

**Superperc and PCNL for Renal Calculus of >1 cm: Comparison of Safety****Jay Dharmashi****Assistant Professor, Department of Urology, Jawaharlal Nehru Medical College, Sawangi, (M), Wardha****ABSTRACT:**

The management of renal calculi larger than 1 cm remains a significant challenge in urology, with Percutaneous Nephrolithotomy (PCNL) being the standard procedure for these types of stones. However, a newer technique, Superperc, has been developed as a minimally invasive alternative to PCNL. This study aims to compare the safety of Superperc and PCNL for the treatment of renal stones larger than 1 cm. We evaluate intraoperative and postoperative complications, stone-free rates, and hospital stay durations between the two methods. Results demonstrate that both techniques have comparable safety profiles, but Superperc offers advantages in terms of reduced blood loss, shorter hospital stays, and fewer complications. Further studies with larger sample sizes are required to confirm these findings and optimize treatment recommendations.

Keywords: Superperc, PCNL, renal calculus, stone size >1 cm, safety comparison, urology, minimally invasive surgery, complications, stone-free rate, hospital stay.

INTRODUCTION

Renal calculi larger than 1 cm, or "large stones," are associated with significant morbidity, and their management presents a challenge to urologists.(1) Percutaneous Nephrolithotomy (PCNL) has been the gold standard for treating these stones due to its effectiveness in removing large stones via a percutaneous route.(2) However, PCNL is not without complications, including bleeding, infection, and prolonged recovery periods.

Superperc, a novel technique introduced in recent years, is a minimally invasive alternative to traditional PCNL. It involves the use of a smaller access sheath and allows for the treatment of larger stones with reduced trauma. Superperc has gained popularity due to its reduced complication rates, lower blood loss, and faster recovery times when compared to PCNL. (3, 4) However, the safety and efficacy of Superperc in comparison to PCNL for stones greater than 1 cm remain controversial, and further comparative studies are required to

establish the best approach for treating large renal calculi.

This study compares the safety profiles of Superperc and PCNL in the treatment of renal stones greater than 1 cm, focusing on complication rates, stone-free rates, and hospital stay duration.

Aim

To compare the safety profiles of Superperc and Percutaneous Nephrolithotomy (PCNL) in the management of renal calculi larger than 1 cm, assessing complications, stone-free rates, and hospital stay durations.

Objectives

1. To evaluate the intraoperative and postoperative complication rates for Superperc and PCNL.
2. To compare the stone-free rates and hospital stay durations following Superperc and PCNL procedures.

Material and Methods

Study Design

This was a prospective, randomized, comparative study conducted between January 2020 and December 2023. A total of 100 patients with renal calculi greater than 1 cm were included in the study, divided into two groups based on the surgical method used: Superperc (n = 50) and PCNL (n = 50).

Inclusion Criteria

- Adults aged 18–70 years.
- Patients with single or multiple renal stones greater than 1 cm.
- Stones located in any part of the kidney, accessible for either procedure.
- Written informed consent obtained from all participants.

Exclusion Criteria

- Pregnancy or lactation.
- Coagulopathy or bleeding disorders.
- Previous renal surgery.
- Hydronephrosis or other significant renal pathology that would affect surgical outcomes.
- Patients with a history of recurrent urinary tract infections or significant renal failure (eGFR < 30 mL/min).

Preoperative Assessment

All patients underwent a preoperative assessment, including a thorough clinical examination, routine laboratory investigations (complete blood count, liver and renal function tests), and imaging studies, including non-contrast CT scans of the abdomen and pelvis to evaluate stone size, location, and number.

Surgical Techniques

- **Superperc Technique:** A smaller access sheath (12 Fr) is used, and a single puncture is made in the renal parenchyma. The stone is fragmented and removed using a combination of ultrasound and laser lithotripsy.
- **PCNL Technique:** Standard PCNL was performed using a 24 Fr access sheath, with stone fragmentation done using a pneumatic or laser lithotripter.

Outcome Measures

The primary outcome was the rate of intraoperative and postoperative complications, including bleeding, infection, and injury to surrounding organs. The secondary outcomes were the stone-free rate (defined as the absence of stones on postoperative imaging) and hospital stay duration.

Results

Table 1: Comparison of Intraoperative and Postoperative Complications

Complication Type	Superperc Group (n = 50)	PCNL Group (n = 50)
Blood loss (mL)	70 ± 20	250 ± 50
Postoperative fever	4%	10%
Infection (UTI)	6%	12%
Hematoma	2%	8%
Organ injury	0%	2%

Table 2: Comparison of Stone-Free Rates and Hospital Stay

Outcome Measure	Superperc Group (n = 50)	PCNL Group (n = 50)
Stone-free rate (%)	88%	92%
Average hospital stay (days)	2 ± 1	5 ± 2

Discussion

The results from the study reveal that both Superperc and PCNL are effective for the management of renal calculi greater than 1 cm, with comparable stone-free rates. However, certain differences between the two techniques were noted.

In Table 1, Superperc was associated with significantly lower blood loss compared to PCNL. This finding aligns with previous studies that have shown Superperc to be a less traumatic procedure due to the use of a smaller access sheath and minimal renal parenchymal dissection (5, 6). Furthermore, postoperative complications such as infection and fever were less common in the Superperc group, suggesting that the minimally invasive nature of Superperc contributes to a lower incidence of these complications. This is consistent with findings by Hasegawa et al. (7), who reported fewer infections and faster recovery with Superperc when compared to traditional PCNL.

Table 2 highlights the differences in hospital stay duration between the two groups. Patients who underwent Superperc had an average hospital stay of 2 days, significantly shorter than the 5-day stay for PCNL patients. This shorter hospital stays correlates with faster recovery times, as noted in studies by Ozturk et al. (8), which indicate that Superperc patients often experience less pain and quicker mobilization postoperatively.

While the stone-free rates between the two groups were similar, with a slight advantage to PCNL, this difference is not statistically significant. Previous research has shown that both techniques have high success rates, though Superperc may be more effective in smaller stones or cases where less extensive surgery is needed (9, 10).

Conclusion

Both Superperc and PCNL are safe and effective techniques for the management of renal calculi greater than 1 cm. However, Superperc offers several advantages, including reduced blood

loss, fewer postoperative complications, and shorter hospital stays. Although the stone-free rates are comparable between the two methods, Superperc's minimally invasive nature makes it a promising alternative to PCNL, particularly for patients who are at higher risk of complications or those who require faster recovery.

Further large-scale, multi-center studies are necessary to confirm these findings and refine patient selection criteria for both procedures.

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