

Fall in Hemoglobin as a Measure of Intra-Operative Bleed in Previously Operated and New Cases Undergoing PCNL

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ABSTRACT

Background: Percutaneous nephrolithotomy (PCNL) is a procedure to remove stones from the kidney. Intra-operative bleeding is one of the known complications in previously operated cases. Hemoglobin drop during PCNL with or without history of prior open renal surgery may differ so we conducted this study.

Aim: To determine the mean drop in hemoglobin in patients undergoing PCNL and mean hemoglobin in previously operated versus new cases undergoing PCNL.

Methods: This descriptive cross sectional study was done at Armed Forces Institute of Urology Rawalpindi from 20-03-2015 to 20-09-2015. A total of 90 patients were selected. Non-probability purposive sampling technique was used. Blood samples taken on 1st day and 24 hours post operatively. Drop in hemoglobin was calculated.

Results: The mean age of patients was 43.68±13.14 years and male to female ratio was 2.2:1. Mean size of stone was 2.54±0.62cm and overall mean fall in Hb was 1.05±0.45mg/dl. 31.11% of the cases were previously operated while 68.89% were new cases. The mean fall in Hb value in previously operated cases was 1.23±0.31mg/dl and mean fall in Hb value in new cases was 0.97±0.49mg/dl. The significant distinction was present between the falls in Hb values.

Conclusion: It is concluded that statistically significant more drop in the Hb values in previously operated cases as compared to new cases.

Keywords: PCNL, Previously operated, Bleeding, Hemoglobin.

INTRODUCTION

Renal stone disease is one of the most common urological affliction with a prevalence of approximately 2-3% in general population. There is 12% assessed lifetime risk of developing a renal stone¹. Pakistan is situated in stone belt area with very high frequency of renal stones.² Advent of minimally invasive, endoscopic procedures and extra-corporeal shock wave lithotripsy (ESWL) have nearly replaced the classically performed open surgery for evacuation of renal stones¹. Percutaneous nephrolithotomy (PCNL) is a minimally invasive surgery which is accepted for treating renal stones ≥ 2 cm and upper ureteric calculi³.

Renal stones tends to recur with a reported recurrence rate more than 50% in 5-7 years¹. Therefore a large number of patients presenting to us with renal stones requiring PCNL have history of open surgery for renal stone in past. There are reports of additional technical difficulties, higher failure rates, more operative time and more complication rates in patients undergoing PCNL having previous history of renal surgery. Distortion of pelvicalyceal and retroperitoneal scarring are some of the responsible factors.¹ Intra-operative bleeding is one of the risks in previously operated cases. Nakamon et al observed a mean drop in Hb in PCNL was 3.34±2.99gm/dl⁴. Gupta et al did a comparative study in 106 patients and found the average drop of hemoglobin by 1.39±0.59g/dl in old cases compared to 1.1±0.49g/dl in new cases.¹ Gupta et al in group of 90 patients found

average of fall in hemoglobin level was comparable in patients and with history of open stone surgery (2.3g/dl vs 2.1g/dl)⁵.

Resorlu et al evaluated that PCNL in patients with history of renal surgery has no high risk complications and with a stone clearance similar to that of PCNL in patients with no previous.⁶ Patients presenting to our hospital requiring PCNL have previous history of open renal surgery which renders them to operative difficulties and complication like intra-operative bleeding.

MATERIALS AND METHODS

This cross sectional study was done in Urology Department at Armed Forces Institute of Urology Rawalpindi within 6 months from 20-03-2015 to 20-09-2015. All patients having renal stones ≥ 2 cm with or without history of previous renal surgeries on same side. Both gender and age from 25-65 years were included. Study was started after approval of ethical committee of Armed Forces Institute of Urology, Rawalpindi. All the patients diagnosed to have renal stones requiring PCNL treatment after detailed history and physical examination, underwent ultrasound and X-ray of kidney ureter and bladder as well as Intravenous urography. Serum creatinine coagulation profile and urine cultures was done to include or exclude the patients accordingly, complete blood picture was done one day before surgery. All the patients fulfilling in selections criteria underwent PCNL which was done by consultant. Hb level of all the patients having PCNL with and without history of previous surgery was done. Blood samples were taken on 1st post-operative day 24 hours post operatively and were sent to Armed Forces Institute of Pathology for

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determination of hemoglobin in gm/dl. Drop in Hb in overall patients undergoing PCNL and drop in hemoglobin in both groups were calculated by subtracting post-operative hemoglobin from pre-operative hemoglobin. Data was collected and entered on a proforma. Descriptive statistics was calculated for both qualitative and quantitative variables. For qualitative like gender frequency percentage was calculated. For quantitative variable like age, mean hemoglobin at base line of and at first post-operative day, mean drop in hemoglobin overall and new and previously operated cases mean \pm SD was calculated. Independent samples t-test was used to compare mean fall in hemoglobin. Effect modifies like age, gender, site and size of stones was controlled by stratification.

