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PERIRENAL HEMATOMA AFTER URETEROSCOPY : A SYSTEMATIC REVIEW

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Abstract

The global incidence of urolithiasis is 14%, and the burden of urological consultants has increased by 20% over the past seven years, according to current trends. As a consequence, stone disease is becoming a burden on our health care system. However, advancements in apparatus and technology over the past two decades have made it possible for endourologists to perform increasingly complex treatments for the management of stones. Endourologists who treat ureteral or renal calculi are required to be aware of PRH risk factors. PRH occurred more frequently among patients with a low BMI. Patients with a low BMI had less body fat and perirenal fat than those with a higher BMI. After an injury, perirenal fat cushions the kidney to prevent cortical overstretching caused by an increase in renal pelvis irrigation pressure. PRH is produced in kidneys with minimal perirenal adipose. Two of the four patients with PRH had a low BMI. Underweight can be a sign of malnutrition, which can impair the structure of the kidneys. The timing of surgery is uncertain. PRH caused by FURSL may be treated as a kidney injury. If the patient has loin or flank pain after FURSL, the surgeon should examine the serum hemoglobin and perform abdominal sonography or a CT scan to detect PRH. Hematomas with mass effect were evacuated percutaneously when they were large. Percutaneous drainage may delay the progression of a hematoma in stable patients, although it may cause severe discomfort or renal compression. Angiograms should be used to treat renal bleeding if the serum hemoglobin continues to decline. If conservative or angiographic therapy fails to control bleeding, immediate open surgery must be performed. Cases of PRH are extremely uncommon, with percentages ranging from 0.1 to 8.9%. Despite this, this condition needs to be monitored closely because it has the potential to compromise the patient's health in a negative way.

Keyword: *Bleeding; Perirenal Hematoma; Ureteroscopy; Renal; Urolithiasis*

INTRODUCTION

The global incidence of urolithiasis is 14%, and current trends reveal a 20% increase in the workload of urological consultants over the past seven years. As a result, stone disease is becoming a demanding problem for our health care.[1] However, over the course of the past two decades, developments in equipment and technology have made it possible for endourologists to carry out increasingly complicated treatments for the management of stones.[2,3]

The guidelines developed by the European Association of Urology (EAU) currently propose ureteroscopy (URS) as one of the primary treatments for renal calculi that are smaller than 2 centimeters in size. Other treatment options, such as extracorporeal short wave lithotripsy (ESWL) and percutaneous nephrolithotomy (PCNL), are also available, depending on the size and location of the stone to be removed. URS is said to be the procedure with the best stone clearance, and its observed complication rate is said to be reasonably low.[4,5]

According to the findings of a recent study conducted by the Clinical Research of the Endourological Society (CROES), which included 11,885 patients from 114 centers located in 32 countries, the complication rate for URS was 7.4%.[6,7] Bleeding, fever, and urinary tract infections (also known as UTI) were the most prevalent consequences that followed URS. The formation of a perirenal haematoma (PRH) is a risk closely associated with intraoperative hemorrhage. PRH are typically observed after other procedures, such as PCNL or SWL.[8]

They may also be the result of trauma or interventional radiological procedures, or even occur spontaneously, particularly in anticoagulant-treated patients. Post-URS PRH are frequently mentioned in case series and reports, and although the number of cases remains low, they are a significant finding that must be appropriately addressed to prevent long-term morbidity.[9] Attempts have been made to identify patterns among the predisposing factors of patients, and recommendations have been made to reduce the risk of occurrence.[9,10] The discussion will center on the facts regarding perirenal hematoma following ureteroscopy.

METHODS

PRISMA 2020 complied with requirements for data acquisition, processing, and reporting. The decision to implement new restrictions was influenced by multiple factors. This review investigates the incidenct of perirenal hematoma after ureteroscopy. All written materials regarding the effect of nocturia on mortality must be composed in English, according to the primary findings of the study. This systematic review analyzed scholarly articles published after 2015 that met the inclusion criteria of the study. The collection will exclude editorials, entries lacking a DOI, reviews of previously published books, and duplicate journal articles that are excessively extensive.

