INTRODUCTION

Hematuria may be occurred by many causes and fatal to patient sometimes. In operation room, there are no sufficient tools to evaluate the origin of hematuria. Therefore, intra-operative hematuria is very difficult situation for anesthesiologist to evaluate the causes and make a decision whether to resume the operation or not.

Recently, we encountered intra-operative gross hematuria of unknown origin. Therefore, we report the serial evaluation methods which could be performed in operation room and decision making process to resume the operation or not.

CASE DESCRIPTION

A 63 years old woman entered operating room for undergoing posterior lumbar fusion for L3/4, 4/5 spinal stenosis. The personal and family medical histories were otherwise non-contributory. The preoperative laboratory findings were all within normal ranges. In addition, there was no evidence which might suspect any abnormality on preoperative physical examination or previous medical history.

The patient was premedicated with midazolam 2 mg and glycopyrrolate 0.2 mg intramuscularly 30 minutes before anesthesia. In the operating room, electrocardiography, non-invasive blood pressure, and pulse oximetry were applied. The initial vital signs were all within normal limits. Anesthesia was induced with lidocaine 20 mg, propofol 120 mg, and vecuronium 8 mg, and trachea was intubated. The anesthesia was maintained with oxygen (2 L/min), N₂O (2 L/min), and sevoflurane (2.0~3.0 vol% end-tidal concentration). Following the induction of anesthesia, mechanical ventilation was initiated at a tidal volume of 8 mL/kg and a respiratory rate of 12 breaths/min. After the induction of anesthesia, invasive monitoring was installed to right radial artery and internal jugular vein. A 16 Fr. Foley catheter was inserted and there was no sign of urethral injury. After position change from supine to prone, urine output was not shown. Therefore, we examined the patency of Foley catheter. The patency was confirmed by manipulation and saline irrigation of Foley catheter.

About 2 hours elapsed form starting operation, her blood pressure was fluctuated during spine instrumen-
Intra-operative Hematuria by Renal Stone

Fig. 1. Gross fresh hematuria in urine collecting bag.

Fig. 2. Non specific finding in post-operative KUB image.

Fig. 3. Multiple renal calyceal stone in abdominal CT scan image.

tation. Systolic pressure ranged from 120 to 70 mmHg and diastolic pressure ranged from 60 to 40 mmHg. The laboratory result revealed that serum hemoglobin level was 9.7 g/dL (initial level was 11.9 g/dL). The estimated blood loss was 700~800 mL. We decide to transfuse 2 units of packed red blood cell (p-RBC) considering the ongoing blood loss. About 15 mins after second p-RBC transfusion start, gross hematuria with fresh red color was found in urine collecting bag (Fig. 1). We stopped transfusion and asked for ABO compatibility of transfused RBC to blood bank. For the supplement of blood loss, we replaced 500 mL colloid solution during 10 min. After fluid replacement, vital sign was stabilized and urine output was above 1 ml/kg/h.

About 5~10 mins later, blood bank reported that there is no abnormality on transfused RBC. Urine analysis and urine cytology was performed to rule out the possibility of malignancy and peripheral blood smear was done to rule out hemolytic reaction by inappropriate transfusion. Peripheral blood smear finding was normochromic and normocytic anemia; there was no evidence of hemolytic reaction. In urine analysis and urine cytology, malignant cell was not found. We decided to continue transfusion and operation. As time goes on, fresh red urine color became almost clear. Finally, seven hours’ operation was finished. Five hours after completion of operation, urine analysis was normal and urine color became completely clear.

After discussion with operator and urologist, we carried out KUB to verify the existence of renal or ureter stone after the operation and there was no abnormal finding (Fig. 2). For the further evaluation, abdominal spiral CT scan was performed. The spiral CT scan revealed 2~4 mm various sized small calyceal stones in both kidneys (Fig. 3). On urology consultation, the urologist suggested that renal calyceal
stone might move to ureter and irritate its’ mucosa. Therefore temporally gross hematuria might be occurred. 7 days later, patient was discharged without complication, about calyceal stone, urology outpatient department follow up was scheduled.

**DISCUSSION**

Hematuria may be a sign of serious but treatable conditions such as malignancy, calculi, or infection. In addition, hematuria is a danger sign that should not to be ignored because it may represent fatal condition such as inappropriate transfusion, urethral rupture, un-diagnosed urologic cancer, or azotemia. Therefore the discrimination of cause is important.(1) The prevalence varied with the age and sex of the population assessed, the referral source, and the clinical setting, but it was highest in patients undergoing urologic evaluation, in the elderly, and in men.(2) In a woman with hematuria, it is important to determine if she is menstruating at the time of the evaluation so that extra care is taken to obtain an uncontaminated urine specimen for analysis.(3)

One of the most catastrophic transfusion reactions is that arising from intravascular hemolysis. Intravascular hemolysis occurs when there is a direct attack on transfused donor cells by recipient antibody and complement. Such a reaction can occur from infusion of as little as 10 mL of blood.(4) If properly treated, death is rare.(5) However, prevention of kidney failure and a coagulopathy (i.e. DIC) is crucial. The signs and symptoms are such as chills, fever, chest and flank pain, and nausea which can be came out by anesthesia. Under general anesthesia, the only signs may be hemoglobinuria, bleeding diathesis, or hypotension. The presenting sign is usually hemoglobinuria. Due to hemolytic reaction, there may be abnormal finding in peripheral blood smear. By confirmation of blood bank and the result of peripheral blood smear, we could rule out hemolytic transfusion reaction.

