



Doppler Study of 50 Cases of Renal Disease

KEYWORDS

Renal Doppler, Hypertension, Renal artery stenosis

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ABSTRACT Introduction- Renal Doppler is a non-invasive technique that provide both detail information about the nature and severity of vascular lesion and quantitative indication of their impact on blood flow. Doppler ultrasound can detect Renal artery stenosis (RAS). RAS is most commonly caused by either fibro muscular dysplasia or atherosclerosis and it may occur alone (isolated anatomical RAS) or associated with hypertension, renal insufficiency (ischemic nephropathy) or both..

Aims & objectives- To determine the role of colour assisted duplex sonography as an accurate and rapid tool for non-invasive mapping of various renal diseases .

Material and method-This study has been done in government institute. It include 50 cases of Doppler study of renal diseases during year of may 2008 to 2010. Each patient studied in detail with relevant clinical history and examination finding. Doppler study was done using 3.5-5 MHz real time convex probe. Follow-up and other confirmative procedure were carried whenever indicated. Each patient study in detail with (1)demographic criteria(2)clinical presentation like swelling, hematuria, abdominal pain, urinary symptoms, headache(3)general examination(4)local examination(5)laboratory investigation(6)radiological investigation-Doppler analysis.

Results Out of 50 patients 30(60%) were male and 20(40%) were female. Maximum patients belonged to age group of 41-50 years 18(36%), followed by 31-40 years 10(20%) .In present study, most of the patients had clinical presentation of abdominal pain (50%) followed by lump in abdomen, hematuria, fever, headache. Out of 50 patients majority were smokers (50%). 20 patients were suffering from diabetes and 16 patients were hypertensive In our study 66% of the patients had vascular lesions, followed by 10% had renal parenchyma disease. Renal artery stenosis was most common in patients suffering from vascular lesions 86 % (29/34). In our study in 52% patients had increased vascularity in renal lesion followed by 36% with decreased vascularity in renal lesion.

Conclusion- Doppler study has added an important dimension to renal ultrasound. It has also gains increasing important in urological study .by using this renal artery stenosis can demonstrated

INTRODUCTION

Over past 40 years continuing technological progress in the design and performance of ultrasound scanner. In recent years, various special scanners optimized for particular application have been developed and some of these designs especially for vascular studies for superficial vessels like carotid and femoral vessels scanner with high frequency transducer (3-10 MHz) are now used. That also gives high quality image with sub-millimetre resolution. The deeper abdominal vessels must be examined with transducer frequency of 3.5-5 MHz. For the assessment of blood flow angiography remains gold standard. Renal Doppler is a non-invasive technique that provides both detail information about the nature and severity of vascular lesion and quantitative indication of their impact on blood flow. Doppler ultrasound can detect Renal artery stenosis (RAS). RAS is most commonly caused by either fibro muscular dysplasia or atherosclerosis, and it may occur alone (isolated anatomical RAS) or associated with hypertension, renal insufficiency (ischemic nephropathy) or both.

RAS due to atherosclerotic changes of the renal arteries has become a serious concern as a cause of hypertension and renal ischemia, resulting frequently in end-stage renal failure [1]. Several epidemiologic studies [1,2] 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 [3,4] RAS is the most common potentially reversible and curable cause of secondary hypertension and renal failure. Thus, early diagnosis of RAS is an important clinical objective since interventional treatment may improve or cure hypertension and preserve renal function [5]. Prevalence of RAS is estimated to range from 1% to 5% of all hypertensive in the general population up to 30% of a highly selected referral population (i.e. malignant hypertension, young patients with hypertension, the presence of an abdominal bruit, decreased serum potassium, unexplained azotaemia, recurrent congestive heart failure or "flash" pulmonary oedema [6,7]. Clinical screening of hypertensive patients is therefore recommended before extensive investigation for renovascular disease is started. The pathologic causes of RAS include atherosclerosis, fibro muscular dysplasia (FMD), arteritis, dissection and neurofibromatosis. From a practical point of view, there are only two major diseases that affect the RAs: (a) atherosclerotic disease, the most common pathologic condition, which mainly affects the orifice and proximal portion of the RA; (b) FMD, much less common, which involves mid to distal portion of the RAs. Intimal and periarterial FMD is com-

monly associated with progressive dissection and thrombosis, whereas medial FMD progresses only in 30% of patients and is rarely associated with dissection and thrombosis. Atherosclerotic RAS is a progressive disease, particularly in patients with diabetes or other manifestations of atherosclerosis [5]. 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 (e.g., abdominal aortic aneurysm, renal mass, etc.) 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. Owing to its invasive character and the substantial costs involved, angiography is not used as a screening method but as a guide for therapeutic transluminal angioplasty. Furthermore, angiography provides no information on the functional significance of the stenosis. Thus, in recent years many less invasive or noninvasive diagnostic methods, such as captopril renal scintigraphy, colour-Doppler ultrasonography (CDUS), computed tomography angiography (CTA) and magnetic resonance angiography (MRA) have been tested and compared to arteriography. Among these different methods, CDUS has been selected by many institutions as the principal screening tool used to detect RAS.