The search for studies to be included in the systematic review was carried out from April, 12th 2023 using the PubMed and SagePub databases by inputting the words: “perirenal”, “hematoma” and “ureteroscopy”. Where *"perirenal"[All Fields] AND ("blood"[MeSH Subheading] OR "blood"[All Fields] OR "blood"[MeSH Terms] OR "bloods"[All Fields] OR "haematology"[All Fields] OR "hematology"[MeSH Terms] OR "hematology"[All Fields] OR "haematoma"[All Fields] OR "hematoma"[MeSH Terms] OR "hematoma"[All Fields] OR "haemorrhage"[All Fields] OR "hemorrhage"[MeSH Terms] OR "hemorrhage"[All Fields] OR "haemorrhages"[All Fields] OR "hemorrhages"[All Fields] OR "haemorrhagic"[All Fields] OR "haemorrhaging"[All Fields] OR "hematologies"[All Fields] OR "haematomas"[All Fields] OR "hematomas"[All Fields] OR "hematoma s"[All Fields] OR "hematomae"[All Fields] OR "hemorrhaged"[All Fields] OR "hemorrhagic"[All Fields] OR "hemorrhagical"[All Fields] OR "hemorrhaging"[All Fields]) AND ("ureteroscopy"[MeSH Terms] OR "ureteroscopy"[All Fields] OR "ureteroscopies"[All Fields])* is used as search keywords.

Equally influential on the acceptability of studies were their abstracts and titles. Consequently, they must rely on historical documents. Considering that research findings are typically consistent, unpublished English papers are required. For the systematic review, only studies meeting the inclusion criteria were considered. This restricts the search results to only those that meet the specified criteria. The evaluation procedure is divided into the following sections. The research took into account authors, publication dates, geographic locations, activities, and motivations.

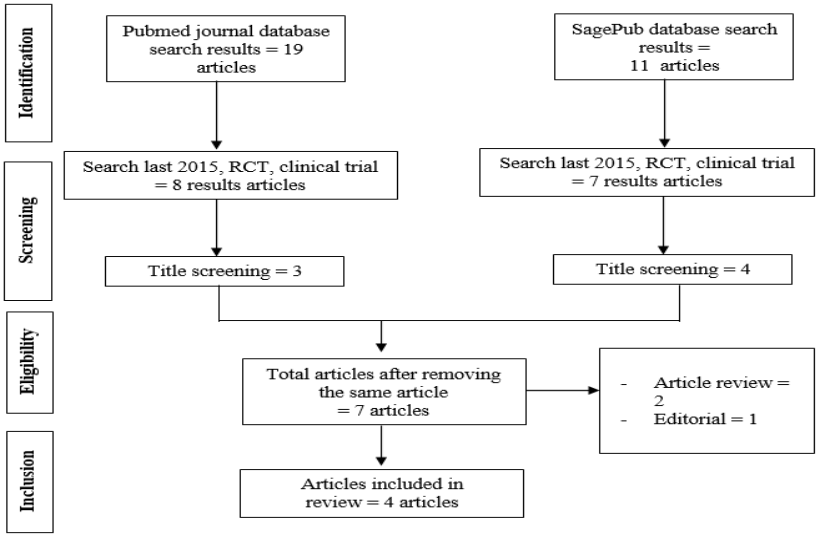

Figure 1. Article search flowchart

After EndNote had recorded a search's results, the database scoured for duplicate articles and removed them. This article involved two people reviewing the titles and abstracts of all the papers. Each author carefully considers relevant abstracts and article titles before deciding which articles to cover. Each paper that meets the review criteria will be subject to a comprehensive and thorough analysis. After completing our investigation, we will review relevant scientific publications that we may have missed the first time. Relevant research was included, while we excluded research that was not relevant.

