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Original Research

RIRS in the elderly: Is it feasible and safe?

F. Berardinelli, MD, FEBU [a, *], P. De Francesco [a], M. Marchioni [a], N. Cera [b], S. Proietti [c], D. Hennessey [d], O. Dalpiaz [e], C. Cracco [f], C. Scoffone [f], G. Giusti [c], L. Cindolo [a], L. Schips [a]

[a] Department of Urology, "S. Pio da Pietrelcina" Hospital, Vasto, CH, Italy
[b] Faculty of Psychology and Educational Sciences, University of Porto, Porto, Portugal
[c] Urology Dept, Urological Research Institute, IRCCS Ospedale San Raffaele, Ville Turro Division, Milan, Italy
[d] Department of Urology, Austin Health, Melbourne, Australia
[e] Urologische Klinik, Medizinische Universität, Graz, Austria
[f] Urologia, Ospedale Cottolengo, Torino, Italy

HIGHLIGHTS

- RIRS has gain more acceptance as first line therapy in renal stones up to 2 cm.
- RIRS is an effective and safe technique regardless the age of patients.
- RIRS is a surgical technique with a low complication rate.

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ABSTRACT

Background: The aim of this study was to compare the safety and efficacy of RIRS in men ≥65 years to those <65 years.

Materials and methods: Patients who underwent RIRS were prospectively collected from March 2013 to March 2014 in 5 European centers. Perioperative outcomes and complications in elderly men were compared with men <65 years. Univariable and multivariable analyses were performed for factors predicting overall complications. The groups were compared using Mann–Whitney *U* test. Categorical variables were compared using chi-squared test and the Yates correction or the Fisher's exact test.

Results: A total of 399 patients with renal stones were included, 308 (77.19%) were aged <65 years, 91 (22.8%) were aged ≥65 years. Elderly patients were more likely to have higher ASA scores (35.7% vs 92.3%; $p < 001$), Charlson Comorbidity Index (1.8 vs. 5.2, $p < 0.001$), hyperlipidemia (10.06% vs. 30.76%; $p = 0{,}0005$) and coronary heart disease (5.51% vs. 17.58; $p = 0.005$) compared to younger cohort. Perioperative outcomes (stone free rate, operative time and re-intervention rate) did not show differences between the two groups ($p > 0.05$). Surgical and medical complication rates were similar between the cohorts (14.28% vs 9.89%; $p = 0.38$). Multivariate analysis did not identify any predictive factors of complications among the two groups ($p > 0.05$).

Conclusions: In this study, elderly RIRS patients had comparable short term efficacy and perioperative complications to younger patients, despite a higher prevalence of comorbidity. Age itself should not be considered as a risk factor for the development of complications in patients undergoing RIRS for renal stone.

1. Introduction

The worlds population is aging and senior adults are the fastest growing population, particularly so in Western countries. Demographic projections suggest that the world's older population (≥60 years) is set to rise from 841 million in 2013, to more than 2 billion by 2050 [1]. Although age itself is not an illness, it is the most

ABBREVIATIONS: RIRS, Retrograde Intrarenal Surgery; SFR, stone free rate; ESWL, Eclectro Schock Wave Litothripsy; PCNL, percutaneous nephrolithotomy; ASA, American Society of Anesthesiologists; CT, Computer Tomography; UAS, Ureteral Access Sheath; DJ, double J stent; BMI, body mass index; OT, operative time; SD, standard deviation; CCI, Charlson Comorbidity Index; GA, General Anesthesia.

* Corresponding author. Department of Urology, "S.Pio da Pietrelcina" Hospital, Via San Camillo de Lellis,1, 66054 Vasto, Italy.
E-mail address: berardinelli.francesco@gmail.com (F. Berardinelli).

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important contributing factor for perioperative complications, when the overall narrowed margins of organ function reserve are transgressed during the perioperative period [2]. For this reason a more accurate approach to elderly population is very important. Global literature reports an increasing prevalence of urinary stone disease [3,4]. Geriatric stone formers comprise 10–12% of all stone formers [5] and are not only an extension of younger stone forming patients presenting at an older age. Retrograde Intrarenal surgery (RIRS) has gained acceptance as a first-line alternative treatment option for renal stones up to 20 mm [6,7] and in other special circumstances [8,9]. RIRS has potentially higher stone-free rates (SFR) than extracorporeal shock wave lithotripsy (ESWL) and lower morbidity than percutaneous nephrolithotomy (PCNL) [10].

As well as age is an important factor for the ESWL and the PCNL, as the safety of the procedures could be challenged, if it represents a decisive factor for RIRS, must be still clarified.

Even if RIRS is a minimally invasive procedure, it is not free of complications (surgical and medical). Few studies have verified whether the outcomes of the RIRS in the elderly population are different from the general population. So elderly patients could be under treatment for hypothetical risks that have never been verified and quantized. The aim of this study was to evaluate the safety and efficacy of RIRS for renal stones in elderly patients.

