

(RESEARCH ARTICLE)



Preoperative renal function in women in Port Harcourt, Nigeria, with major gynecological lesions requiring urological and surgical interventions

Monday Komene Sapira ^{1,*} and Leesi Sapira-Ordu ²

¹ Department of Surgery (Urology Division), University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.

² Department of Obstetrics and Gynecology, Rivers State University Teaching Hospital, Port Harcourt, Nigeria.

Magna Scientia Advanced Research and Reviews, 2023, 07(02), 079–085

Publication history: Received on 09 March 2023; revised on 16 April 2023; accepted on 19 April 2023

Article DOI: <https://doi.org/10.30574/msarr.2023.7.2.0051>

Abstract

Introduction: Preoperative renal function assessment is a prerequisite for many surgical procedures. This is because of the vital function of the kidneys in the regulation of serum electrolytes, and excretion of waste products or by-products of metabolic processes.

Materials and Methods: This cross-sectional descriptive study was done at two university teaching hospitals in Port Harcourt, Nigeria, from January 2021 to December 2022. Case files of seventy-two (72) women scheduled for major gynecological surgeries were studied. Data obtained were analyzed using the SPSS, version 20, and the outcome was expressed using frequency tables and charts.

Results: The mean age of the women in the study was 37.50 ± 1.22 years. Women with hyponatremias were 9 (12.5%); hypokalemia, 11 (15.3%); hyperkalemia, 3 (4.2%). Thirty-nine patients, 39 (54.2%) had acidosis, low serum bicarbonate (HCO_3^-). Low blood urea was found in 11 (15.3%) of the women. One of them (1.4%) had elevated blood urea. The rest had normal values. Hypocreatinaemia and hypercreatinaemia were detected in 29 (40.3%) and 2 (2.8%) patients respectively.

Conclusion: Electrolyte derangement was found in 40 (55.6%) of the patients preoperatively. This finding suggests that renal function assessment is crucial in the preoperative evaluation of gynecological patients before major gynecological surgeries.

Keywords: Preoperative renal function; Women in Port Harcourt; Major gynecological operations; South-Southern Nigeria

1. Introduction

The determination of perioperative kidney functions is an important aspect of pre-operative preparation and post-operative management of patients. This study has been necessitated by our previous observations in Port Harcourt and those of others published in the literature. In Port Harcourt, previous local studies have shown that there is a high incidence of risk factors for kidney diseases in the city. These include hypertension, diabetes mellitus, glomerulonephritis, high environmental contents of petroleum-derived volatile organic compounds (VOC), and heavy metals which have been reported in different local studies in the city and its suburbs [1-3]. In a local study, hypertension was found to have a crude prevalence of 18.3% in the city [4]. In our previous study of 421 patients dialyzed at UPTH with chronic kidney disease (CKD) and its complications, we found that 139 (33.0%) were females, mostly of childbearing age [5]. Diabetes mellitus and hypertension accounted for 89 (24.7%), and 145 (40.2%) of CKD

* Corresponding author: Monday Komene Sapira; Email: monday.koesi@gmail.com

respectively, in the patients. The female population in the city has been chosen for this study because many women of childbearing age have had additional risks of having had hypertensive diseases in previous pregnancies, eclampsia, pre-eclampsia, severe peripartum hemorrhages, puerperal sepsis, HIV infection, and AIDS. These diseases have been associated with chronic kidney injury [6-9]. The ultimate objective of pre-operative renal function assessment is to ensure safe anesthesia and surgery. The aim of this study is to assess the pattern of renal function among women with major gynecological conditions scheduled for surgical interventions.

2. Material and methods

This study was conducted at two university teaching hospitals in Port Harcourt, Nigeria (Rivers State University Teaching Hospital (RSUTH), and University of Port Harcourt Teaching Hospital (UPTH). The study period was from January 1, 2021, to December 31, 2022.

Seventy-two case files of women scheduled for major gynecological surgeries were retrieved from the Medical Records Departments of the hospitals using their folder numbers obtained from urological and gynecological ward registers. Socio-demographic characteristics, reports of renal function tests, abdominal ultrasound scan, and urinalysis as well as other relevant data were obtained using a semi-structured proforma. The reference ranges for the values of the serum electrolytes as well as the urea and creatinine were those of the chemical pathology laboratories where the tests were conducted. The data were entered into Microsoft Excel sheets, and exported to the SPSS (version 20) for analysis. The results were expressed in frequency tables and charts.

