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ORIGINAL ARTICLE

Effects of previous unsuccessful extracorporeal shockwave lithotripsy treatment on the performance and outcome of percutaneous nephrolithotomy

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KEYWORDS

Kidney stones;
ESWL;
Percutaneous nephrolithotomy;
Bleeding;
Complications

ABBREVIATIONS

Hb, haemoglobin;
LOS, length of hospital stay;
PCNL, percutaneous nephrolithotomy

Abstract ***Objective:*** To evaluate the effects of previous unsuccessful extracorporeal shockwave lithotripsy (ESWL) treatment on the performance and outcome of percutaneous nephrolithotomy (PCNL).

Patients and methods: Of 1625 PCNL procedures performed in our clinic, 393 renal units with similar stone burden and number of accesses was included in the present study. We categorised the study patients into two groups according to whether they underwent ESWL within 1 year prior to PCNL or not. Accordingly, Group 1 comprised 143 (36.3%) ESWL-treated patients and Group 2 comprised 250 (63.7%) non-ESWL-treated patients.

Results: Residual stones were detected in 36 (25.1%) of the ESWL-treated patients (Group 1) and in 60 (24%) of non-ESWL-treated patients (Group 2). There were no statistically significant differences between the groups for length of hospital stay (LOS), nephrostomy tube removal time, and the presence of residual stones. When we evaluated the groups for both the preoperative and postoperative haemoglobin (Hb) drop and blood transfusion rate, manifest Hb declines and more transfusions were required in the ESWL-treated patients (both $P = 0.01$).

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Conclusions: In our study, previous ESWL treatment had no influence on the PCNL stone-free rate, operation time, incidence of postoperative complications, and LOS, in patients with similar stone burdens. However, bleeding during PCNL was more prevalent in the ESWL-treated patients, so close attention should be paid to bleeding in patients who have been pretreated with ESWL.

Introduction

Percutaneous nephrolithotomy (PCNL) is a minimally invasive treatment method for urinary tract stone disease. Today PCNL has virtually replaced open stone surgery, as it has significant advantages, e.g. relatively short length of hospital stay (LOS), lower treatment costs, less loss of labour, and a minimal surgical incision. However, there are various complications of PCNL, as with any other surgical procedure. Probable underlying causes that may be associated with these complications have been examined in many studies. Many patients who have previously undergone ESWL, later present with a recurrent stone in the same kidney and need PCNL [1]. ESWL has the potential for serious side-effects and complications, although it has been shown in large series to be a reliable and an effective method [2,3]. ESWL-related complications can occur acutely, as well as later. The economic burden of kidney stones includes both direct and indirect costs; the latter including decreased or lost work productivity. In 2005, the Urological Disease in America Project analysed the direct and indirect costs of stone disease using medical and pharmacy claims of 25 large USA employers covering >300,000 beneficiaries aged 18–64 years for the calendar year 2000 [3]. In the present study, we evaluated the effects of previous unsuccessful ESWL treatments (failed disintegration of stones or failed clearance of stones, not recurrences) on the performance and outcome of PCNL.

Patients and methods

Of the PCNL procedures performed in our Urology Clinic at Tepecik Training and Research Hospital Turkey, between January 2009 and October 2014, 393 patients had similar stone burdens (cumulative stone burden $>600\ mm^2$), as well as number of accesses and were included in this retrospective study. Stone size was evaluated by CT. Patients were divided into two groups: Group 1, comprised 143 (36.3%) patients who underwent ESWL (failed disintegration of stones or failed clearance of stones) within 1 year prior to PCNL (to standardised all patients); Group 2, comprised 250 (63.7%) patients who had no ESWL. Haemoglobin (Hb) levels and stone-free rates before and after PCNL were evaluated and compared. The demographic details of the groups are shown in Table 1.

Complete blood count, serum creatinine, sodium, potassium, liver function tests, urine analysis, urine culture and antibiogram, and coagulation tests were performed preoperatively for each patient. In all patients a complete blood count was repeated 2 h after PCNL. Anti-aggregant or anticoagulant treatments were discontinued for ≥7 days before PCNL. We excluded patients that had a bleeding tendency or abnormal coagulogram. All patients were evaluated by CT preoperatively. All procedures were conducted according to the regulations of the Local Ethics Committee.

Patients with a cumulative stone burden (for multiple stones, total area) of $>600\ mm^2$, multiple access, and incomplete data were excluded from the study. The stone size (for one stone = length × weight) was assessed as the surface area and calculated according to European Association of Urology guidelines [4].

The PCNL procedure

The PCNLs were performed under general anaesthesia. The patients were placed in lithotomy position and an open-ended 6-F ureteric catheter placed using a 22-F cystoscope, with the correct placement of the catheter into the renal collecting system confirmed by fluoroscopy. The ureteric catheter was stabilised using silk ties on to the urethral 16-F Foley catheter to prevent displacement during turning of the patient from a supine to prone position. The patient was prone positioned and the anaesthetist supervised the head and neck. The renal collecting system was imaged using retrograde contrast medium diluted with saline (~1:1).

Table 1 Demographic data and characteristics of the kidney stones.

Variable	Group 1	Group 2	*P*
Number of patients (%)	143 (36.3)	250 (63.6)	
Age, years, mean	45.6	46.1	0.98
BMI, kg/m^2, mean	28.1	27.8	0.87
Male/female, *n*	80/63	140/110	0.13
Stone size, mm^2, mean	425	460	0.078
Side, right/left, *n*	63/80	120/130	0.69