

Intravenous urography findings among patients with uterine fibroid - is intravenous urography a necessity?

Vivian Ndidi Akagbue ^{1,*} and Chidinma Wekhe ²

¹ Department of Radiology, Rivers State University Teaching Hospital, Port Harcourt, Nigeria.

² Department of Radiology, Senior Lecturer RSU, Rivers State University Teaching Hospital, Port Harcourt, Nigeria.

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Abstract

Background: Uterine fibroid is a common tumor seen in Nigerian women and conventional intravenous urography (IVU) is used in evaluating urinary system before surgical intervention.

Aim: This study is aimed at evaluating the usefulness of IVU in the uterine fibroid or is to know if IVU is necessary in patients with uterine fibroid.

Study design and settings: A retrospective, observational study was conducted in the Radiology Department of Rivers State University Teaching Hospital (RSUTH). From 1st May 2021 to 31st May 2023.

Data analysis: Data were analyzed using SPSS 21.0 version. The level of statistical significance was set at $p < 0.05$.

Results: A total of 100 data were analyzed. The age of the study group was ≤ 35 years and ≥ 35 years. This study shows that urinary bladder indentation is the commonest finding (78%) due to pressure effect from the uterine fibroids. The second commonest finding was hydronephrosis ($n=52$). Grade 2 is the commonest ($n=22$) while grade 4 ($n=1$) is the least.

Conclusion: This study shows that urinary bladder indentation is the commonest finding due to pressure effect from the uterine fibroids. The second commonest finding was hydronephrosis. Grade 2 is the commonest while grade 4 is the least. This showed that IVU is necessary in the preoperative evaluation of patients with uterine fibroids.

Keywords: Intravenous Urography; Findings; Uterine fibroids; Genitourinary tract

1. Introduction

Renal impairment is a frequently seen medical condition/disorder. It is characteristically classified as pre-renal, intra-renal or post-renal. In severe cases, any of these conditions can result/lead to renal failure (azotaemia).¹

Uterine fibroids patients present with obstructive renal impairment and seen commonly by gynecologists. Fibroids are known to cause mechanical compression/obstruction of the pelvic ureters, may cause impairment, with hydronephrosis and hydronephrosis. Most of these cases are recognized incidentally at ultrasonography. Hardly, a fibroid may cause acute retention of urine by kinking of the ureters.²

Conventional intravenous urography (IVU) is a vital radiological investigation used in the assessment of the morphology and efficient state of the genitourinary system after administration of radio-opaque material via the intravenous route.³

* Corresponding author: Vivian Ndidi Akagbue

IVU images are taken sequentially in a planned pattern, in order to optimize illustration of definite part of the urinary tract during the maximal contrast media opacification. Urographic study might be tailored and may offer additional diagnostic feature than some current capabilities of other imaging modalities.⁴ Infrequently IVU is limited by a number of changeable factors such as the level of bowel preparation, radiographic factors, body mass index and split renal function⁵. A foremost disadvantage for IVU investigation has been connected with nephrotoxicity and allergy to the radio-opaque material used during the process. Remarkably IVU has been the core investigation for the evaluation of the urinary tract pathologies⁴. Due to the present advancement in technology, IVU is gradually taken the back stage. Newer imaging modalities such as computed tomography (CT), magnetic resonance imaging (MRI) and ultrasonography has been used in the assessment of the urinary system, in recent years in order to remove the shortfall of conventional IVU.^{4,6} It is worthy of note, that these newer imaging modalities have their own shortcomings just like conventional IVU. Conventional IVU is still relevant in the examination of urinary tract pathologies even with the present modern progress in imaging technologies in low resource clime.⁷

This study is aimed at documenting the IVU findings in patient with uterine fibroids who had conventional IVU in the Radiology Department of Rivers State University teaching hospital (RSUTH). This will also serve as a working document if IVU still has a role to play with regards to pre-operative preparation and medico-legal purposes.

2. Materials and methods

This study is retrospective in design and conducted in the department of Radiology, RSUTH from 1st May 2021 to 31st of May 2023. A total of 100 patients' information was obtained from the annals of the department. Patients request forms and reports were recovered and sorted from the annals of the department. The demographic, indication and findings were obtained and documented in the data sheet.

- Ethical approval was not considered necessary since its secondary data.
- Data obtained were analyzed using SPSS 21.0 version and statistical significance was set at < 0.05.

3. Results

Table 1 Age distribution

Age (years)	n (%)
Mean \pm SD = 37.72 \pm 5.74 (Range: 25 - 52)	
\leq 35 years	27 (27.0)
> 35 years	73 (73.0)

The above table is showing the age distribution in the study, 27 percent of the study population is lesser than 35 years and 73 percent is greater than 35 years.

