

ORIGINAL ARTICLE

Color doppler for patients with obstructive uropathy

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ABSTRACT:

Background: Obstructive uropathy is a common cause of stomach pain that is seen in the emergency department. The present study assessed the role of color doppler in obstructive uropathy. **Materials & Methods:** 64 patients of obstructed kidney of both genders were divided into 2 groups. Patients were kept in group I (64) and controls in group II (64). Clinical features were recorded. The venous impedance index was calculated from PSV and EDV using the formula Peak Systolic Velocity (PSV) - End Diastolic Velocity (EDV)/Peak Systolic Velocity. **Results:** Duration of pain was <24 hours in 34, 24-48 hours in 12 and >48 hours in 8 cases. clinical features in group I were loin pain in 30, hematuria in 25, and vomiting in 18 patients. Site of obstruction was PUJ in 37, VUJ in 20 and ureter in 5 cases. The difference was significant ($P < 0.05$). The mean resistive index was 0.79 in group I and 0.65 in group II. The mean venous impedance was 0.35 in group I and 0.48 in group II. The difference was significant ($P < 0.05$). **Conclusion:** The most blockage cases experience a reduction in the venous impedance index. It has been observed that color doppler therapy is beneficial for patients with obstructive uropathy.

Key words: Color doppler, Obstructive uropathy, Ultrasonography

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INTRODUCTION

Obstructive uropathy is a common cause of stomach pain that is seen in the emergency department.¹ Anywhere along the urinary system where there is structural resistance to urine flow, it has been documented to cause pelvicalyceal dilatation. The term "obstructive nephropathy" describes the renal parenchyma damage brought on by obstructive uropathy. It can be difficult to diagnose early obstructive uropathy with regular B-mode USG or the arterial sensitivity index.^{2,3} Renal parenchymal compliance is decreased when the urinary tract becomes obstructed, resulting in an increase in collecting system pressure. Compared to arterial flow, this has a greater effect on intraparenchymal venous blood flow.⁴

Traditional US cannot identify the etiology of obstructive dilatation since it cannot provide relevant physiological information on renal status, despite its claimed sensitivity of up to 98% for detecting upper urinary tract dilatation.⁵ Urinary tract obstruction is often the cause of both acute and chronic renal failure, and ultrasonography is a rapid and effective way to identify and assess this condition. If the urinary system is blocked, increased hydrostatic pressure that goes straight to the nephron's tubules might result in elevated intraluminal ureteral pressure. Ultrasonic

imaging has several advantages, such as being portable, inexpensive, not requiring contrast medium, and able to detect fluid accumulation caused by blockage.⁶ The present study assessed the role of color doppler in obstructive uropathy.

MATERIALS & METHODS

The present study consisted of 64 patients of obstructed kidney of both genders. All patients gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Patients were kept in group I (64) and controls in group II (64). Clinical features were recorded. Using color doppler ultrasound, the interlobar arteries and veins of both kidneys were inspected, and the arterial resistive and impedance indices were computed. Every individual had renal venous and arterial doppler examinations of the interlobar veins and arteries. The kidneys that were blocked and those that weren't were examined for PSV, EDV, RI, and II (Impedance Index) values in the interlobar arteries and veins. The venous impedance index was calculated from PSV and EDV using the formula Peak Systolic Velocity (PSV) - End Diastolic Velocity (EDV)/Peak Systolic Velocity. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Assessment of parameters in patients

Parameters	Variables	Number	P value
Duration of pain	<24hours	30	0.05
	24-48hours	20	

	>48hours	14	
Clinical features	Loin pain	54	0.94
	Hematuria	31	
	Vomiting	27	
Site of obstruction	PUJ	37	0.01
	VUJ	20	
	ureter	5	

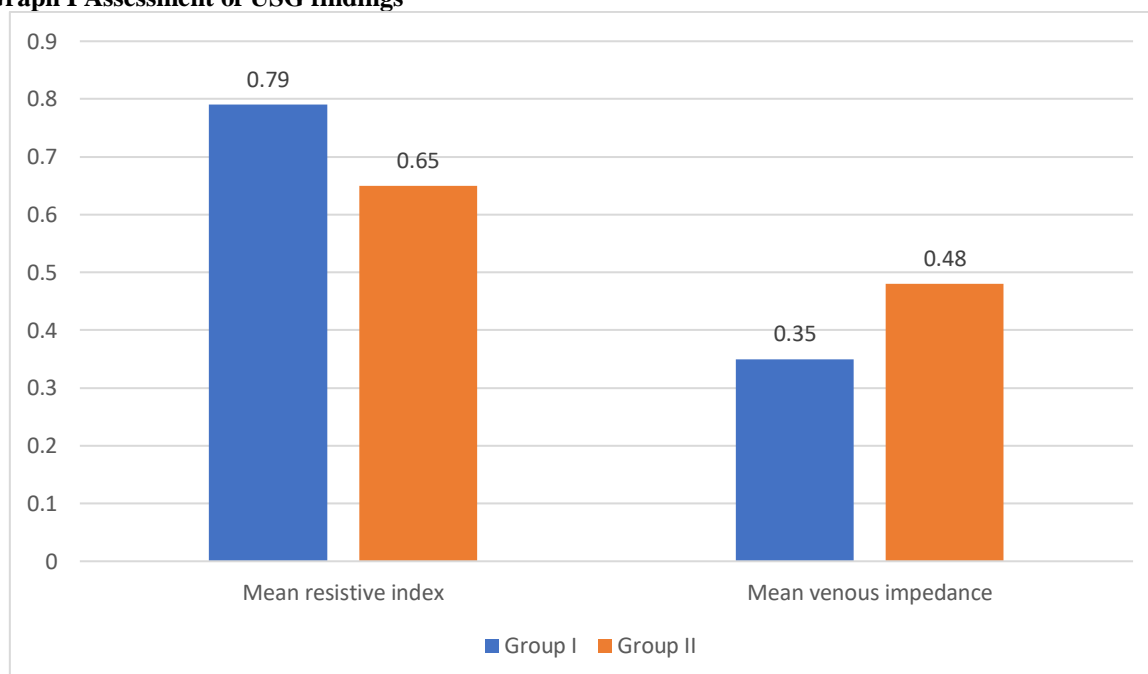
Table I shows that duration of pain was <24 hours in 34, 24-48 hours in 12 and >48 hours in 8 cases. Clinical features in group I were loin pain in 30, hematuria in 25, and vomiting in 18 patients. Site of obstruction was PUJ in 37, VUJ in 20 and ureter in 5 cases. The difference was significant (P< 0.05).

