Comparative Evaluation of Ultrasonography and Intravenous Urogram in Detecting Ureteric Obstruction in Cervical Cancer Staging

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Abstract
Background: Renal ultrasonography an easily available procedure was compared to intravenous urogram (IVU) to determine its suitability as an alternative to the latter, which is a relatively invasive test for demonstrating hydronephrosis/ or ureteric obstruction in cervical cancer staging.
Study design: Thirty five histologically confirmed cervical cancer patients had intravenous urogram carried out to determine ureteric obstruction for routine cervical cancer staging. Each subject also had renal ultrasonography (USG) done within 24 72 hours after the intravenous urogram without prior knowledge of the IVU report.
Results: 70 kidneys were studied. No statistical significant difference was found between IVU and USG in the two methods of identifying ureteric obstruction in cervical cancer staging using the chi square test. Chi square of 0.17 and p-value of 0.68. Percentage of agreement was 97.1%
Conclusions: Renal ultrasonograhy is a suitable alternative method of demonstrating ureteric obstruction in cervical cancer staging. It should be included as one of the permissible examinations for cervical cancer staging.
Keywords: Renal Ultrasonography; Intravenous Urogram; Cervical Cancer Staging; Ureteric Obstruction, Hydronephrosis;

Introduction:
FIGO classification is the most commonly used staging for cervical cancer[1,2]. This is based on examination under anaesthesia and an intravenous urogram (IVU) and sometimes cystoscopy [1,2]. Findings of optional examinations such as lymphangiography, arteriography, ultrasonography, venography, laparoscopy, computed tomography scan, and MRI are not basis for changing the staging because these are not generally available and interpretation of results is variable[1,2,3,4,5].
The spread of tumour to the pelvic side wall often causing hydronephrosis or nonfunctioning kidney on IVU is classified as stage III b disease[1]. Thus ureteric obstruction is an important landmark in staging and subsequent management of cervical cancer. Intravenous urography which has been the permissible radiological tool by Figo [1,2,3,4,6], is a minimal invasive procedure with associated radiation risk and a possible contrast induced reaction such as renal failure[7,8]. However renal ultrasonography(USG), a non-invasive, rapid and safe procedure has proved to be a valuable tool in diagnosing hydronephrosis and ureteric obstruction in many disease conditions [9,10,11,12]. Renal ultrasound is cheaper than IVU [13] and is available even in less resourced areas, and can also be performed when the renal function is poor. The added advantage is that most gynaecologist who have to do the primary staging of Cancer of cervix are also capable of performing renal ultrasonography. This study is therefore aimed at finding out whether renal ultrasonography can be a suitable alternative and if so advocate for it to be offered more prominence in cervical cancer staging workups.

Methods
New cases of suspected cervical cancer seen between July 1999 and July 2006 at Komfo Anokye Teaching Hospital (KATH) were examined in theatre and cervical biopsy done for histological confirmation. Those that were

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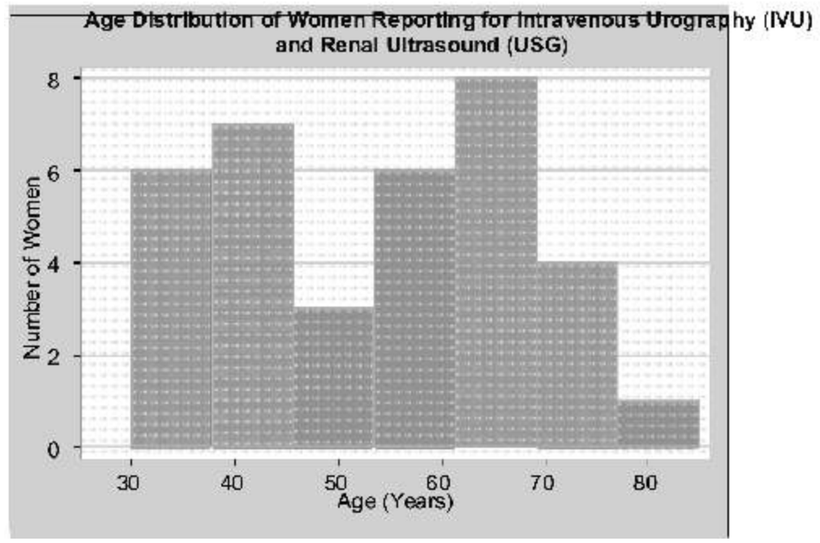
Figure 1



confirmed histological as invasive cervical cancer and had normal biochemical renal function tests (serum urea, creatinine and uric acid) had intravenous urogram as a normal routine staging procedure carried out by a radiologist after an empiric bowel preparation. Each patient had 60ml of intravenous urografin followed by routine serial radiograms. Delayed films for 24Hrs were done for non functioning kidneys. The IVU findings were categorized into the followings
(a) Normal: No evidence of pelvi-calyceal dilatation.
(b) Hydronephrosis: evidence of pelvi-calyceal dilatation.
(c) Delayed/Non functional : No excretion of dye after 24hours