2. Material and methods

Data was collected prospectively on patients undergoing RIRS for renal stones from 2013 to 2014 at 5 European centers. Patients was divided in 2 different groups on the basis of age (Group1:<65 y and group 2:>65 y). Patient data included: demographics, medical comorbid conditions, American Society of Anesthesiologists (ASA), anticoagulant therapy and hydronephrosis. Renal stones were evaluated with computed tomography (CT), stone parameters evaluated included: stone size, the presence of multiple stones and past surgery for other renal stone. A sterile urine culture was required before the surgery in all the patients. We excluded cases with a preoperative urinary tract infection due to the potential risk of post-operative sepsis [11]. Patients with severe neurological disorders, pregnancy and cachexya were excluded. Patients who had positive cultures (greater than 100,000 cfu/ml) were treated with appropriate antibiotics based on sensitivity profile at least 7 days and re-evaluated up to obtain sterile culture.

All patients underwent RIRS under general or spinal anesthesia, in a standard lithotomy position. At the time of induction, all patients received intravenous broad spectrum antibiotics according to local guidelines and sensitivities. Informed consent was obtained from all patients, and the possible need for a staged procedure in order to obtain satisfactory stone clearance was mentioned. The ureteral access sheath (UAS) and double J (DJ) stent were placed according to surgeon preference. Stone clearance and the integrity of the collecting system were confirmed intraoperatively. The patients were discharged unless complications required hospitalization. The "stone-free" status was defined as no evidence of stones more than 2 mm on one-month postoperative CT. Patients with significant residual fragments, were scheduled for second look RIRS at the time of discharge. Intraoperative and postoperative complications were assessed according to the modified Clavien classification [12]. Perioperative complications were divided into surgical and medical. Surgical complications were considered those directly related to the procedure or perioperative consequences (perforation of pelvis/calyx, ureteral injury, bleeding), whereas medical complications were those conditions that were exacerbated by perioperative stress or intubation and mechanical ventilation (cardiac, gastrointestinal, pulmonary, hematologic, infective or other).

2.1. Statistical analysis

The two groups were compared in terms of baseline patients characteristics (gender, BMI, ASA score, Hydronephrosis, Arterial hypertension, Alteration of lipid metabolism, Diabetes, Coronary heart disease, Chronic kidney disease, Anticoagulant therapy, previous surgery for renal stone) and stone characteristics (presence of multiple stones, stone diameters) as well as in terms of operative outcomes (use of UAS, operative time (OT), Re-intervention, SFR) and overall complications (intra-op and post-op) graded according to Dindo-Clavien classification. Univariable and multivariable analyses were performed for factors predicting overall complications. For continuous data, variables were presented as mean ± standard deviation (SD). For variables with non-normal distribution, the groups were compared using Mann–Whitney *U* test. Categorical variables were compared using chi-squared test, using, where possible, the Yates correction or the Fisher's exact test. To assess the effect of continuous variables on the dicotomous variable "overall complications" an univariable and multivariable logistic regression model was performed considering the independent variables: BMI, Stone length, Stone width and OT. Significance was set at $P < 0.05$ corrected. Analysis was performed using Statistica® 8.0 (StatSoft Inc.)

3. Results

3.1. Patient demographics

A total of 399 patients underwent RIRS with holmium laser lithotripsy for renal stones from January 2013 to October 2014. Three hundreds and eight patients (77.19%) were aged <65 years (Group 1) and 91 (22.8%) were aged ≥65 years (Group 2). The mean age of Group 1 was 48,61 ± 13.16 years while the mean age of Group 2 was 72,1 ± 5.06 years. Group 2 patients had an overall higher ASA score ($p < 001$), Charlson Comorbidity Index (CCI) ($p < 0.001$) and were more likely to have hyperlipidemia ($p = 0.0005$) and coronary heart disease ($p = 0.005$). However, the rate of arterial hypertension ($p = 0.10$), diabetes ($p = 0.27$), chronic kidney disease ($p = 1.0$) was similar between the groups. Group1 patients were more likely to have to the procedure under general anesthesia (GA) compared to Group 2 patients (80.1% vs. 67%; $p = 0.007$). Data shown in Table 1.

3.2. Stone characteristics and clearance

Stone characteristics were not significantly different between the groups, stone size ($p > 0.17$) and the presence of multiple stones ($p = 0.41$) were consistent. Perioperative outcomes did not show differences between the two groups. UAS were more likely to be used in older patients and there is a trend for slightly longer OT and lower stone free rates in Group 2 patients, but this was not statistically significant, ($p > 0.05$). Re-intervention rates were lower in Group 2 patients than Group 1 patients, however again this difference was not statistically different ($p > 0.05$). Data is shown in Table 1.

3.3. Perioperative outcomes and complications

The complication rate for Group 1 patients is 14.2%, while the rate for Group 2 patients is 9.8%. A total of 44 complications were noted in Group 1, 21 (47%) were surgical complications and 23 (53%) were medical complications. Of note in the Group 1, three patients (1%) were re-admitted following discharge for obstructive pyelonephritis (Clavien IIIa) and treated endoscopically (DJ stent placement) with no major sequences. The rest of the complication