RESULTS

In this study a total of 90 cases were enrolled. The mean age was 43.9 \pm 13.14 years with minimum and maximum ages of 25 & 65 years respectively (Table 1). The study results showed that the 68.89% patients were males and 31.11% patients were females ratio of the patients was 2.2:1. The mean stone size was 2.54 \pm 0.62cm with minimum and maximum stone sizes of 2-3.5cm respectively (Table 2). The study results showed that, the cases with previous surgery were 31.11% (n=28) and the cases without previous surgery were 68.89% (n=62).

The study results showed that the mean Hb value at baseline of the patients was 11.71 \pm 0.45mg/dl and the mean Hb value at post-op was 10.66 \pm 0.34mg/dl with minimum and maximum post-op values of 9.5 & 11.4 respectively (Table 3). The mean fall in Hb was 1.05 \pm 0.45mg/dl with minimum and maximum values of 0 and 2 respectively (Table 4). The mean fall in Hb value in previously done surgery patients was 1.23 \pm 0.31mg/dl and the mean fall in Hb value in without previous surgery was 0.97 \pm 0.49mg/dl. Statistically there is significant difference was found between the fall in Hb values with previous and without previous surgery (p 0.003 Table 5).

Below 40 years patients, the mean fall in Hb value with previous open surgery was 1.27 \pm 0.39mg/dl and in without surgery, its mean value was 0.87 \pm 0.50, in above 40 years, the mean fall in Hb value with surgery was 1.21 \pm 0.27mg/dl and in without surgery, mean value was 1.06 \pm 0.46. Statistically significant difference was seen between the fall in Hb with and without previous surgery in patients with below 40 years of age (P 0.022 Table 6). In male patients, the mean fall in Hb with previous surgery was 1.24 \pm 0.38mg/dl and in without previous surgery and mean value was 0.95 \pm 0.46 in female patients, the mean fall in Hb with previous surgery was 1.21 \pm 0.18mg/dl and in without previous surgery patients its mean value was 1.01 \pm 0.56. Statistically significant difference was seen between the fall in Hb with and without previous surgery in male patients (P 0.029 Table 7). In patients below \leq 2.5cm stone size, the mean fall in Hb value without previous surgery patients was 1.15 \pm 0.19mg/dl and in with previous surgery patients mean drop in Hb was 1.02 \pm 0.51mg/dl. Similarly in patients with $>$ 2.5cm stone size, the mean fall in Hb without previous surgery was 1.28 \pm 0.37mg/dl and in with previous surgery patients, mean drop in Hb was 0.95 \pm 0.49mg/dl. Statistically insignificant difference was observed between the fall in Hb with and without previous surgery in patients with stone size \leq 2.5cm (P 0.457).

However, significant difference was observed between the fall in Hb with and without previous surgery in patients with stone size \geq 2.5cm (P 0.013 Table 8).

Table 1: Descriptive statistics of age (years)

Age (years)	n	90
	Mean	43.9
	SD	13.14
	Minimum	25
	Maximum	65

Table 2: Descriptive statistics of stone size

Stone size (cm)	n	90
	Mean	2.54
	SD	0.62
	Minimum	2.0
	Maximum	3.5

Table 3: Descriptive statistics of Hb at baseline and at post readings

		Baseline reading	Post reading
		n	90
Hemoglobin	Mean	11.71	10.66
	SD	0.45	0.34
	Minimum	11.0	9.5
	Maximum	12.5	11.4

Table 4: Descriptive statistics of fall in Hb

Fall in Hemoglobin	n	90
	Mean	1.05
	SD	0.45
	Minimum	.0
	Maximum	2.0

Table 5: Comparison of fall in Hb w with previous surgery

		Previous surgery	
		Yes	No
Fall in Hemoglobin	n	28	62
	Mean	1.23	0.97
	SD	0.31	0.49