RESULT

Study by Ilic, et al (2016) showed the length of time spent under anesthesia, the requirement for additional treatment, the average length of stay in the hospital, and the incidence of mild complications such as perirenal haematoma, urinoma, and limited ureteral perforation were all considerably reduced in the LL group ($p < 0.05$). We discovered that there was a statistically significant difference between the stone-free rates of the two groups; the LL group had a considerably higher stone-free rate than the PL group (LL: 94.4% vs. PL: 62.5%) ($p < 0.05$).[11]

Other study cnducted with 45 consecutive patients treated with FURSL developed PRH. Patients with PRH had a lower body mass index (20.2 ± 3.2 kg/m2 vs 26.9 ± 5.5 kg/m2, p = 0.015), a thinner kidney cortex thickness (0.88 ± 0.41 cm vs 1.39 ± 0.41 cm, p = 0.024), and a history of chronic kidney disease (75% vs 14.6%, odds ratio [OR] = 17.5, 95% confidence interval [CI] = 1.55–197.46, p = 0.021). In contrast, patient age, diabetes mellitus, hypertension, liver disease, coronary artery disease, urolithiasis history, presence of multiple stones, and stone size and location were comparable between the two groups. Three PRH patients were successfully managed with conservative therapy. One patient with PRH underwent emergency nephrectomy within one day, but despite vigorous resuscitation, died two weeks later.[12]

Table 1. The litelature include in this study

Author	Origin	Method	Sample	Conclusion
Ilic, 2016[11]	Italy	Retrospective observational study	36 patients	For the treatment of kidney stones in children, the minimally invasive, effective, and safe surgical approach known as laser endoscopic lithotripsy has a low risk of complications and requires only a small incision. The effectiveness is hampered to some degree by the fact that it can only treat stones in the lower pole calices of the kidney.
Talwar, 2020[13]	India	Case report	2 case	Endourologists are required to take certain precautionary measures, such as reducing operative time and perfusion pressures, treating urinary tract infections, and preoperatively optimizing patients with hypertension, diabetes, and chronic kidney disease (CKD), in order to further decrease the incidence of SRH. This is necessary in order to prevent the complication from occurring. In the majority of instances, conservative treatment, including percutaneous drainage and antibiotics, is the recommended course of action. Surgery is only performed on patients who are hemodynamically unstable.
Kao, 2015[12]	Taiwan	Retrospective observational study	45 consecutive patients treated with FURSL	Patients in this study who had a lower body mass index (BMI), chronic kidney disease (CKD), and a thinner renal cortex were at a greater risk of developing PRH following FURSL. When treating patients with a low body mass index (BMI), chronic kidney disease (CKD), and a thin renal cortex, endourologists should have a heightened vigilance for the possibility of PRH.
Tao, 2015[14]	China	Retrospective observational study	2,059 patients	When patients experience the symptoms of considerable loin pain following URSL for obstructed ureteral stones with thin renal cortices, it is important to evaluate the possibility that they have a subcapsular renal hematoma. The treatment for post-URSL renal subcapsular hematomas must be individualized for each patient in order to be effective.
Yu, 2022[15]	China	Retrospective observational study	1,535 patients	A rare but potentially fatal consequence of URSL is a condition known as SRH. Strong risk factors for developing SRH include the presence of severe hydronephrosis, a thin renal cortex prior to surgery, and an extended duration of operation. Patients who have severe ureteral tortuosity should give serious consideration to undergoing laparoscopic ureterolithotomy as an alternate surgical procedure. Treatment for SRH is determined by the clinical signs of the patient. The vast majority of patients are able to be successfully treated with conservative methods or percutaneous drainage alone.