Table 2 Comparison of age by IVU

IVU		Mean \pm SD	t**	p-value
Normal	16	35.44 \pm 6.18	1.752	0.083
Abnormal	84	38.15 \pm 5.59		

The above table revealed that the relationship between normal and abnormal IVU outcomes in patients presenting with uterine fibroids with regards to age is insignificant.

Table 3 Hydronephrosis Grading

Variable	Frequency	Percentage
Grade 1	13	25.0
Grade 2	22	42.3
Grade 3	16	30.8
Grade 4	1	1.9
Total	52.0	100.0

The above table is showing hydronephrosis which is the commonest finding in this study with the degree of severity. Grade 2 is the commonest grade (42.3 percent), followed by grade 3(30.8 percent) and grade 1(25.0 percent). The least is grade 4 (1.9 percent).

Table 4 Types of IVU findings among patients according to the type of affected organs

Organ	Type of abnormality	n (%)
Kidney		
	Large size	31 (31.0)
	Non-visualized	1 (1.0)
	Small size	1 (1.0)
Ureter		
	Laterally deviated	17 (17.0)
	Medially deviated	17 (17.0)
	Kinked/deviation	5 (15.0)
	Proximal portion moderately dilated	2 (2.0)
	Non-visualized	1 (1.0)
Urinary bladder		
	Indented	78 (78.0)

IVU: Intravenous urography, n: number of patients with abnormal IVU findings; *Total number of patients investigated was 100

The table above showed that the kidney is enlarged in 31%, not visualized and small kidney has equal presentation but laterality was not shown. Lateral and medial deviations of the ureters are equivocal (17%) each. Kinking and deviation is seen in 5%, dilatation of the proximal ureter is 2% and non-visualized ureter is 1% only. The abnormality seen in the urinary bladder is outline indentation due to the pelvic mass (78%).

Table 5 Frequency distribution of urinary tract calculi among patients

Location of Calculi	n (%)
Kidney	2 (2.0)
Total	2 (100.0)

n: number of patients with calculi

This table revealed that renal calculi was seen in 2 percent of the women evaluated.

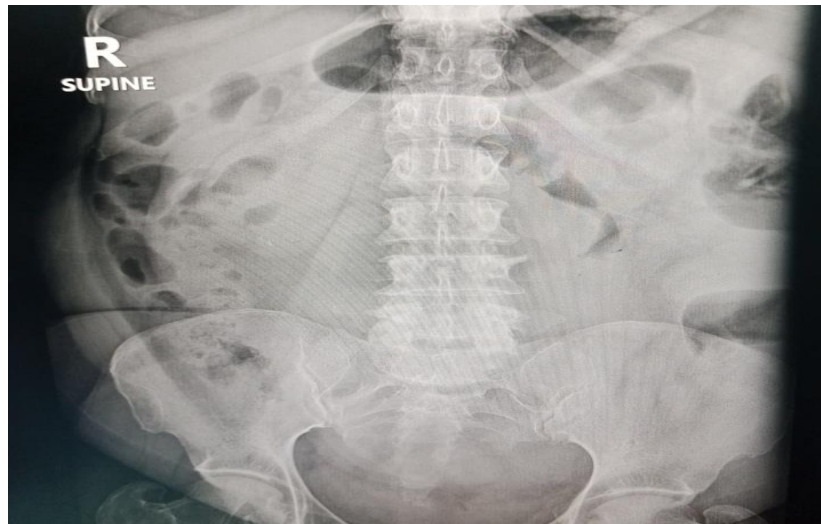


Figure 1 Control radiograph showing a soft tissue density lesion arising from the pelvis, more to the left side up to the level of L2 vertebral body-Leiomyoma. Note degenerative changes in the lumbar spine.

