



## African Journal of Urology

Official journal of the Pan African Urological Surgeons' Association  
web page of the journal

[www.ees.elsevier.com/afju](http://www.ees.elsevier.com/afju)  
[www.sciencedirect.com](http://www.sciencedirect.com)



### Endourology

Original article

# Investigation of urinary neutrophil gelatinase associated lipocalin (NGAL) for early diagnosis of acute kidney injury after percutaneous nephrolithotomy



M. MohamadiSichani<sup>a</sup>, Z. Tolou\_Ghamari<sup>b,\*</sup>

<sup>a</sup> Department of Urology, Faculty of Medicine, Isfahan University of Medical Sciences, Iran

<sup>b</sup> Isfahan Kidney Transplantation Research Center, Faculty of Medicine, Isfahan University of Medical Sciences, Iran

Received 24 December 2016; accepted 10 April 2017

Available online 27 July 2017

#### KEYWORDS

Percutaneous;  
Nephrolithotomy;  
Neutrophil  
gelatinase-associated  
lipocalin;  
Kidney stones

#### Abstract

**Introduction:** Percutaneous nephrolithotomy (PCNL) could be mentioned as the most important treatment of choice for kidney staghorn stones. Previous publications reported that the novel biomarker urinary neutrophil gelatinase-associated lipocalin (NGAL) activity significantly increases in acute kidney injury (AKI) but there is not many published articles related to increase of NGAL after PCNL procedure.

**Objective:** This study aimed to investigate AKI by urinary measurement of NGAL after PCNL procedure. **Subjects and methods:** Based on a cross-sectional design, 41 patients with staghorn renal stones were nominated. All patients have been informed and signed the consent form. NGAL levels were measured by urinary sampling at 2 h before and 12 h after the procedure. Serum creatinines (Cr) were measured 12 h before and 48 h after the surgery. Demographic and clinical data including surgical procedure were recorded in Excel and analyzed by SPSS (SPSS Inc., Chicago, IL) for windows.

**Results:** With a minimum of 20 and a maximum of 70, the mean age of patients was 47 years old. 71% of patients studied were males. There was a significant change in mean serum Cr (1.06 versus 1.12 mg/dL;  $p < 0.01$ ) before and after the procedure respectively. Glomerular filtration rate (GFR) with a mean of 81.93  $\mu\text{mol/L}$  before the procedure was decreased ( $p < 0.02$ ) to 77.46  $\mu\text{mol/L}$  after the procedure. The changes in urine level of NGAL were significant ( $p < 0.02$ ), associated to an increase in mean value of 20.63 ng/mL (two hours before) versus 56.28 ng/mL (twelve hours after) the PCNL procedure.

\* Corresponding author.

E-mail addresses: [m\\_mohammadi@med.mui.ac.ir](mailto:m_mohammadi@med.mui.ac.ir) (M. MohamadiSichani), [Toloeghamari@pharm.mui.ac.ir](mailto:Toloeghamari@pharm.mui.ac.ir) (Z. Tolou\_Ghamari).

Peer review under responsibility of Pan African Urological Surgeons' Association.

Association.

<http://dx.doi.org/10.1016/j.afju.2017.04.001>

1110-5704/© 2017 Pan African Urological Surgeons Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**Conclusions:** Within different extents after PCNL procedure there was a significant increase in the biomarker of NGAL levels. In order to reduce AKI and other post-operative complications, further studies in a large population of patients seem to be advantageous.

© 2017 Pan African Urological Surgeons Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