Table II Assessment of USG findings

Parameters	Group I	Group II	P value
Meanresistiveindex	0.79	0.65	0.04
Mean venousimpedance	0.35	0.48	0.02

Table II, graph I shows that the mean resistive index was 0.79 in group I and 0.65 in group II. The mean venous impedance was 0.35 in group I and 0.48 in group II. The difference was significant (P< 0.05).

Graph I Assessment of USG findings



DISCUSSION

While gray scale sonography is the first line of treatment for many renal disorders, its sensitivity is low in the diagnosis of acute ureteric obstruction. Due to its high sensitivity but low specificity for urinary system dilatation, traditional gray scale sonography may miss the diagnosis of renal obstruction since pyelocaliectasis might occur later in obstructive conditions.⁷ Unlike other types of collecting system dilatation, which include extrarenal pelvis, pyelonephritis, and residual dilatation from previously alleviated obstruction, standard grayscale USG only detects structural alterations, including pelviureteric dilatation in ureteral obstruction. Furthermore, in a serious case, obstruction might not go away for some hours until the collecting system dilatations.⁸The present study assessed the role of color doppler in obstructive uropathy.

We found that duration of pain was <24 hours in 34, 24-48 hours in 12 and >48 hours in 8 cases. clinical features in group I were loin pain in 30, hematuria in 25, and vomiting in 18 patients. Site of obstruction was PUJ in 37, VUJ in 20 and ureter in 5 cases. Bateman et al⁹ assessed the hypothesis that acute obstruction of the renal collecting system reduces the intraparenchymal renal compliance, which affects the intraparenchymal venous blood flow to a greater degree than the arterial flow. Twelve patients with clinical evidence of acute obstructive uropathy were referred for helical CT to confirm the diagnosis and to provide a gold standard by which we could evaluate the sonographic findings in the 12 test patients. Twelve patients without renal disease served as a control group. Doppler sonography of the interlobar arteries and veins of both kidneys then was performed, with the sonographer unaware of which

kidney had an obstruction. Peak venous flow measurements and arterial resistive and venous impedance indexes were obtained. The impedance indexes of the obstructed and unobstructed kidney were compared for each patient. The mean arterial resistive indexes of the obstructed kidneys were larger than those of the unobstructed kidneys, 0.67 ± 0.08 and 0.62 ± 0.05 , respectively ($p = 0.05$). The venous impedance indexes comparing obstructed and unobstructed sides were 0.38 ± 0.25 and 0.80 ± 0.25 , respectively, a statistically significant result. On average, the peak venous flow signal in the obstructed kidney was 69% higher than that of the unobstructed kidney and 86% higher than that of the peak venous flow signal in the control group.

We observed that the mean resistive index was 0.79 in group I and 0.65 in group II. The mean venous impedance was 0.35 in group I and 0.48 in group II. In 32 patients who had renal colic, Rodgers et al¹⁰ compared the findings of urography with color doppler ultrasound. The sensitivity and specificity were only 44% and 82%, respectively, when the reported discriminating limits for renal obstruction (mean resistive index >0.70) were utilized. The variation in the degree of renal obstruction may account for this obvious divergence in the results. De Toledo et al¹¹ looked at 64 patients whose whole and partial renal obstruction thresholds were >0.70 to see how well color doppler ultrasound worked as a diagnostic tool. For total blockage, they discovered a sensitivity of 92% in 37 patients and 48% in 27 patients for partial obstruction. A blockage can be diagnosed using angiographic assessments of the arterial RI by duplex doppler sonography since they can detect even the smallest changes in intrarenal blood flow. In addition to using real-time sonographic data from the collecting system to assess mean arterial Resistivity Index (RI) differences, Doppler sonography can be utilized to evaluate renal blood flow.

CONCLUSION

Authors found that most blockage cases experience a reduction in the venous impedance index. It has been observed that color doppler therapy is beneficial for patients with obstructive uropathy.

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