Table 6: Comparison of fall in Hb w with previous surgery stratified by age

Age (years)	Previous surgery	Mean	SD	P value
<40	Yes	1.27	0.39	0.022
	No	0.87	0.50	
\geq 40	Yes	1.21	0.27	0.270
	No	1.06	0.46	

Table 7: Comparison of fall in Hb w with previous surgery stratified by sex

Sex	Previous surgery	Mean	SD	P value
Male	Yes	1.24	0.38	0.029
	No	0.95	0.46	
Female	Yes	1.21	0.18	0.244
	No	1.01	0.56	

Table 8: Comparison of fall in Hb w with previous surgery stratified by stone size

Stone size	Previous surgery	Mean	SD	P value
\leq 2.5cm	No	1.15	0.19	0.457
	Yes	1.02	0.51	
$>$ 2.5cm	No	1.28	0.37	0.013
	Yes	0.95	0.49	

DISCUSSION

This descriptive cross sectional study was done in Urology Department at Armed Forces Institute of Urology Rawalpindi to determine the mean drop in hemoglobin in patients undergoing PCNL and the difference in mean drop in hemoglobin in previously operated versus new cases undergoing PCNL.

Significant bleeding is an uncommon but dreadful complication of PCNL. The incidence of significant haemorrhage requiring blood transfusion after PCNL had been variably reported between 2-45%.⁹⁷⁻¹²

According to our study the mean Hb value at baseline of the patients was 11.71 ± 0.45 mg/dl and the mean Hb value at post-op was 10.66 ± 0.34 mg/dl, the mean fall in Hb of the patients was 1.05 ± 0.45 mg/dl. Some of the studies are discussed here below showing their results as.

Nerli et al¹³ brought about the mean rise in serum creatinine at discharge was 0.05 ± 0.03 mg/dl and the mean fall in serum hemoglobin was 1.63 ± 0.77 g/dl. The stone-free rate was 100% after three months of surgery.

Kefer et al¹⁴ surveyed the safety and efficacy of PCNL in patients requiring long-term anticoagulant therapy from 2000 to 2007. They demonstrated that mean hemoglobin decrease was 1.5g% (range, 0-4.1g%) and mean change in serum creatinine was 0.03mg% (range, 0-0.4mg%). Two patients (7%) had significant bleeding and 1 (4%) had a thromboembolic complication.

Another study showed that the mean drop in Hb in PCNL was 3.34 ± 2.99 gm/dl.⁴ Shah et al¹⁵ described that mean difference drop in hemoglobin, transfusion requirement, and complication rate between two groups was not statistically significant. In our study mean fall in Hb value in previously done surgery patients was 1.23 ± 0.31 mg/dl and the mean fall in Hb value in without previous surgery patients was 0.97 ± 0.49 mg/dl. Statistically lower fall values of hemoglobin were observed in patients of without history of surgery (P 0.003).

One study by Basiri et al¹⁶ enrolled patients of two groups in their study. One group patients were those who underwent nephrolithotomy at least once and the other group patients were those who are presenting at first time. They concluded that open nephrolithotomy history does not adversely affect the efficacy or morbidity of PCNL. Gupta et al did a comparative study in 106 patients and found the average drop of hemoglobin by 1.39 g/dl \pm 0.59 g/dl in old cases compared to 1.1 g/dl \pm 0.49 g/dl in new cases.¹ Gupta et al in group of 90 patients found average of fall in hemoglobin level was comparable in patients with and with history of open stone surgery (2.3g/dl vs 2.1g/dl).⁵ Another study by Kurtulus et al¹⁷ showed that significant differences are not seen when the outcomes are compared with the primary cases as far as tract numbers (various tracts: 8.5% v 10.2%), operative time (2.3 v 2.2 hours), transfusion rate (540 v 495mL), hospitalization time (4.4 v 4.2 days), complication rate (1.4% v 3%) and residual stones (5% v 3%) (P >0.05). Resorlu et al assessed that PCNL in patients with past history of renal surgery has no high risk of complications and with stone clearance similar to that of PCNL in patients with no past surgery⁶.

A study by Zehri et al¹⁸ concluded that the elements such as age, hypertension, previously treated urinary tract contamination, diabetes mellitus, ischemic heart disease,

amplatz size, numerous punctures, were not significant and didn't correlate with bleeding.