The 25-kDa lipocalin-2 (LCN2) or oncogene 24p3 or neutrophil gelatinase-associated lipocalin (NGAL) first recognized as a protein accumulated in particular granules of the human neutrophil and encoded by the LCN2 gene. The protein is supposed to attach small lipophilic substances such as bacterial resultant formyl peptides and lipopolysaccharides (LPS) and might function as a modulator of inflammation [1]. Upon encountering attacking bacteria the toll-like receptors on immune cells motivate the synthesis and secretion of NGAL. Secreted NGAL then limits bacterial growth that is involved in the intrinsic immunity responses by sequestering iron that in turn restricted bacterial growth by binding to bacterial siderophores. It is articulated in neutrophils and in low levels in the kidney, prostate and epithelia of the respiratory and alimentary tracts. There are many investigations that confirm NGAL could be used as a biomarker of kidney injuries due to stones or other related disorders [2,3]. Percutaneous kidney surgery reported to be as routine management related to a number of kidney pathologies [4–6]. Previous publication confirmed that percutaneous nephrolithotomy (PCNL) is the procedure of choice for renal staghorn stones. Clinical trials those confirming the immediate effects of PCNL on renal function are limited. Although, some studies have shown that there is no correlation between PCNL and acute change in renal function [7–11] but published data in 2014 revealed that during early post-operative period following unilateral PCNL, both kidneys experienced a provisional descent in function [8]. Another publication in 2012 stated that due to damaging nature of PCNL, it could cause interference in renal task depending on its' parenchymal damage [9]. Evaluating of the changes in the glomerular filtration rate (GFR) early postoperative period showed a decrease and then an increase during the 24–48 h following tract dilatation after PCNL [10–12]. To identify acute kidney damage (AKI), there are many diagnostic biomarkers such as creatinine (Cr), kidney injury molecule-1 (KIM-1), *N*-acetyl- $\beta$ -D-glucosaminidase (NAG) and liver-type fatty acid binding protein (LFABP), and NGAL [13]. Serum Cr does not command for early detection of AKI due to its' lack of ability to identify early kidney damage. NGAL is AKI biomarker which its' endogenous and molecular role in AKI remains unclear, however; it is believed to play a role in iron transportation. 1-3,7 Experimental research on animals showed that, GFR decreases immediately after PCNL and returns to baseline within the next few days [14,15]. Sharifiaghdas et al., in 2011 reported that PCNL does not cause kidney tubular injury beyond one week [16].

Although, K/DOQI (Kidney/Disease Outcomes Quality Initiative) clinical practice guidelines for chronic kidney disease recommended clearance of Cr for estimation of renal function [17], but it seems that it suffers from many disadvantages. Serum Cr concentration is dependent on age and gender and it is not able to show small changes

of GFR [18]. Sometimes Cr concentration rises because of other etiologies such as when the Cr is increased due to pre-renal causes while there is no actual tubular injury [19]. Other variables may also affect the Cr concentration such as weight, muscular metabolism and drugs. Serum levels of Cr may also change with some delay after the renal injury [20]. Kardakos et al., in 2014 reported that one of the biomarker that is increasingly used as a GFR levels both in serum and urine is NGAL that is a protein mainly produced by renal tubules in response to tissue damage. Hypoxia, renal disease and malignancies can influence its values [21]. NGAL has been proved as one of the best markers for early diagnosis of AKI [22–24]. Therefore, as a guide for post-operative period management, the correlation between urine level of novel biomarker NGAL and kidney function after PCNL surgery was of interest that is investigated.

## Patients and methods

Based on a cross-sectional design, 41 patients with kidney staghorn stones of larger than 2 cm, were candidate for unilateral PCNL. All patients have been informed and signed the consent form. The study was conducted to the Isfahan Kidney Transplantation Research Center and approved by the Local Ethics Committee. Patients with no evidence of obstruction such as hydronephrosis, delayed excretion or kidney damage such as size, echogenicity and scar based on radiologic evaluations were enrolled in the study from January to April 2014. The exclusion criteria were as: (1) history of renal surgery (2) renal failure (3) history of medication that potentially affect serum Cr level (4) heavy bleeding (5) those with more than one access. Demographic, clinical and surgical variables such as age, sex, size and opacity of stone, laterality, co-morbid diseases, operation time, number and site of accesses and complications during and after surgery were recorded in d-base.

### *Surgical technique*

Under general anesthesia a 5 Fr ureteral catheter was inserted in the ureter and then secured to a Foley catheter. Patients were placed in the prone position and areas under pressure were protected with pads. Under fluoroscopic guidance, access to desired calyx was achieved using 18 gauge Chiba needle and guide wire was inserted. The tract was dilated with Amplatz dilators up to 28 Fr. Nephroscopy was performed and renal stones were fragmented with pneumatic lithoclast (SWISS lithoclast) and removed. At the end of the procedure, a 16 Fr nephrostomy tube was placed in renal pelvis.

### *Laboratory measurements*

4 mL urine were obtained from patients 2 h before and 12 h after the procedure and sent to laboratory for measurements of NGAL levels

Download English Version:

<https://daneshyari.com/en/article/5729529>

Download Persian Version:

<https://daneshyari.com/article/5729529>

[Daneshyari.com](https://daneshyari.com)