SONOGRAPHIC STUDY OF REJECTION OF TRANSPLANTED KIDNEY

An Essay
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by
Ashraf Ahmed Mohamed Nour El-Din
M.B.B.Ch.
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RADIOLOGICAL DEPARTMENT

Supervised by

Prof. Dr. Abd El-Zaher Hassan
Professor of Radiodiagnosis
Faculty of Medicine,
Ain Shams University

Dr. Alia El-Feky
Lecturer of Radiodiagnosis,
Faculty of Medicine,
Ain Shams University.

Dr. Mohamed El-Hedek
Lecturer of Radiodiagnosis,
Faculty of Medicine,
Ain Shams University.

FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY
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IN THE NAME OF ALLAH

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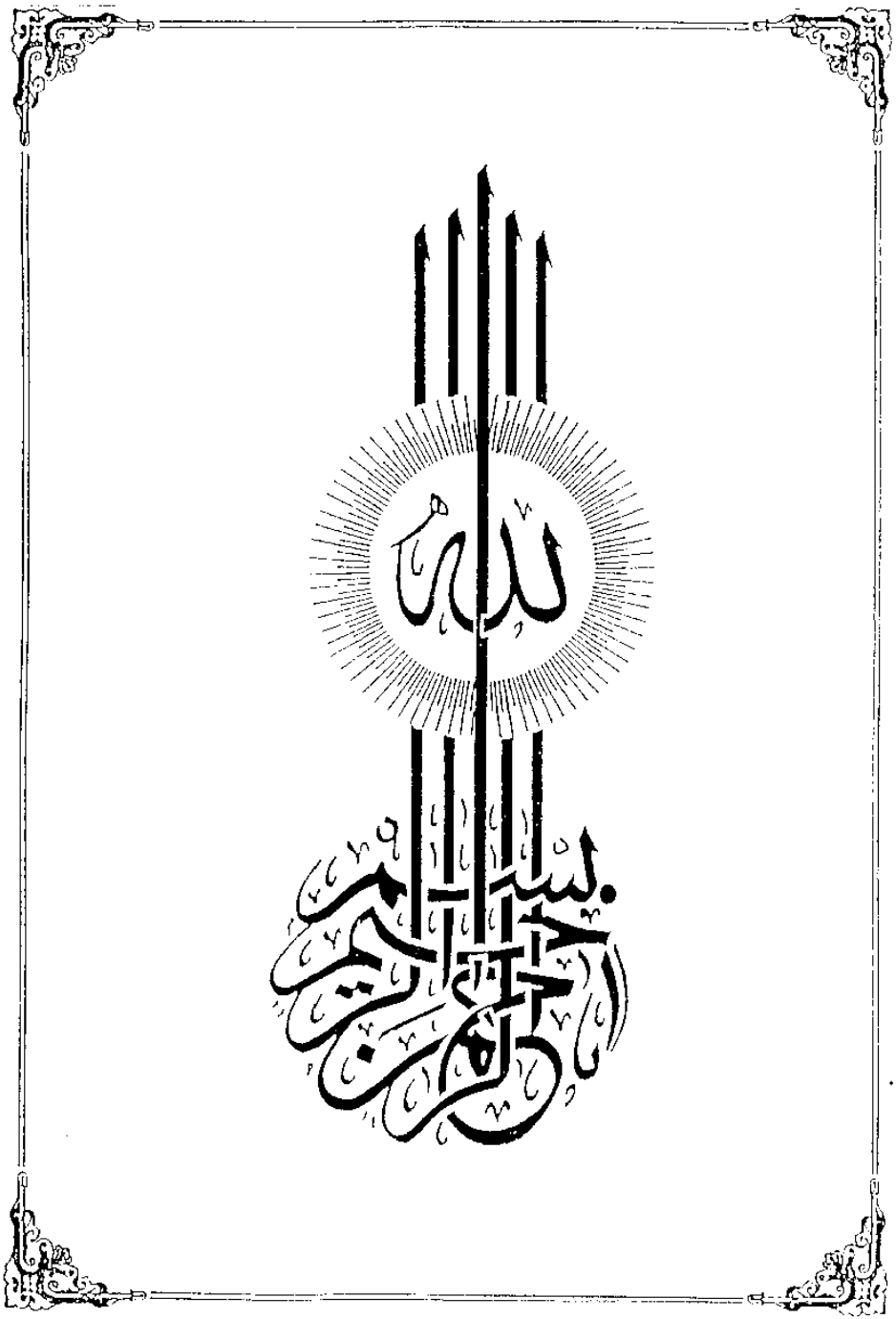

