Endourological Society 2022 Summer Student Scholarship

The effect of preoperative calcitriol on inflammatory markers following percutaneous nephrolithotomy (PCNL): a randomized controlled trial

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Background

Percutaneous nephrolithotomy (PCNL) is one of the main surgical procedures for renal stones [1]. Generally, systemic inflammation and inflammatory complications following surgeries are not uncommon [2]; PCNL is no exception. Besides, some studies have evaluated the incidence of systemic inflammatory response syndrome (SIRS) following PCNL and its possible risk factors [3, 4].

On the other hand, there have been some efforts to identify the possible preoperative or intraoperative anti-inflammatory medications to lower the risk of post-PCNL systemic inflammation and possible infection. In a study by Qi et al., the authors investigated the effect of a single dose of intraoperative dexamethasone and furosemide in PCNL. Comparing the pre- and postoperative inflammatory markers, including interleukin-6 (IL-6) and procalcitonin, and assessing the clinical outcomes, they observed that the study group had lower inflammatory markers and lower incidence of urosepsis compared to the control [5]. Also, another study by Izadpanah et al. aimed to determine the efficacy of pentoxifylline on postoperative inflammation of open nephrolithotomy and PCNL. Lower serum levels of tumor necrosis factor-α (TNF-α) and IL-6 showed the beneficial anti-inflammatory effect of preoperative intravenous pentoxifylline injection [6].

Method and materials

Herein, we intend to determine the efficacy of preoperative calcitriol, as a possible anti-inflammatory agent, on inflammatory markers following PCNL. In this regard, in a randomized controlled trial (RCT), two groups of patients who are scheduled to undergo PCNL will be included. Patients older than 18 and operated on by a single surgeon (Abdolreza Haghpanah) will be included. However, patients with recent vitamin D supplement consumption, high vitamin D or serum calcium levels, hypersensitivity to calcitriol, and metabolic bone diseases will be excluded.

Demographic and preoperative information and laboratory data will be recorded. Also, inflammatory markers will be measured preoperatively as the baseline. The patients will be randomly divided into two equal groups. Patients in the study group will receive 2 mcg of intravenous calcitriol two hours before the operation, while the control group will receive a placebo. After the operation, inflammatory markers will be measured 24 hours after the surgery, in addition to the clinical outcomes and other routine postoperative laboratory data. The groups will be compared to determine the anti-inflammatory efficacy of preoperative calcitriol.

Updates on the project

Literature review

- ✓ The following articles were read for ideation and designing the study:
  - ❖ "Effect of intravenous pentoxifylline in the inflammatory response in patients undergoing nephrolithotomy" by Izadpanah et al. [6]
  - ❖ "Effects of propofol on the inflammatory response during robot-assisted laparoscopic radical prostatectomy: a prospective randomized controlled study" by Roh et al. [7]
  - ❖ "Intraoperative dexmedetomidine attenuates postoperative systemic inflammatory response syndrome in patients who underwent percutaneous nephrolithotomy: a retrospective cohort study" by Tan et al. [8]
  - ❖ "The potential effect of intravenous calcitriol on the ischemia-reperfusion process and inflammatory biomarkers in patients following percutaneous coronary intervention (PCI)" by Dastan et al. [9]
  - ❖ "The retrospective study of the perioperative application of dexamethasone and furosemide for postoperative anti-inflammation in patients undergoing percutaneous nephrolithotomy" by Qi et al. [5]

Consultation with pharmacologist

- ✓ The dosage of calcitriol was determined to be 3 mcg. However, we changed it to 2 mcg based on our consultation with the pharmacologist of the project. Also, further inclusion and exclusion criteria were added.

Consultation with pathologist

- ✓ Consultation with the pathologist of the project was done, and inflammatory markers were determined. The initial decision was to measure IL-6, TNF-α, c-reactive protein (CRP), and procalcitonin, but these factors may change based on the financial conditions

Consultation with statistics specialist

- ✓ Due to finding no articles in the literature investigating the effect of calcitriol on inflammatory markers in the PCNL operation, the work should begin with no actual sample size calculation before starting the project. Further statistical analysis will be needed after gathering data of some patients.

Project presentation

- ✓ We wrote a research proposal and presented it to our university regarding the ethical approval of our investigation.

Data gathering

- ✓ After randomization and providing consent from the patients, data gathering was started. We are currently at this stage.

References

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