INTRODUCTION

Renal artery stenosis (RAS) is most commonly caused by either fibromuscular dysplasia or atherosclerosis, and it may occur alone in the form of isolated anatomical RAS or associated with hypertension, renal insufficiency as ischemic nephropathy or both. RAS due to atherosclerotic changes of the RAs has become a serious concern as a cause of hypertension and renal ischemia, resulting frequently in end-stage renal failure.[1-3] Identification of patients with RAS-induced hypertension has important clinical implications because correction of RAS with angioplasty and stenting can improve blood pressure control in as many as 64% of patients with hypertension resistant to medical treatment. Also, improvement or stabilization of renal function occurs in 79% of all patients, vascular color doppler ultrasound is planned according to the direct technique with the patients in the supine position with low-frequency curve transducers (2 to 3.5 MHz) to allow greater penetration (10-12 cm) of the ultrasound beam. After case history recording and careful examination of all patients, vascular color doppler ultrasound was planned according to the direct technique with the patients in the supine position with low-frequency curve transducers (2 to 3.5 MHz) to allow greater penetration (10-12 cm) of the ultrasound beam. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

MATERIALS AND METHODS

After considering the utility of the study and obtaining approval from ethical review committee of the institute, we selected fifty-eight suspected patients of renovascular arterial hypertension of both genders. All gave their written consent for the participation in the study. Considering this, we planned present study to assess efficiency of vascular color doppler ultrasound for renal artery stenoses.[6-10]

RESULTS

There were 30 (51.7%) males and 28 (48.3%) females. [Table 1]
Color doppler revealed 24 were normal, 14 showed moderate stenosis, 10 were obstructed, 2 were inconclusive and 8 had hemodynamically significant stenosis The difference was significant (P< 0.05). [Table 2, Figure 1]

Table 1: Patients distribution

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>58</td>
<td>30 (51.7%)</td>
<td>28 (48.3%)</td>
</tr>
</tbody>
</table>

Table 2: Assessment of outcome of color doppler

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>24</td>
<td>0.05</td>
</tr>
<tr>
<td>Moderate stenoses</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Obstructed</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Inconclusive</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hemodynamically significant stenoses</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Diagnostic accuracy of color doppler

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>94.2%</td>
</tr>
<tr>
<td>Specificity</td>
<td>92.3%</td>
</tr>
<tr>
<td>PPV</td>
<td>88.4%</td>
</tr>
<tr>
<td>NPV</td>
<td>85.1%</td>
</tr>
</tbody>
</table>

Sensitivity of color doppler found to be 94.2%, specificity 92.3%, positive predictive value (PPD) of 88.4% and negative predictive value (NPV) of 85.1%.

![Figure 1: Assessment of outcome of color doppler](image)

DISCUSSION

Atherosclerotic RAS is a progressive disease, particularly in patients with diabetes or other manifestations of atherosclerosis. The ideal imaging procedure for RAS should identify the main RAs as well as the accessory vessels, localize the site of stenosis or disease, provide evidence for the hemodynamic significance of the lesion and identify associated pathologies that may have an impact on the treatment of RAS. Angiography, once considered the “gold standard” for arterial imaging, is invasive, expensive and carries a small but not negligible risk of severe complications such as adverse contrast media reactions, cholesterol embolization or arterial dissection. The present study assessed efficiency of vascular color doppler ultrasound for renal artery stenoses.[11,12]

Our results showed that there were 30 (51.7%) males and 28 (48.3%) females. Hua et al used a cutoff value of 200 cm/s and RA diameter reduction of more than 60% in a series of 107 patients reaching a sensitivity of 91% and a specificity of 75%. A PSV greater than 200 cm/s has been suggested as the threshold for Doppler diagnosis of 60% reduction of the RA diameter.[13-15]

Our results showed that color doppler revealed 24 were normal, 14 showed moderate stenosis, 10 were obstructed, 2 were inconclusive and 8 had hemodynamically significant stenosis. Egglin et al found that of the 137 renal arteries assessed on vascular color doppler ultrasound, 43 (31.3%) were considered normal, 11 (8.1%) had moderate stenoses, 70 (51.1%) had hemodynamically significant stenoses, 7 (5.1%) were obstructed, and in 6 (4.4%) arteries the examination was inconclusive. The arteriographic findings were as follows: 50 (36.5%) renal arteries were normal, 10 (7.3%) had moderate stenoses, 67 (48.9%) had hemodynamically significant stenoses, 9 (6.6%) were occluded, and in 1 (0.7%) the examination was inconclusive.[16]

Our results showed that sensitivity of color doppler found to be 94.2%, specificity 92.3%, positive predictive value (PPD) of 88.4% and negative predictive value (NPV) of 85.1%. Soares et al reported that renal-segmental ratio (RSR), i.e. a ratio of PSV measured in the renal artery to that obtained in the segmental artery, was the best parameter (sensitivity 93.33%; specificity 89.47%). Aytac et al showed that if the diameter of a RA measured by US is 4.65 mm or less, the presence of an accessory renal artery can be established with 80% sensitivity and 80.5% specificity. If the diameter of the renal artery is 4.15 mm or smaller, the presence of an accessory renal artery is extremely probable, with 98.8% specificity. It was also interesting that in kidneys with a main RA diameter of 5.5 mm, no accessory RAs were encountered.[17]
Missouris et al showed that renal duplex scanning using contrast enhancement produces more reproducible spectral waveforms, improves accuracy and reduces the time needed for the examination. They demonstrated a sensitivity of 85% and a specificity of 79% without contrast enhancement, and a sensitivity of 94% and a specificity of 88% with contrast enhancement, besides an important reduction in the duration of the procedure. Several epidemiologic studies have shown the elevated prevalence of ischemic nephropathy in elderly patients mainly due to atherosclerotic RAS. Over the past decade, data have accumulated implicating atherosclerotic RAS as an increasingly significant cause of end-stage renal disease (ESRD) ranging anywhere from 5% to 22% of incident ESRD patients. RAS is the most common potentially reversible and curable cause of secondary hypertension and renal failure.[18,19]

CONCLUSION

Color Doppler provides useful information in renal artery stenosis. Early diagnosis of renal artery stenosis may be helpful in preventing renal hypertension.

REFERENCES