3. Results

Table 1 Socio-demographic and obstetric characteristics of women with major gynecological conditions scheduled for surgical intervention at 2 hospitals in South-South Region of Nigeria

Variable (N = 72)	Frequency	Percentage
Age Range (Years)		
25-29	7	9.72
30-34	22	30.55
35-39	15	20.83
40-44	13	18.06
45-49	13	18.06
65-69	2	2.78
Mean Age \pm standard deviation-	(37.50 \pm 1.22years; Age range= 25-68 years)	
Marital Status		
Single	20	27.78
Married	48	66.67
Widowed	4	5.55
Educational level		
Primary	5	6.94
Secondary	28	38.89
Tertiary	39	54.17
Parity		
Para 0	43	59.72
Para 1-4	18	25.00
Para 5 and above	11	15.28
\geq Para 6	5	8.2

Seventy-two consecutive patients scheduled for major gynecological surgeries during the study period were studied. The mean age of all 72 patients was 37.50 ± 1.22 years. Their ages ranged between 25 to 68 years. The modal age group was 30-34 years and comprised 22 patients. (Table 1) Most of the patients were women of child bearing age. Serum electrolyte derangements were the most common observations. These included hypokalemia, hyponatremias and mild-to-moderate acidosis (Table 2).

Table 2 Distribution of the renal function test reports of the women with major gynecological conditions scheduled for surgical intervention at RUSTH and UPTH, Port Harcourt, Nigeria

Variable	Frequency	Percentage
Na ⁺ (mmol/liter)		
<128	9	12.5
128 – 148	63	87.5
K ⁺ (mmol/liter)		
<3.4	11	15.3
3.4 – 4.8	58	80.5
>4.8	3	4.2
HCO ₃ (mmol/liter)		
<24	39	54.2
24 – 30	33	45.8
Urea (mmol/liter)		
<1.5	11	15.3
1.5 – 6.6	60	83.3
>6.67	1	1.4
Creatinine (μmol/liter)		
<60	29	40.3
60 – 120	41	56.9
>120	2	2.8
Cl ⁻ (mmol/liter)		
<98	12	16.7
98 – 108	55	76.4
>108	5	6.9

[Na⁺ - Sodium; K⁺- Potassium; HCO₃- Bicarbonate; Cl, chloride]

Of 72 patients that had urinalysis (Figure1), only patients with significant numbers of pus cells, erythrocytes, yeast cells and leucocytes were presented in the chart with these urine contents. Patients that had ≥ 5 pus cells/ high power field (hpf) in their urine sample were recorded as having had significant pyuria. The same concentration of cell ≥ 5 cells/hpf was used to define significant microscopic hematuria, or significant leucocyturia,

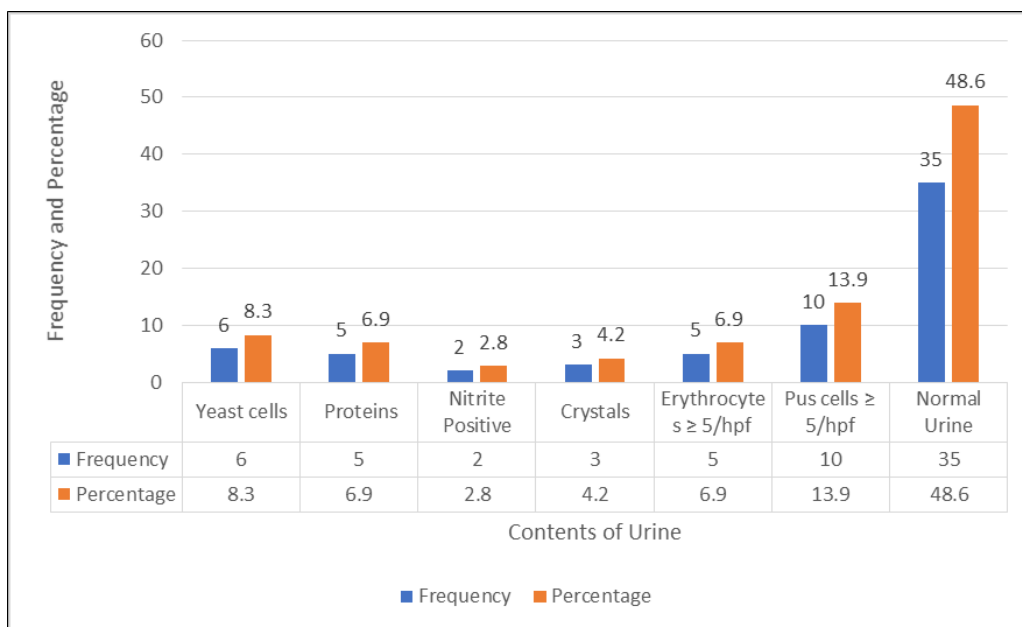


Figure 1 Urinalysis results of women with major gynaecological conditions scheduled for major surgical operations at RSUTH and UPTH, Port Harcourt, Nigeria

