

Risk Factors for Postoperative Systemic Inflammatory Response Syndrome Following Minimally Invasive Percutaneous Nephrolithotomy

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BACKGROUND

Minimally invasive percutaneous nephrolithotomy (MPCNL) is essentially a modified PCNL technique using a miniaturized scope through a smaller (18 Fr or less) nephrostomy tract, with the potential advantages of decreased trauma to renal parenchyma. However, postoperative systemic inflammatory response syndrome (SIRS) is still one of the most common complications. The incidence was reported between 9.8 and 37%. SIRS is recognized as the first step of the septic cascade. This study was to identify the risk factors to SIRS following MPCNL for upper urinary tract calculus.

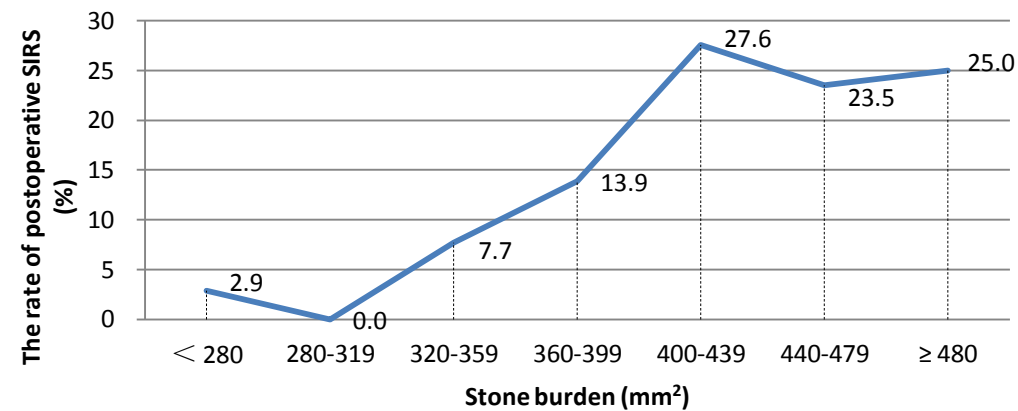
METHOD

We retrospectively analyzed the clinical data from 173 consecutive cases of upper urinary calculi treated by one-phase MPCNL. The peri-operative clinical data were compared between the patients with or without SIRS. By a logistic regression model, multivariate statistical analyses were performed to determine risk factors to postoperative SIRS.

RESULTS

- MPCNL procedures of 173 cases were successful, and the incidence of SIRS after MPCNL was 15.0% (26/173).
- Compared with non-SIRS group, SIRS group had **higher mean stone burden** ($409.3 \pm 49.3 \text{ mm}^2$ vs. $370.7 \pm 77.7 \text{ mm}^2$, $P=0.015$) **higher mean irrigation rate** ($206.4 \pm 33.7 \text{ ml/min}$ vs. $182.6 \pm 34.9 \text{ ml/min}$, $P=0.002$).

RESULTS



- The rate of postoperative SIRS in patients with **diabetes mellitus** was 30.0% (9/30), higher than that (11.9%, 17/143) in patients without diabetes mellitus ($P=0.025$).
- The patients with **positive preoperative urine culture** had a higher rate of SIRS (40.0%, 8/20) than that (11.8%, 18/153) with negative urine culture ($P=0.003$).
- Turbid urine** was aspirated on initial puncture in 7 cases, and 4 (57.1%) of them developed postoperative SIRS, with a higher rate than that (13.3%, 22/166) in patients without pelvic turbid urine.
- Multivariate logistic regression analysis of peri-operative clinical data and postoperative SIRS

Variables	OR	95% CI	P
Diabetes mellitus	2.998	1.023~8.779	0.045
Stone burden	3.038	1.111~8.303	0.030
Preoperative urine culture	2.521	0.643~9.891	0.185
Pelvic turbid urine	2.056	0.271~15.582	0.486
Irrigation rate	4.969	1.869~13.209	0.001

DISCUSSION

In the current study, the incidence of SIRS was 15.0%, which is similar to other recent studies.

- Diabetic PCNL patients had a significantly greater risk of developing urinary tract infections and a fever during the postoperative period. The overall immune suppression might be a potential explanation why diabetes predisposes to postoperative infection and major complications.
- Larger calculi were more likely to harbor bacteria and contain higher endotoxin load. The operative duration of MPCNL for high burden calculi was always prolonged. Patients with complicated calculi were more likely to have a higher residual stone rate, and then it might lead to the suffering of postoperative complications, especially of infectious ones.
- Pressured perfusion is a method commonly used to maintain a clear view and push out stone fragments in MPCNL. This procedure, however, can lead to pyelovenous backflow, which increases the risk of bacterial endotoxin absorption.

CONCLUSIONS

Diabetes mellitus history, higher stone burden, increased irrigation rate are risk factors with significant relevance to SIRS following one-phase MPCNL for upper urinary tract calculus.



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