ABBREVIATIONS

APN	:	Acute papillary necrosis
ATN	:	Acute tubular necrosis
CMD	:	Corticomedullary differentiation
HAR	:	Hyperacute rejection
Hz	:	Hertz
RAO	:	Renal artery occlusion
RI	:	Resistive index
RVO	:	Renal vein occlusion
RVT	:	Renal vein thrombosis

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Introduction & Aim of Work

INTRODUCTION

Renal transplantation is used as a method of treatment for patients with chronic irreversible renal failure, which has progressed to the point when life can no longer be sustained by adequate conventional medical treatment. One year survival rates are as high as 80% with new immunosuppressive therapy especially cyclosporine-A. However, renal graft rejection remains real problem particularly in the first few months after transplantation.

Accurate detection and characterization of significant complications will hopefully sustain and perhaps improve graft survival rate (Jari et al; 1981).

Aim of The Work :

Trail for sonographic illustration of the most common local complications following transplantation.

This essay summarizes the ultrasonographic imaging technique which can be used for diagnosis of early and late postoperative problems with focusing on rejection as a frustrating complication.

Sonogrphic anatomy of the normal kidney

SONOGRAPHIC APPEARANCE OF NORMAL KIDNEYS :

the sonographic appearance of internal renal anatomy are remarkable similar to, the appearance of cut sections of kidney at postmortem (Diagram 1).

With early available ultrasound equipment, the evaluation of renal parenchymal disease was limited mainly to determination of kidney size

Introduction of gray scale digital scanners and high resolution real time systems make a closer evaluation of renal parenchyma in normal and diseased kidneys possible. It permits identification of cortex and medulla and arcuate vessels with the renal parenchyma and calyces with renal pelvis within renal sinus (Anderson E.E., et al; 1972).

There are some technical factors in imaging the renal parenchyma summarized in table (I)