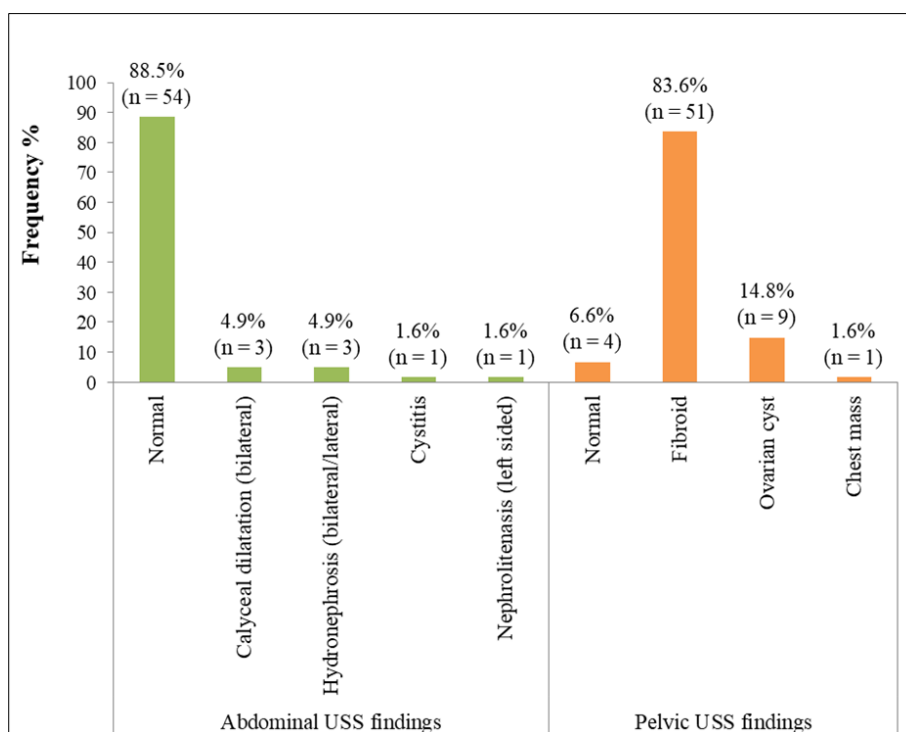


Figure 2 Abdominal and pelvic ultrasound scan findings of women with major gynaecological conditions scheduled for urological and surgical operations at RSUTH and UPTH, Port Harcourt, Nigeria

Sixty-one patients had ultrasonography for diagnosis. Results are presented in the Figure 2. Eleven (11) others were diagnosed either with clinical examination alone or clinical examination with radiological contrast studies. The diagnosed lesions and / or scheduled surgeries were renal exploration, pyeloplasty for pelviureteric junction obstruction, myomectomy, ovarian cystectomy, and left nephrolithotomy, thoracotomy for a chest tumor, cystoscopy and transurethral biopsy of urinary bladder lesions. Five other patients had, respectively, uterocutaneous fistula repairs with excision of subcutaneous and cutaneous endometriotic tumors, uterovaginal prolapse repair with management of

chronic urinary retention, rectovaginal and rectouterine fistulas repair, and staged management of anorectal carcinoma, and five other cases of vesicovaginal fistula repairs. One patient had uterovaginal prolapse (with rectocele and cystocele). She was scheduled for total abdominal hysterectomy and had pelvic floor repair. Most of these cases required multidisciplinary (Team) management, principally involving gynecological, urological and general surgical teams working at the respective hospitals.

4. Discussion

The assessment of renal function is an integral part of pre-operative preparation for major gynecological surgeries. This is crucial in the diagnosis of acute or chronic kidney injury which has been found to be associated with both short and long-term morbidity and mortality among surgical patients. [10] The kidneys excrete waste products as well as drugs and toxins from the body. They regulate the extracellular fluid volume, serum electrolyte concentrations, produce hormones, maintain acid-base equilibrium, and excrete urine through the functional units called nephrons, and the collecting system [11]. The markers used for routine assessment of renal function include creatinine, urea, uric acid as well as electrolytes. The other markers that have been found to be useful include cystatin C, β -Trace protein and inulin. [12] The use of proteinuria, urine specific gravity, and urine microscopy as well as blood osmolality have also been documented.