AIMS AND OBJECTIVES

To determine the role of colour assisted duplex sonography as an accurate and rapid tool for non-invasive mapping of various renal diseases by adopting the following approach

- Confirmation of clinical diagnosis.
- Localization and extent of disease in arteries and veins.
- To study vascularity of renal masses.
- Study the effect of management and evaluate success of management after using Colour Doppler

MATERIAL AND METHOD

This was a prospective observational study done at Government Medical College, Surat, during may 2008 to may 2010. It includes 50 cases of Doppler study of patients of renal diseases. Each patient studied in detail with relevant clinical history and examination finding. Doppler study was done using 3.5-5 MHz real time convex probe. Follow-up and other confirmative procedure were carried whenever indicated. Each patient study in detail with 1) demographic criteria, 2) clinical presentation like swelling, hematuria, abdominal pain, urinary symptoms, headache, 3) General examination, 4) Local examination, 5) Laboratory investigation, 6) Radiological investigation-Doppler Analysis.

DOPPLER: Patient should be rest comfortable in flat supine position. The best view is obtained by positioning the transducer just above the midway point between the xiphoid process and the umbilicus. All patients were examined in fasting states. as renal artery is deeply situated we used a lower frequency transducer operating at 2.02 to 3.5 MHz

DOPPLER ANALYSIS: In this we have done frequency spectrum analysis and colour flow analysis. In frequency spectrum analysis we have done sample volume, waveform, acceleration, laminar and disturbed flow, diagnosis of arterial obstruction while in colour flow analysis we have done visual measurement of stenosis and differentiation of stenosis and obstruction.

Statistical Analysis: basic descriptive statistical tools like mean, percentages, SD, variance and others utilize for the analysis.

OBSERVATIONS AND RESULTS

Out of 50 patients 30(60%) were male and 20(40%) were female. Maximum patients belonged to age group of 41-50 years- 18(36%), followed by 31-40 years- 10(20%).

In present study, most of the patients had clinical presentation of abdominal pain (50%) followed by lump in abdomen, haematuria, fever, headache.

Out of 50 patients majority weresmokers (50%).20 patients were suffering from diabetes and 16 patients were hypertensive.

Table 1: incidence of lesion

Lesion	No. of patients	percentage
Normal variant		
-Accessory renal artery	2	4%
-Nutcracker syndrome	1	2%
Vascular lesion		
-Renal artery stenosis	29	58%
-Renal vein thrombosis	4	8%
-AV fistula	1	2%
Neoplastic lesion		
-Bening	2	4%
-Malignant	1	2%
Renal parenchyma disease	5	10%
Obstructive Uropathy	4	8%
Renal Allograft	1	2%

In our study 66% of the patients had vascular lesions, followed by 10% had renal parenchyma disease. Renal artery stenosis was most common in patients suffering from vascular lesions 86%(29/34).

Table 2 : Radiological Findings

Drugs	No. of patients	percentage
Absence of flow in renal artery	2	4%
Absence of flow in renal vein	4	8%
Increased vascularity in renal lesion	26	52%
Decreased vascularity in renal lesion	18	36%

In our study in 52% patients had increased vascularity in renal lesion followed by 36% with decreased vascularity in renal lesion. Among 50 patients 32(64%) had nonvascular lesions while 18(36%) had vascular lesions.

DISCUSSION

Renal diseases common now a days. Doppler Ultrasound is useful tool for the diagnosis of renal pathology. This study analysed the diagnosis of renal diseases by Doppler ultrasound in our department in a tertiary care hospital attached to our institute.

Total data of 50 subjects had been collected. Demographic data of patients like age, sex, relevant clinical data like clinical presentation, general and local examination, past and personal history, laboratory investigation, radiological investigations were collected and analysed.

Out of 50 patients 30(60%) were male and 20(40%) were

female. Maximum patients belonged to age group of 41-50 years- 18(36%), followed by 31-40 years- 10(20%). In this study peak incidence of renal artery stenosis is between 21-30 years and male and female ratio in renal artery stenosis 1:1. In renal artery stenosis majority patients were hypertensive this finding is of renal artery stenosis is matched with Carolyn et al. study^[8].

In present study, most of the patients had clinical presentation of abdominal pain (50%) followed by lump in abdomen, hematuria, fever, headache. Out of 50 patients majority were smokers (50%). 20 patients were suffering from diabetes and 16 patients were hypertensive. This finding in coexistence with study^[9]

In our study 66% of the patients had vascular lesions, followed by 10% had renal parenchyma disease. Renal artery stenosis was most common in patients suffering from vascular lesions 86 % (29/34).

CONCLUSION

From this study we concluded that both invasive and non-invasive (Doppler) tests continue to play role in evaluation of patient with renal disease. Colour flow imaging is mainstay of renal vessel examination. Doppler examination determine the severity of vessel occlusion. Colour Doppler study has added an important dimension to renal ultrasound. It has also gains increasing importance in urological study. By using this renal artery stenosis can be demonstrated in 70-90% of cases. Colour Doppler study help in differentiating obstructive and non-obstructive hydronephrosis. Duplex Sonography is not as accurate as CT or MRI for de novo detection of tumour extension in to renal vein. Colour Doppler study become an important diagnostic tool for renal pathologies and can replace radio nucleotide and angiographic study in many cases. Particularly renal artery stenosis.

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