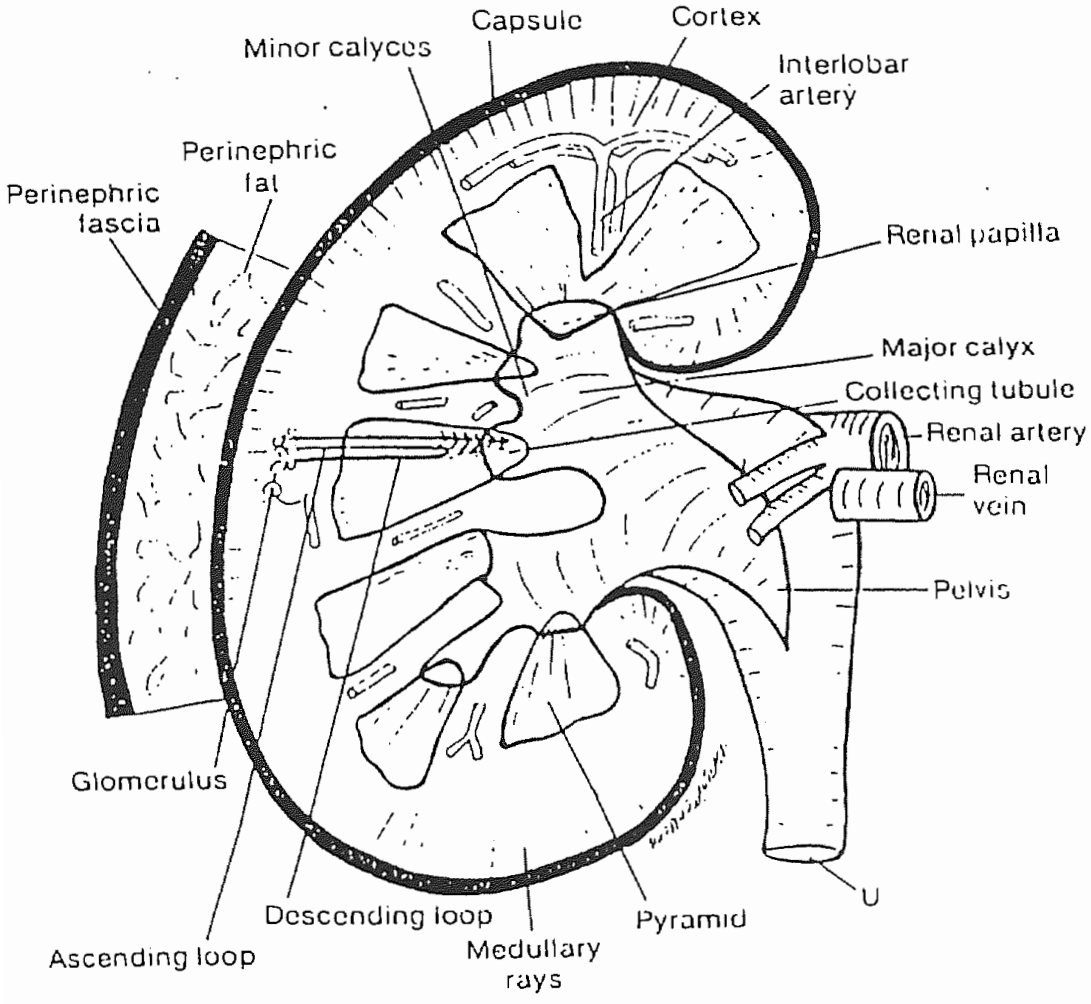

DIAGRAM (1)

Cut section of kidney at postmortem

Table (I) : Optimal technique for evaluation of renal parenchyma.

1. Highest frequency transducer that will image the kidney in each projection.
2. Simple sector scans.
   A. Through the liver for the right kidney.
   B. Coronal scans in the right lateral decubitus position for left kidney.
3. While writing on a black background.
4. Suspended respiration.
5. Appreciated gain for given machine and patient :
   A. High enough to write the cortex.
   B. Low enough so medulla is not obliterated.

Standard positions for examination of the kidneys are obtained with the patient supine, prone and in decubitus positions, transverse and longitudinal scan are obtained in each position (Darwish M.H., et al; 1990).

Renal parenchyma of the right kidney is always best shown with the patient supine, using the liver as acoustic window. For demonstrating the left kidney coronal sector scans are obtained with the right side down decubitus position at several levels.

The collecting system of the kidney could be best outlined by using a lower than normal gain on gray scale studies (Colman B.G., et al; 1988).

Cortical thickness is generally uniform or may be lobulated. The cortex is more echogenic at 5 MHZ which would indicate that the higher frequency transducer is a more superior for discovery of smaller cortical lesions (Adwards E., et al; 1987).

The normal cortex contains less intense echoes than the parenchyma of the spleen and liver, unless liver diseases is

present. Increased echoes amplitude may be seen within the cortex in disease states in which there is deposition of collagen and calcium and in some acute processes (Colman B.G., et al; 1988).

The degree of increased cortical echogenicity identified as :

Mild : echogenicity which is equal to that of the liver.

Moderate: this is greater than that of the liver but less than that of normal renal sinus.

Severe : which equal to that of normal sinus.

The normal values for the ratio of the cortex to the liver parenchyma and the cortex to renal sinus will vary with different machinery, but can be standardized for an individual laboratory.

On an equipment, the normal cortex is always less intense than the normal liver, and markedly less intense than the renal sinus (Edwards E, et al; 1987).

It contain echoes while the medulla is relatively sono-lucent with characteristic shape distinguish them from the

cysts, cortex and medulla can be clearly seen in approximately half percent of the patients who are examined, but they are vaguely seen in obese patients.

Corticomedullary differentiation is exaggerated in normal kidneys where there is enhanced amplification of echoes due to passage of the beam through a medium of low attenuation between the kidney and the transducer.

The arcuate and interlobar subsidiary vessels within renal parenchyma do not run a consistent course and are rarely imaged in their longitudinal axis on a sector scan. They are seen in cross section or oblique section at the corticomedullary junction. The intensity of returning echoes from these vessels varies with the angle of incidence (Ansert-Hagen S.L., et al; 1980).

The arcuate vessels are best seen at 2.25 MHZ were the cortex is less echogenic since they are less obscured by cortical echoes around them.

At lower frequency transducer there is penetration and visualization of portion of the kidneys more distal to the transducer.

The renal sinus return a specular echoes and may be optimally written using either bi-stable equipment or grey scale equipment.

The infundibula and calyces can be identified and evaluated, they are virtually a potential spaces, section of these structures can be seen in each scan and details such as the fornices and calyceal cup can be identified using proper technique. Fluid intake should be documented, and if possible controled led prior to nephrosonography and the patient questioned about medication such as diuretics.

The appearance of the collecting system may vary markedly with the state of hydration. A similar state of hydration is required for true comparison to be made a sequential examination (Sanders R.C., et al; 1991).