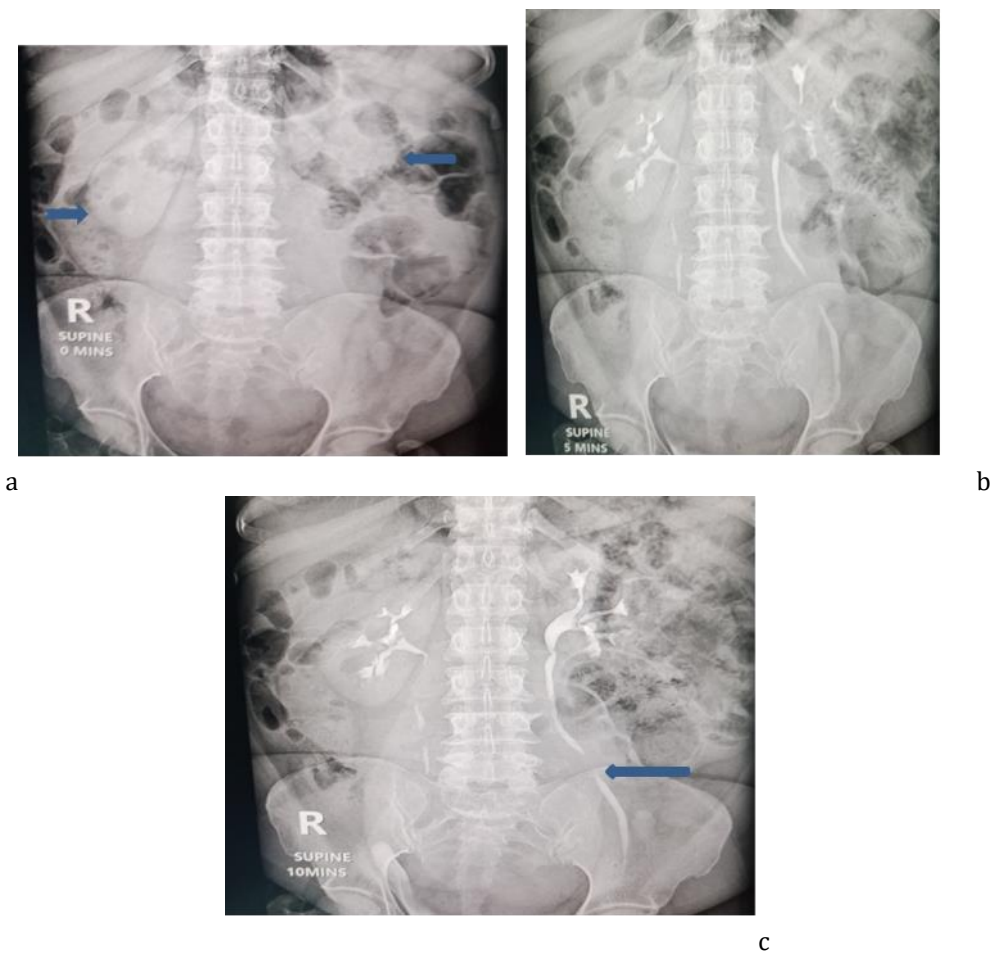


Figure 2 Contrast series

Figure 2 These are spot films from the contrast series of the IVU at various time intervals, **a**-is a nephrogram phase showing the both kidneys (blue and yellow arrows for right and left kidneys respectively.) **b** and **c** images are taken at

5 and 10 minutes showing the excretion of contrast from the kidneys to the pelvicalyceal systems, the ureters and partly in the urinary bladder. The left ureter is displaced laterally by the pelvic mass (slim long blue arrow).