Other study showed two patients and one patient had obstructive middle and proximal ureteral stones ranging from 0.8 to 1.6 cm on preoperative imaging, and three patients had thin renal cortices. All double-J ureteral stents were implanted regularly. All three subcapsular renal hematoma patients exhibited loin pain of the operation side, fever, and one needed a transfusion due to a hemoglobin decline from 111 to 61 g/L. Two patients presented 24 hours after URSL and one on

day 10. One patient recovered without intervention or drain after 3 weeks of bed rest, antibiotics, hemostasis, and analgesics. The other two had ultrasonography-guided hematoma drainage. All three hematomas resolved two months later on CT scans or ultrasonography. Post-URSL renal subcapsular hematoma is rare but dangerous. Patients with considerable loin discomfort after URSL for ureteral stones with thin renal cortices may have subcapsular renal hematoma. Post-URSL renal subcapsular hematomas require individualized treatment.[14]

CT URSL in other study confirmed in six patients the presence of subcapsular renal haematoma (SRH). The incidence of SRH following URSL was 0.39 percent. After rigid URSL and flexible URSL, the incidences of SRH were 0.38 and 0.41 percent, respectively. After URSL, the typical clinical manifestations of SRH are intolerable ipsilateral flank pain and a significant decrease in hemoglobin concentration. Age, gender, history of diabetes mellitus, preoperative hypertension, body mass index, stone laterality, and perfusion pressure did not differ significantly ($p > 0.05$). SRH was significantly associated with stone size, stone location, degree of hydronephrosis, and duration of surgery (p0.01). One patient was treated conservatively without additional intervention, four patients underwent percutaneous drainage, and one patient underwent emergency angiography. No patients perished due to SRH.[15]

DISCUSSION

Patients typically develop SRH following extracorporeal short-wave lithotripsy and PCNL. There are few cases of SRH after URSL reported in the literature. In 2010, Bansal et al. reported the first case of SRH confirmed by pneumatic URSL. A 35-year-old male patient with a right ureteric stone developed a 11 x 12 x 10 cm SRH following pneumatic URSL, which was treated with percutaneous drainage and percutaneous nephrostomy. Bai et al. reported 11 patients with SRH following rigid URSL, the highest number of patients with SRH following URSL reported in the literature.8 However, Bai et al.8 only documented patients who developed SRH following rigid URSL; patients who developed SRH following flexible URSL were not mentioned.[8,9,16]