Preoperative assessment of urine protein or proteinuria has been found to be useful in the assessment of postoperative acute kidney injury. This is due to the fact that there is significant association between preoperative proteinuria and postoperative acute kidney injury as well as prolonged hospital stay. [13]

Traditionally, preoperative renal function is assessed using serum urea and creatinine as well as serum electrolytes which are markers of glomerular filtration, and this is known as renal function test. This can be used to establish a baseline for the patient or to detect renal dysfunction preoperatively, as this may be necessary in the choice of anesthesia as well as the decision to start a scheduled surgery, or to correct a detected existing disorder before the surgery. [13, 14, 5]

The assessment of renal function in this study basically evaluated serum electrolytes as well as urea and creatinine. Common features of renal dysfunction observed in this study include hyperkalemia, hypokalemia and mild metabolic acidosis. Potassium imbalance has been reported to be the most common clinical electrolyte disorder, and this can be fatal whether in the form of hypokalemia or hyperkalemia especially if severe. [15] Hypokalemia may manifest as leg cramps, weakness, respiratory difficulties, paralytic ileus, and electrocardiographic changes. In severe cases, rhabdomyolysis with ascending paralysis may occur. Hyponatremia as well as hypernatremia have also been associated with neurological symptoms. Both electrolyte derangements were found in this study. Hyponatremia was found in 9 (15.3%) of the patients. Pre-operative correction of these abnormalities is crucial as they could potentiate the toxicity of anesthetic agents, and result in poor surgical outcomes [16].

Metabolic acidosis is an important acid-base dysfunction seen especially in acutely ill surgical patients, as it often indicates an on-going tissue or organ hypo perfusion. This, if not promptly corrected, may lead to organ failure or death. [17] Metabolic acidosis may present biochemically as low serum bicarbonate (HCO_3^-), and this was seen in 39 (54.2%) of the women in this study. However, the levels were mostly within the less toxic ranges.

Preoperative evaluation of serum urea and creatinine is very important for detection of occult renal disease especially in patients with risk factors such as fluid loss, adrenal disease, severe or prolonged hypertension, diuretic therapy, diabetes mellitus, and procedures requiring radiocontrast agents [16]. It is also necessary in patients with pre-existing renal disease in order to assess the level of function as this may determine the need for adjustment of drug dosages to prevent toxicity due to inappropriate excretion. Patients with prior renal disease may also undergo the evaluation preoperatively to produce baseline values that are necessary for important clinical decision-making, including the choice of drugs, fluid therapy, radiocontrast investigations, and choice of dietary regimens. In addition to serum biochemical assessment of renal functions, preoperative proteinuria has been found to be an independent risk factor for postoperative acute kidney injury [18]. Five (6.9%) of this study group had proteinuria of $\geq 30\text{mg}/100\text{ml}$.

Abdominal ultrasonography has also been found to be of great importance in the assessment of the organs of the urinary tract such as the kidneys, ureters and the urinary bladder. Although the ureters are rarely seen on ultrasound imaging, they may be seen when dilated with accumulated static urine [19]. Abnormalities of the kidneys such as hydronephrosis, dilatation of the pelvic calyces, as well as renal stones can be diagnosed on ultrasonography. These were noted in some of the patients in this study as indicated in Figure 2.

Limitations of the Study

In this study we were mindful of the fallibilities of the use of urea and creatinine in the estimation of renal function. The use of estimated glomerular filtration rate, using any preferred of the standard mathematical formulae, would probably have been more reliable. However, this study was designed for a cross-sectional examination of secondary data stored in patients' records. At the time of this study (and even currently), urea and creatinine are still being universally used at the two hospitals for estimation of renal function. A margin of error will therefore be expected in results obtained in the records for early stages, 1-3, of CKD. Many patients early CKD might have been missed. However, the method of using estimated glomerular filtration rate, to the best of our knowledge has not been standardized for our population.

Conclusion

This study revealed that significant proportion of the women had preoperative hypokalemia, hyponatremia, as well as metabolic acidosis evidenced by low serum bicarbonate levels, while few patients had laboratory evidence of acute kidney injury. Preoperative assessment of renal function is suggested by these findings to be necessary in the preparation of patients for major gynecological surgeries. This tests might offer the opportunity to correct any detected abnormality, with subsequent improvements in surgical outcome as well as turbulence-free postoperative period.

Recommendation

While we suggest further studies on this subject, it is suggested that preoperative renal function assessment be done before major gynecological surgeries. Standard operating procedures should be made available for the correction of the various abnormalities detected in order to achieve satisfactory postoperative surgical outcome.

Compliance with ethical standards

Acknowledgments

We are grateful to the Heads of Department of Obstetrics and Gynecology of UPTH and RSUTH, Port Harcourt for granting us access to patients' records. We thank the Residents doctors that assisted us during data collection.