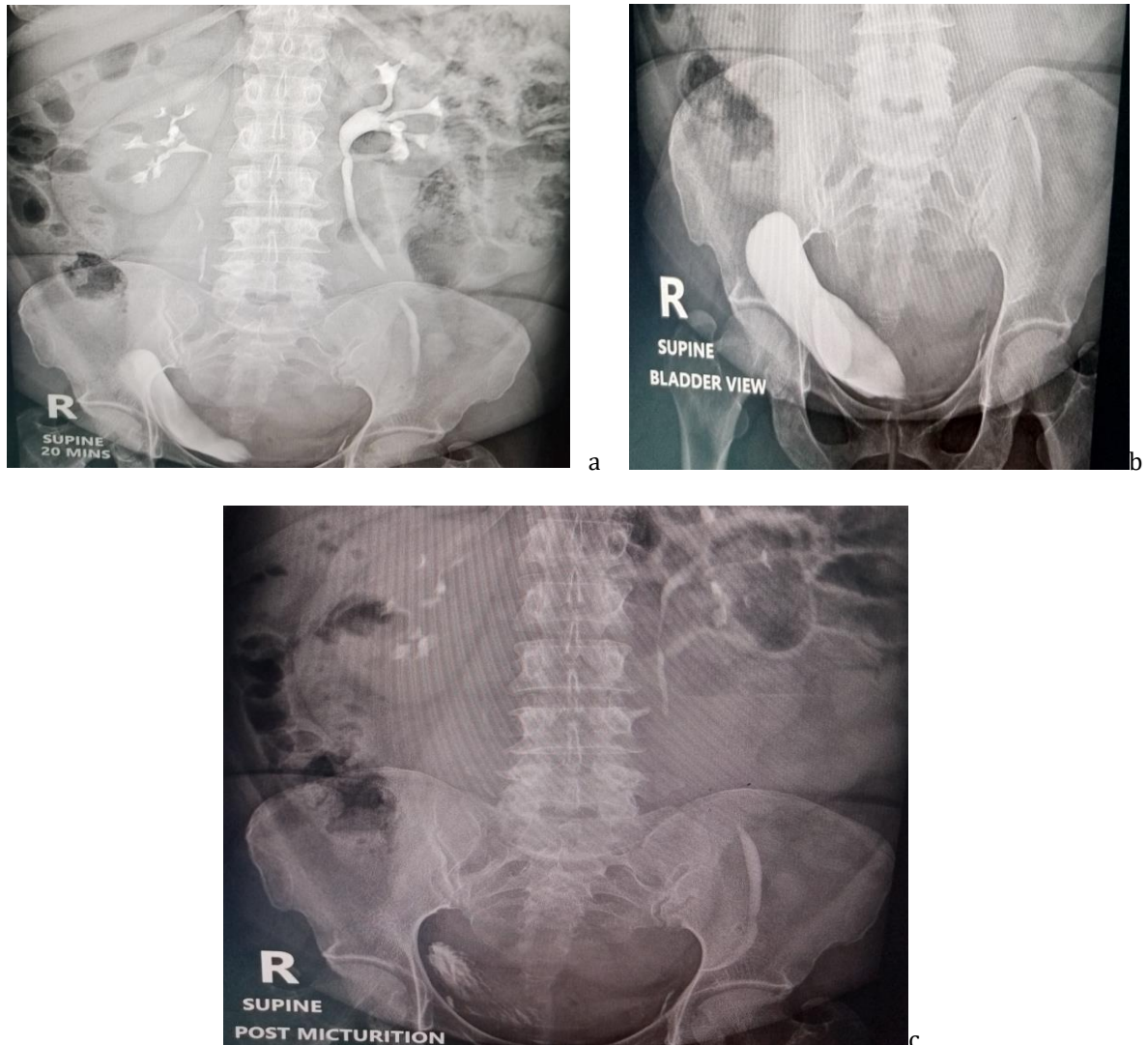


Figure 3 Contrast series

Figure 3 is also showing the contrast series of the IVU at time intervals, **a**-is a spot film taken at 20 minutes showing the kidneys, ureters and the contrast opacified urinary bladder is minimally filled. Spot films **b** and **c** are showing a full bladder which is stretched and displaced to right by the pelvic mass. The urinary bladder is completely empty at the post micturition image, however; contrast is still noted in the kidneys and displaced left ureter.

4. Discussion

Recent technological advancement has led to replacement of few older techniques with newer ones that are more sensitive and specific, cheaper and less invasive.⁷ On the other hand, with introduction of CT scan in the management of urinary tract diseases/pathology, the role of IVU in the evaluation/management of urinary tract systems in women with uterine fibroids in our clime cannot be down played. Meanwhile it is cheaper and obtainable in most centers than CT scan (CT urography).

This present study is an all females study with gynecological issue. This finding corroborates with a study done in United States by Hale et al⁹, Kumar et al⁴ and Akagbue et al¹⁰ respectively wherein more female presented for IVU. This could be attributed to the fact that more gynecological cases were referred for IVU in their study.

With regards to age, this is an all adult study population, higher incidence was seen in greater than 35 years. No previous study for comparison.

In this index study, normal IVU was 16, this is near 23.1%, 26.0% and 31.2% in Pakistan, Brazil and Yemen^{11,7-8} respectively. This contradicts a report submitted by Little MA et al⁵ (77.0%). Also, in this current study abnormal IVU was 84, this agrees with previous studies^{7,11,12}. This could be explained away by being carried out in developing countries/low resource region of the world as well as same sex with the same presenting complaints.

A comparison between age and IVU outcome was done in this study, it was not statistically significant(P -value=0.083). No previous study for comparison

The commonest finding in this present study is urinary bladder outline indentation (78%). This is contrary to reports of renal calculi as the commonest finding documented by earlier studies.^{4,12} In contrast to another study conducted by Akagbue et al¹⁰ which documented hydronephrosis as its commonest finding, probably due to uterine fibroid been the commonest indication. This is possible simply because of the mass effect caused by the uterine fibroids in our patients. Hydronephrosis is the second commonest finding in this study($n=52$). The commonest grade is grade 2 ($n=22$, 42.3%). This finding may be explained by the sole fact that our subjects presented with uterine fibroids, which could be a cause of back pressure renal changes seen as hydronephrosis of varying degrees. No earlier studies for comparison.

With regards to kidney size abnormality, only 32% showed abnormality. The most common abnormalities are large size, however no laterality considered. Ureters deviation either medially or laterally are seen equivocally in this study due to the uterine fibroids. Renal calculi were the least finding in this present study.

5. Conclusion

This study shows that urinary bladder indentation is the commonest finding due to pressure effect from the uterine fibroids. The second commonest finding was hydronephrosis. Grade 2 is the commonest while grade 4 is the least.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Authors contribution

VNA-Data collection, data analysis, conceptualization, literature search, review and editing; CW Conceptualization, data analysis, review and editing.

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