Summary & Conclusion

Duplex Doppler examination, an attractive option provides a readily available noninvasive assessment of renovascular bed resistance through simple measurement.

Color Doppler ultrasonography is inexpensive diagnostic procedure that is capable, in an experienced hand, of accurately screening for Reno vascular disease(stenosis , fistula, aneurysm…etc) .

Many studies reported normal mean RI values of 0.64 ± 0.05.

In general, most sonographers now consider 0.70 to be the upper threshold of the normal RI in adults .

Important exceptions to this threshold have been reported, however. In children, it is common for the mean RI to exceed 0.70 through the first year of life, and a mean RI greater than 0.70 can be seen through at least the first 4 years of life .

In elderly patients without renal insufficiency, the normal RI can also exceed 0.70 . It is uncertain whether this is a normal phenomenon, perhaps due to age-related changes in vascular compliance, or the consequence of small vessel changes in the kidney due to aging.

In the early 1990s, several groups postulated that the pathophysiology of urinary obstruction might be reliably manifested by changes in arterial Doppler spectra . Initial studies suggested that this vasoconstriction response was primarily mechanical, due to increases in collecting system pressures.

RIs from many hydronephrotic kidneys were obtained before nephrostomy. The mean RI in two third of the kidneys with confirmed obstruction (0.77 ± 0.04) was significantly higher than the mean RI from one third of the kidneys with nonobstructive pelvicaliectasis (0.64 ± 0.05). Moreover, RI values returned to normal after nephrostomy .

So, In patients undergoing percutanous nephrostomy follow-up duplex Doppler study can evaluate the success of nephrostomy drainage as the relief of obstruction results in reduction of RI value.

Moreover, the accuracy of the Doppler diagnosis of obstruction increased when the RI of the potentially obstructed kidney was compared with that of the unaffected contralateral kidney An RI difference greater than 0.10 between kidneys was seen only with true obstructive pelvicaliectasis .

In cases of renal masses, conventional ultrasonography proved to be sensitive in the detection of such lesions. However, it lacks some specificity in characterizing their nature.

In medical renal diseases, discriminatory RI levels are used to characterize the major forms of renal medical disease.

The production of Doppler waveform changes is strongly influenced by the site of the main disease within the kidney. Kidneys with active disease in tubulo-interstitial compartment had elevated RI (mean RI value was 0.75± 0.1).

This was significantly different from the RI in kidneys with diseases limited to glomeruli (mean RI was 0.63±0.06).

Changes in RI values are noted early in the course of hepato-renal syndrome and before renal function tests are affected.

Doppler U/S has high sensitivity in detection of flow disturbance resulting from the abnormal vascular morphologic characteristics in renal tumor. There are two different types of waveforms within malignant masses.

This study concludes that renal duplex Doppler sonography is an important method of investigation used in various kidney lesions. It can differentiate obstructed from non obstructed dilated collecting systems, it can evaluate the success of nephrostomy drainage, characterize the major forms of medical renal disease detect early renal involvement in chronic liver disease, DM, and vascularity changes in and out the renal mass.

Renal biopsy results were correlated with RI analysis. Those patients with isolated glomerular disease had normal RI values (mean, 0.58), whereas subjects with vascular or interstitial disease had markedly elevated RI values (means, 0.87 and 0.75, respectively).

There was little correlation between the degree of renal dysfunction (assessed by serum creatinine values) and the RI.

Those same researchers reported that Doppler sonography was useful in predicting the outcome of patients with lupus nephritis. With various degrees of nephritis, an elevated RI value was shown to be a predictor of poor renal outcome, even in patients with normal baseline renal function .

Doppler sonography was also suggested as a useful tool for evaluating nonobstructive acute renal failure; an RI greater than 0.7 was found to be a reliable discriminator between acute tubular necrosis and prerenal failure, although a theoretic framework (and supporting histologic findings) to explain this finding was lacking.

Finally, the RI has been advocated as a useful marker of diabetic nephropathy .

Multiple researchers have since documented the lack of specificity of an elevated RI .

After these encouraging results, series were published indicating the potential of Doppler sonography to differentiate renal transplant obstructive and nonobstructive pelvicaliectasis and to determine ureteral stent patency .

Although RI analysis is not helpful in differentiating the typical causes of transplant dysfunction (acute tubular necrosis, rejection, and immunosuppression toxicity), it is still useful for potentially identifying vascular complications associated with transplantation.

Although intrarenal Doppler sonography has failed as a reliable screening examination for transplant renal artery stenosis, identification of a tardus–parvus waveform from an intrarenal artery should prompt even more diligent color and duplex Doppler evaluation of the renal artery anastomosis to exclude arterial stenosis .

Focal high-velocity, low-impedance intrarenal arterial flow might suggest an arteriovenous fistula. Finally, renal vein thrombosis may be present when diastolic flow is reversed and no renal venous flow is detected .