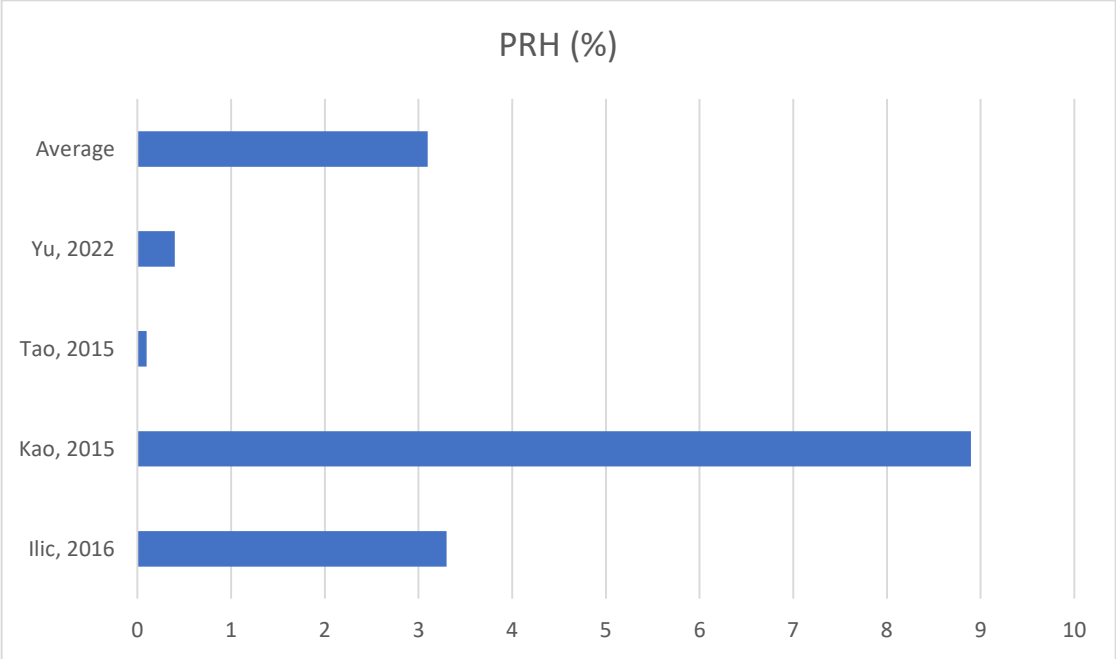

Figure 2. Percentage of occurrence of RPH based on studies

Endourologists treating ureteral or renal calculi must know PRH risk factors. Low-BMI patients had PRH more often. Low BMI patients had less body fat and perirenal fat than higher BMI patients. Perirenal fat cushions the kidney to prevent cortical overstretching from increased renal pelvis irrigation pressure after injury. PRH formed in kidneys with low perirenal fat. Two of the four PRH patients had low BMIs. Underweight may indicate malnutrition, which may weaken kidney structure.[14,17,18]

A study reported that obese patients with BMIs over 24 mg/m2 typically suffered PRH following URSL. Obesity may complicate guidewire installation and ureteroscope advancement, increasing system damage risk. Before FURSL, we implanted the ureteral access sheath and guidewire. To minimize unanticipated ureteral or renal damage, we abandoned the procedure if flexible ureteroscope advancement was problematic. Surgical considerations may affect complication rates. Thus, in vivo or in vitro investigations should elucidate the discrepancies.[14,17]

CKD may have caused PRH in our study. CKD patients have thin renal cortex.13 CKD patients have weaker kidneys. High irrigating pressure injured the weaker renal structure.[19] Yuruk et al.[20] found that FURSL was safe and effective in CKD patients and did not cause PRH in 62 patients. Their investigation used 7.5-F and 8.5-F flexible ureteroscopes, which may explain the disparity. 7.5-F flexible ureteroscope alone. We assumed fiberscopes with larger lumens needed

less irrigating pressure to preserve vision. Yuruk et al. did not record irrigation pressure. How to balance eyesight with intrarenal pressure is still being studied.

Due to the fact that CKD is linked to anemia, thrombocytopenia, and decreased platelet function, individuals who have the condition are at a greater risk of bleeding during medical treatment. Yuruk and colleagues conducted a study on patients with CKD who received URS and discovered that there was no significant change in the number of problems that these patients experienced, despite the fact that these patients had a higher number of co-morbidities. Although none of the studies have conclusively demonstrated it, chronic kidney disease (CKD) may be a contributor to post-URS PRH.[20,21]

Surgery timing is uncertain. PRH from FURSL may be treated as a traumatic kidney injury. After FURSL, the surgeon should check serum hemoglobin and abdominal sonography or CT for PRH if the patient has loin or flank pain. Large hematomas with mass effect were drained percutaneously. In stable individuals, percutaneous drainage may slow hematoma progression, although it may cause severe discomfort or renal compression.19 Angiograms should treat renal bleeding if serum hemoglobin drops continuously. If conservative or angiographic treatment fails to stop bleeding, open surgery should be done immediately.[8]

Although they are uncommon, renal hematomas are potentially fatal complications that can arise after ureterolithotripsy. It is possible that the occurrence of perirenal hematomas can be decreased by the implementation of safety measures during ureteroscopy. The combination of a comprehensive clinical exam and imaging to determine the location and size of the hematoma is essential to arriving at an accurate diagnosis as quickly as possible.[18,22]

CONCLUSION

PRH cases are actually rare, with percentages from 0.1 to 8.9%. Even so, this condition must be watched out for because it can have a negative impact on the patient's health.

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