Gross hematuria typically brings the patient promptly to the physician and little debate surrounds the need for a thorough evaluation. Indeed, visible blood in the urine is the presenting symptom in up to 85 % of patients with bladder cancer and 40 % of patients with renal cell carcinoma.(1) Cytological examination of exfoliated cells within the urine is currently the best noninvasive test for the detection of malignancy. Sensitivity for transitional cell carcinoma varies according to tumor grade and is most useful in the detection of carcinoma-in-situ and high-grade transitional cell carcinoma (45% to 75%). Sensitivity for low-grade transitional cell carcinomas is poor (20%).(6,7) Another uncommon causes of hematuria are expanding abdominal aortic aneurysms may erode into the urogenital tract, embolic renal infarction, and renal vein thrombosis, renal arteriovenous malformations are other serious diagnoses that can cause hematuria.(3)

We must not ignore the possibility of false hematuria. In false hematuria, the urine appears bloody. False hematuria includes bleeding from other sources, such as the vagina or external genitalia, and pigmentation. Pigmenturia is common with certain foods, such as beets, and drugs including phenazopyridine, methyl-dopa, and rifampin. Myoglobinuria and hemoglobinuria both cause positive urine dipstick tests in the absence of erythrocytes on microscopic examination. Fictitious hematuria can be exceedingly difficult to diagnose and is best ruled out by careful catheterization.(8) On the basis of patient past medical history and intra-operative laboratory results, we could convince that the hematuria was not fatal. Therefore, the operation was resumed,

Non-fatal hematuria may be occurred by urethral trauma. Most iatrogenic urethral injury occurs during urethral catheterization. Hematuria from catheter place-

Intra-operative Hematuria by Renal Stone may be caused by minor urethral or bladder mucosal abrasions and may be related to intrinsic factors such as the presence of urethral strictures. It may induce hematuria in approximately 15 percent of patients. Pulling urethral catheter during patient’s position change can induce hematuria, but the mount rarely exceeds 3 RBCs/high power fields (9) gross hematuria in a trauma victim necessitates further evaluation. (10) In our case, hematuria was found hours after patient’s position change and there was no risk factor that pull urethral catheter. Peri-operative manipulation of internal organs, adjacent to ureter or urethra, can also induce hematuria. In addition, we couldn’t completely rule out the possibility of existence unrevealed underlying abnormality (e.g. renal arteriovenous malformation), injury urological system and damage renal feeding vessel which can cause renal infarct. However, the major operative field was a vertebra which was far from ureter, urethra, or kidney. Therefore, we thought the possibility of direct iatrogenic organ injury would be low in the operating room. Furthermore, the spiral CT scan taken after the surgery confirmed that there was no damage in urologic organs.

We thought that hematuria by ureteral stone was most possible cause. But we couldn’t completely rule out the possibility of existence unrevealed underlying anatomical abnormality (e.g. renal arteriovenous malformation), direct injury of urologic system by operation and renal infarction by ischemia of renal feeding vessel. We concern about temporarily hematuria might bepremonitory sign of irreversible damage which could be induced by missing of appropriate treatment time and could relapse and aggravate anytime.

KUB and abdominal spiral CT scan were performed after the surgery for evaluation of renal stone and urologic system injury and unrevealed underlying abnormality. KUB did not reveal renal calyceal stone and abdominal spiral CT scan for evaluation vascular causes revealed renal stone. Vascular abnormality or evidence of urologic system injury was not found in abdominal spiral CT scan. The urologist suggested that the intra-operative hematuria might be occurred by immigrated renal stone irritation of urethral mucosa, although it might not be confirmed.

In conclusion, the physician should consider that the renal stone might be a rare cause of intra-operative hematuria when they encounter the hematuria of unknown origin.

ABSTRACT

Sudden Intra-operative Gross Hematuria due to Unknown Origin
- A Case Report -

허 혜, 이 한, 박성욱1, 윤승주

고려대학교 의학전문대학원 마취통증의학교실, 경희대학교 의학전문대학원 마취통증의학교실

혈뇨는 수술 중 종종 일어나며 다양한 원인이 있을 수 있다. 하지만, 수술 중 발생한 혈뇨는 종종 치명적인 결과를 유발할 수 있기 때문에, 반드시 원인을 밝혀 치료해야 한다. 저자는 수술 중 발생한 혈뇨의 증례를 통해서, 수술 중 혈뇨가 발생할 경우 처치 및 고찰 과정에 대해 살펴보고자 한다.

중심단어: 혈뇨, Intra-operative, Multiple calyceal stone

REFERENCES