Disclosure of conflict of interest

There is no conflict of interest.

Statement of ethical approval

This study was approved by the Research Ethics Committee of UPTH, Port Harcourt. The study did not involve any animal or human experimentation by any of the authors.

Statement of informed consent

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

References

- [1] Ana GR., Sridhar MK, Asuzu MC. Environmental risk factors and hospital-based cancers in two Nigerian cities. *J Public Health Epidemiol.* 2010 Nov; 2(8): 216-223
- [2] Kale Z Kponee, Jamaji C, Nweren, Xianqiang FU, Iyenemi I Kakulu, Marc G Weisskopf, Chunrong Jia. Elevated Indoor Volatile Organic Compound Exposure in the Niger Delta Region of Nigeria. *Int J Environ Res Public Health.* 2018 Sep; 15(9): 1939. Published online 2018 Sep 6 doi: 10. 3390/ijerph 15091939
- [3] UNEP 2011. Environmental Assessment of Ogoni Land. Nairobi: United Nations Environmental Programme. Available at the ://www.unep.org/Nigeria/. Last accessed on December 20, 2012
- [4] Onwuchekwa AC, Chinenye S. Clinical profile of hypertension at a University Teaching Hospital in Nigeria *Vasc Health Risk Manage,* 2010 Aug 96: 511-6
- [5] Sapira MK, Obiorah CC. Chronic kidney disease in Port Harcourt, Nigeria; Risk factors in dialyzed patients and review of the literature. *World Journal of Advance Healthcare Research* ISSN: 2457-0400 volume 6, Issue; 3 Page N 33-43 2022

- [6] Pavkov M.E, Hanson R.L, Knowler W.C. Effect of intrauterine diabetes exposure on the incidence of end-stage renal disease in young adults with type 2 diabetes. *Diabetes Care*. 2010; 33: 2396-2398.
- [7] Pavkov M.E, Bennett P.H, Knowler W.C. Effect of youth-onset type 2 diabetes mellitus on incidence of end-stage renal disease and mortality in young and middle-aged Pima Indians. *JAMA*. 2006; 296: 421-426
- [8] Vikse B.E. Pre-eclampsia and the risk of kidney disease. *Lancet*. 2013; 382: 104-106
- [9] Rosenberg A.Z. Naicker S. Winkler C.A, Kopp J.B. HIV-associated nephropathies: epidemiology, pathology, mechanisms, and treatment. *Nat Rev Nephrol*. 2015; 11:150-160
- [10] Vaught AJ, Ozrazgat-Baslanti T, Bihorac A. Acute kidney injury in major gynaecological surgery; an observational study. *BJOG* 2015; 122(10): 1340-1346.
- [11] Gounden V, Bhatt H, Jialal I. Renal function tests. Available at: <https://ncbi.nlm.nih.gov>. Last accessed 23/03/2023.
- [12] Gowda S, Desai PB, Kulkarni SS, Hull VV, Math AAK et al. Markers of renal function. *N Am J Med Sci*, 2010; 2(4): 170-173.
- [13] Wahl TS, Graham LA, Moris MS et al. Association between preoperative proteinuria and postoperative acute kidney injury and readmission. *JAMA Surg* 2018; 153(9): e182009. Doi: 10.1001/Jamasurg.2018.2009.
- [14] National Institute of Health. Kidney function tests – Preoperative tests. Available at: <https://www.ncbi.nlm.nih.gov>. Last accessed 25/03/2023.
- [15] S M, C A. Electrolyte imbalance. In: Coomarasamy A, Shafi MI, Davila W and Chan KK (eds). *Gynaecologic and Obstetric surgeries: Challenges and Management Options*. 1st edition. Wiley Online Library, Wiley Press. 2016. Available at: <https://doi.org/10.1002/9781118298565.ch56>.
- [16] Shaw HA, Shaw JA. Preoperative management of the female patient. Available at: <https://emedicine.medscape.com>. Last updated Jan 7, 2021.
- [17] Martin MJ, Fitz Sullivan E, Salim A, Berne TV, Towfigh S. Use of serum bicarbonate measurement in place of arterial base deficit in the surgical intensive care unit. *Arch Surg* 2005; 140(8): 745-751.
- [18] Huang D, Li Y, Wu Y et al. Preoperative proteinuria may be a risk factor for postoperative acute kidney injury: A meta-analysis. *Ren Fail*. 2021; 43(1): 958-967.
- [19] Wade RV, Bliss SA. Diagnostic ultrasonography in Gynaecology. *Glob. Libr. Women’s med*, 2008: Doi 10.3843/GLOWM.10075.