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Percutaneous nephrolithotomy; alarming variables for postoperative bleeding

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KEYWORDS

Percutaneous nephrolithotomy;
Bleeding;
Renal stones;
Complications

ABBREVIATIONS

BMI, body mass index;
GSS, Guy's Stone Score;
Hb, haemoglobin;
KUB, plain abdominal radiograph of the kidneys, ureters and bladder;

Abstract ***Objectives:*** To evaluate factors contributing to bleeding after percutaneous nephrolithotomy (PCNL) and ways of managing this complication, as bleeding is a serious sequela that requires prompt management.

Patients and methods: The demographic and procedural data of 200 patients, who underwent unilateral PCNL during a 20-month period, were prospectively collected. Preoperative, operative, and postoperative details were recorded. The preoperative variables analysed included: age, sex, body mass index (BMI), the presence of hypertension, diabetes mellitus, serum creatinine, degree of hydronephrosis, previous ipsilateral open renal surgery, stone size and complexity. The operative variables analysed included: number of tracts, operative time, size of Amplatz sheath, type of anaesthesia, and complications such as calyceal and pelvic perforation.

Results: The variables of age, sex, BMI, diabetes, hypertension, and a preoperative creatinine level of >1.4 mg/dL had no significant effect on blood loss (all $P > 0.05$). However, the rate of bleeding was significantly higher ($P \leqslant 0.05$) in patients who had a history of previous open renal surgery, intraoperative pelvicalyceal perforations, and Guy's Stone Score (GSS) grade 3 and 4 complex stones;

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OR, odds ratio;
PCNL, percutaneous nephrolithotomy;
US, ultrasonography

however, absence of hydronephrosis, larger stone size, operative time (>83 min), more than one puncture, and size of the Amplatz sheath (26–30 F) did not maintain their significance in multivariate analysis.

Conclusion: According to our present results stone complexity (GSS grade 3 and 4), history of ipsilateral renal stone surgery, and occurrence of intraoperative pelvicalyceal perforation are alarming variables for post-PCNL bleeding.

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Introduction

Percutaneous nephrolithotomy (PCNL) has now largely surpassed open surgical techniques for renal stone management. Following technical improvements in PCNL, it has now become the standard procedure for the management of most large stones [1]. Despite recent advances, complications are still common occurring about a quarter of patients (23.3%) [2]. Bleeding in particular is a serious sequela that requires prompt control and management. Although a conservative approach suffices to control most bleeds after PCNL, a proportion of patients (0.8%) have been shown to have severe haemorrhage that necessitates surgical intervention, such as angiographic embolisation [3]. Also, a wide variation in the rate of blood transfusion for bleeding has been described in the literature ranging from 1% to 55% [4].

Haemorrhage after PCNL can occur immediately or after several days or weeks so called 'delayed bleeding' [5]. Certain patient, stone, and procedure-related factors are of value in predicting bleeding after PCNL, among these factors are body mass index (BMI), diabetes mellitus, stone size, degree of hydronephrosis, dilatation approach, and operative time [6,7]. Akman et al. [8] and others found that multiple access tracts, staghorn calculi, presence of diabetes, and prolonged operative time significantly increased blood loss during PCNL, while others concluded that stone size is the sole predictive factor of bleeding after PCNL [9]. The aim of the present study was to evaluate factors contributing to bleeding after PCNL and the ways of managing this complication.

Patients and methods

After approval of the study protocol by the Ethics Committee of the Sulaymaniyah Teaching Hospital, this study was conducted on patients who underwent unilateral PCNL during a 20-month period. The demographic and procedural data of 200 patients were collected prospectively using Microsoft Excel and analysed for factors that might have the potential to impact on post-PCNL bleeding. Preoperative informed consent was obtained. All patients were evaluated by history, physical examination, and haematological and biochemical investigations including: complete blood count, blood glucose, blood urea, and serum creatinine. All patients had a definitive preoperative diagnosis by plain abdominal radiograph of the kidneys, ureters and bladder (KUB), IVU, ultrasonography (US) and/or abdominal CT.

Surgical procedure and equipment

The entire procedure was performed in the Urology Department with the patient under general anaesthesia in 171 patients and using spinal anaesthesia in 29 patients. Prophylactic antibiotics were given according to the local guidelines of the hospital. After placing the patient in the lithotomy position, retrograde ureteric catheterisation with a 5-F open-ended ureteric catheter was performed under fluoroscopy guidance using a rigid cystoscope. All other parts of procedures were completed in the prone position. The selected calyx was accessed by the attending urologist using C-arm fluoroscopy (Siemens, Berlin, Germany). The 18-G coaxial needle (Cook Medical Inc., Bloomington, IN, USA) was placed in the preferred calyx. The floppy tipped guidewire (Boston Scientific, Quincy, MA, USA) was then passed into the collecting system through the needle. A working channel was established using a serial plastic or metallic dilator system under fluoroscopy control to 20–30 F. The Amplatz sheath (Boston Scientific) was placed over the dilated tract. A 20-F nephroscope (Karl-Storz, Tuttlingen. Germany) was then placed directly into the kidney through the Amplatz. The stones were fragmented using a pneumatic lithotripter (NidhiLith, Nidhi Medical systems, Delhi, India). Forceps and irrigating fluid were used to remove stone fragments. The number and types of accesses depended on the size of the treated stones (staghorn stone vs single stone) and localisation (upper or lower pole). Surgery was terminated and a nephrostomy tube fixed in patients with pyonephrosis at the initial puncture during the procedure.

At the end of the procedure, the ureteric stent was replaced by a JJ stent in cases of pelvic perforation, bleeding, irrigating fluid extravasation and residual stones, while in the absence of the aforementioned

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