Within 24 72 hours after the IVU had been done and before the radiologist's report was received a renal ultrasonography was performed by a gynaecologist trained in obstetrics and abdominal ultrasound using Aloka Model SSD 620 with 3.5 mHz curvi-linear transducers. The renal ultrasonography findings were categorized into following:
(i) Normal Kidney :where the renal pelvis was less than 1cm in width;
(ii) Mild to Moderate degree hydronephrosis where dilated calyces were seen and the renal pelvis was more than 1cm in width but the renal cortex not substantially reduced.
(iii) Marked / advanced degree hydronephrosis where markedly dilated renal calyces and pelvis were associated with decreased renal cortex width.

Table 1
Age Summary

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	35	53.37143	13.93279	30	77

Confidence age

Variable	Obs	Mean	Std. Err.	[95% Conf. Interval]
Age	35	53.37143	2.355072	48.58535 ---58.15751

Table 2
Results of the Comparison Between Intravenous Urography (IVU) and Renal Ultrasound (USG)

	IVU	USG	
Normal	55	54	Normal
Hydronephrosis	8	10	Mild- Moderate Hydronephrosis
Delayed / non function kidneys	7	6	Severe Hydronephrosis
	70	70	

Table 3
Results of the Comparison Between Intravenous Urography (IVU) and Renal Ultrasound (USG)

	IVU	USG	
Normal	55	54	Normal
Hydronephrosis / non function kidneys		15	16 Hydronephrosis
Total	70	70	

Chi square = 0.17
P-value = 0.68

Parametic analysis of the age distribution was performed. Kappa analysis to compare the degree of agreement and Test of proportions using t-test to differentiate between IVU and USG (the two methods of diagnosing ureteric obstruction in cancer of the cervix) were done.

Results
Thirty five (35) patients met the criteria for the study. A total of 70 kidneys were therefore studied using both IVU and USG. Their ages ranged from 30-77years with a mean of 53.3 and standard deviation of 13.9 years. The age distribution of these patients is shown in Fig. 1. Table 2 summaries the results obtained for the 70 kidneys studied with both IVU and USG. Ultrasound diagnosed hydronphrosis in 16 of the 70 cases whiles intravenous urogram diagnosed 8 hydronephrosis and 7 delayed nephrograms/ non execretory kidneys. Using the Figo's criteria of diagnosing ureteric obstruction (ie hydronephosis and non function kidneys), table 3 was constructed.

Using chi square test, no statistical significant difference was found between IVU and USG, the two methods of identifying ureteric obstruction in cervical cancer. Chi square of 0.17 and p-value of 0.68. Percentage of agreement was 97.1% (Kappa index of 0.97).

Discussion:
Renal ultrasound was more reliable in diagnosing hydronephrosis during the workups for staging cancer of the cervix because in severe obstruction of the ureter, the kidneys failed to excrete the contrast medium to outline the calyces and ureter. However there was no significant evidence between renal ultrasound and IVU in demonstrating ureteric obstruction as Figo's criteria for staging of cancer of the cervix accepts nonfunctioning kidneys as evidence of ureteric obstruction[1,2,3,4]. Frohlich EP et al [14] and recently Vanderpuye[13] have recommended renal ultrasound as an alternate to IVU during screening/ workups in cervical cancer staging. There is no statistical difference between the two methods of demonstrating ureteric obstruction, however USG can be performed without any special preparation and any prior knowledge of the renal function. We are therefore advocating renal USG be given more prominence in cervical staging workup . Also of importance is the fact that ultrasound machines are available in most obstetrics and gynaecology units where primary staging of cancer of cervix is done and the use of renal ultrasound as the primary tool for demonstrating ureteric obstruction in staging cancer of the cervix would lead to a rapid, cheaper and yet reliable results as IVU.

Conclusion: Renal ultrasonograhy is a suitable and easily available method of demonstrating ureteric obstruction in cervical cancer and should receive more prominence in cervical cancer staging workups.

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