Renal morphological anomalies 28
    2.5.8 Congenital renal positional anomalies 28
    2.5.9 Tumors presenting in antenatal: childhood period 29
2.6 Previous study

Chapter three
3.1 Design of the study 32
3.2 Population of the study 32
3.3 Sample size and type 32
3.4 Method of data collection (technique) 32
3.5 Variables of the study 36
3.6 Method of data analysis 36

Chapter four

Results

Chapter five
5.1 Discussion 44
5.2 Conclusion 46
5.3 Recommendation 47
References 48
Appendix 49