CONCLUSION

It was concluded that statistically significant lower drop in the Hb values in new cases as compared to previous cases indicating that previous renal surgery is an additional risk factor for intra-operative bleeding in previously operated cases undergoing PCNL.

REFERENCES

- Gupta R, Gupta A, Singh G, Suri A, Mohan SK, Gupta C. PCNL-a comparative study in nonoperated and in previously operated (open nephrolithotomy/pyelolithotomy) patients-a single-surgeon experience. *Int. Braz J Urol* 2011;37(6):739-44.
- Pearle MS, Lotan Y. Urinary lithiasis: etiology, epidemiology, and pathogenesis. *Campbell-walsh Urology* 2007;2:1363-92.
- Jun-Ou J, Lojanapiwat B. Supracostal access: does it affect tubeless percutaneous nephrolithotomy efficacy and safety? *Int. Braz J Urol* 2010;36(2):171-6.
- Nakamon T, Kitiattrakam P, Lojanapiwat B. Outcomes of percutaneous nephrolithotomy: Comparison of elderly and younger patients. *Int. Braz J Urol* 2013;39(5):692-701.
- Gupta N, Mishra S, Nayyar R, Seth A, Anand A. Comparative analysis of percutaneous nephrolithotomy in patients with and without a history of open stone surgery: single center experience. *J Endourol.* 2009;23(6):913-6.
- Resorlu B, Kara C, Senocak C, Cicekbilek I, Unsal A. Effect of previous open renal surgery and failed extracorporeal shockwave lithotripsy on the performance and outcomes of percutaneous nephrolithotomy. *J Endourol.* 2010;24(1):13-6.
- El-Nahas AR, Shokeir AA, El-Kenawy MR, Shoma AM, Eraky I, El-Assmy AM, et al. Safety and efficacy of supracostal percutaneous nephrolithotomy in pediatric patients. *J Urology* 2008;180(2):676-80.
- Huang WH, Jiann BP, Lee YH, Wu TT, Yu CC, Tsai JY. Risk factors of massive bleeding after percutaneous nephrolithotomy and its management. *Diabetes* 2003;3:25.
- Rastinehad AR, Andonian S, Smith AD, Siegel DN. Management of hemorrhagic complications associated with percutaneous nephrolithotomy. *J Endourol.* 2009;23(10):1763-7.
- Lee KL, Stoller ML. Minimizing and managing bleeding after percutaneous nephrolithotomy. *Current Opinion Urology* 2007;17(2):120-4.
- Al-Ba'adani TH, Al-Kohlany KM, Al-Adimi A, Al-Towaity M, Al-Baadani T, Alwan M, et al. Tubeless percutaneous nephrolithotomy: the new gold standard. *Int. Urol and Nephrol* 2008;40(3):603-8.
- El-Nahas AR, Shokeir AA, El-Assmy AM, Mohsen T, Shoma AM, Eraky I. Post-percutaneous nephrolithotomy extensive hemorrhage: a study of risk factors. *J Urol* 2007;177(2):576-9.
- Nerli R, Reddy M, Devaraju S, Hiremath M. Percutaneous nephrolithotomy in patients on chronic anticoagulant/antiplatelet therapy. *Chonnam Med J* 2012;48(2):103-7.
- Kefer JC, Tuma B, Stein RJ, Desai MM. Safety and efficacy of percutaneous nephrostolithotomy in patients on anticoagulant therapy. *J Urol* 2009;181(1):144-8.
- Shah HN, Kausik VB, Hegde SS, Shah JN, Bansal MB. Safety and efficacy of bilateral simultaneous tubeless percutaneous nephrolithotomy. *Urology* 2005;66(3):500-4.
- Basiri A, Karami H, Moghaddam SMH, Shadpour P. Percutaneous nephrolithotomy in patients with or without a history of open nephrolithotomy. *J Endourol.* 2003;17(4):213-6.
- Kurtulus FO, Fazlioglu A, Tandogdu Z, Aydin M, Karaca S, Cek M. Percutaneous nephrolithotomy: primary patients versus patients with history of open renal surgery. *J Endourol.* 2008;22(12):2671-6.
- Zehri AA, Biyabani SR, Siddiqui KM, Memon A. Triggers of blood transfusion in percutaneous nephrolithotomy. *J Coll Physicians and Surg Pakistan* 2011;21(3):138.