



COMPARISON OF TUBELESS AND TOTAL TUBELESS PERCUTANEOUS NEPHROLITHOTOMY IN A TERTIARY CARE HOSPITAL IN EASTERN NEPAL

Urology

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ABSTRACT

Purpose: To compare efficacy, safety and outcome of total tubeless PCNL with tubeless PCNL.

Materials & Methods: The study included 52 patients undergoing PCNL randomized into tubeless PCNL(T) group and total tubeless PCNL(TT) group each containing 26 patients. Patients with congenital renal anomalies, solitary functioning kidney, previous renal surgery, clinically significant residual fragments, perforation of pelvi-calyceal system and requiring conversion were excluded. Data analyzed using SPSS 20, chi-square test and Student's t test were used where appropriate. A p-value of <0.05 was considered significant.

Results: Mean age, mean stone size, preoperative hemoglobin and creatinine level in group T and TT were comparable. Similar was postoperative hemoglobin and creatinine level. The mean operating time, VAS and analgesic required in group TT was significantly shorter than group T. Complications rate and hospital stay was comparable between the groups.

Conclusion: Tubeless and total tubeless PCNL are safe options in selected cases. However, total tubeless PCNL is associated with significantly less postoperative pain, analgesic requirement and avoids revisit for stent removal minimizing stent related complications and treatment cost.

KEYWORDS

Renal stone, Total tubeless PCNL, Tubeless PCNL

Introduction

Kidney stones are a common disease affecting about 10% of people and nearly 70% of people affected experience recurrence¹. Various non-invasive, minimally invasive, and invasive methods are available for treatment of kidney stones, including medical treatment, extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL), and open and laparoscopic renal surgery. In the past 40 years, PCNL as a minimally invasive method has been an effective treatment for large stones in the kidney and upper ureter. Standard PCNL includes four steps: access to the kidney, dilatation of the tract, nephroscopy and fragmentation of stones, and inserting a nephrostomy tube. But insertion of nephrostomy tube can cause complications like more pain and increase duration of hospital stay²⁻³. So modification in PCNL was made like omitting nephrostomy tube (Tubeless PCNL) but a ureteral stent can cause stent related symptoms and requires hospital visit to get ureteral stent removed. Recently, a more modern PCNL technique was introduced- totally tubeless PCNL. In this method, nephrostomy tube, double J stent, or ureteral catheter are not inserted after surgery⁴⁻⁷. The aim of this study is to compare outcome of tubeless and total tubeless PCNL in a tertiary care hospital.

Materials & Methods

The study was conducted in the Urology unit, Department of Surgery, Birat Medical College-Teaching Hospital, Biratnagar, Nepal over a period of one year (January 2017 to December 2017). Fifty two patients were included in the study. Patients with congenital renal anomalies, solitary functioning kidney, previous renal surgery, clinically significant residual fragments, perforation of pelvi-calyceal system and requiring conversion were excluded.

After informed consent and preoperative preparation, patients were randomized into two groups- tubeless PCNL group (T) and total tubeless PCNL group (TT) each having 26 patients by computer generated random numbers. One patient from the tubeless PCNL group was excluded because of intraoperative bleeding requiring nephrostomy tube placement and one patient from total tubeless group was excluded due to urine leak from puncture site requiring ureteral stent placement (Fig. 1). All patients underwent PCNL using standard protocol. Baseline characteristics, intraoperative events and operating time were recorded. Patients in T group received 6F, 26cm both end open double J stent only while both nephrostomy tube and double J stent were omitted in the patients in TT group. Stone clearance was assessed by postoperative KUB (Kidney-ureter-bladder) x-ray. Foley's catheter was removed on first postoperative day in both groups. Postoperative pain was assessed by visual analogue scale (VAS), analgesic requirement (Keterolac 30mg/dose), postoperative complications and hospital stay was recorded. Double J stent was removed after 2 weeks in T group.

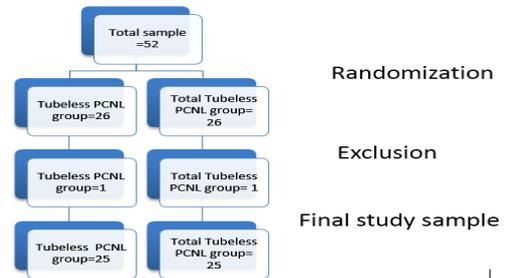


Figure 1: Consort Diagram

Statistical Analysis

Data were analysed using SPSS 20, chi-square test and Student's t test were used where appropriate. A p-value of <0.05 was considered significant.

Results

The ratio of male and female in group T and TT was 13:12 and 12:13 respectively. The mean age was 36.96 ± 11.46 years in group T and 37.20 ± 11.65 years in group TT ($p=0.94$). The mean stone size, preoperative hemoglobin level and creatinine level in group T and TT were 2.34 ± 0.82 cm, 2.12 ± 0.62 cm ($p=0.29$), 12.20 ± 1.03 gm/dl, 11.92 ± 1.41 gm/dl ($p=0.42$) and 1.02 ± 0.20 mg/dl, 1.10 ± 0.20 mg/dl ($p=0.15$) respectively (Table 1).

Table 1: Baseline characteristics

Characteristics	Tubeless PCNL group(T)	Total Tubeless PCNL group(TT)	P value
Age (Mean± SD)	36.96 ± 11.46	37.20 ± 11.65	0.94
M:F	13:12	12:13	-
Stone size(Mean± SD)	2.34 ± 0.82	2.12 ± 0.62	0.29
Hemoglobin (Mean± SD)	12.20 ± 1.03	11.92 ± 1.41	0.42
Creatinine (Mean± SD)	1.02 ± 0.20	1.10 ± 0.20	0.15

Postoperatively, VAS in group T was 2.72 ± 1.02 and 2.00 ± 1.22 in group TT ($p=0.03$). Similarly hemoglobin level and creatinine level in groups T and TT were 11.52 ± 1.03 gm/dl, 11.24 ± 1.30 gm/dl ($p=0.40$) and 1.03 ± 0.21 mg/dl, 1.08 ± 0.17 mg/dl ($p=0.38$) respectively. The mean operating time in group T was 90.60 ± 15.50 min and 78.60 ± 12.29 min in group TT ($p=0.004$). Complications occurred in three (12%) cases in T group with two cases developing stent related symptoms managed by alpha-blocker (Tamsulosin) and one case developed superficial surgical site infection managed by local wound care. Likewise, two cases (8%) in TT group developed urinary fistula

managed by debridement and re-suturing of the tract ($p=0.64$). Two cases in T group and one in TT group required postoperative blood transfusion respectively ($p=0.56$).

Postoperative analgesic requirement in T and TT groups were 73.20 ± 17.49 and 52.80 ± 21.70 milligrams of ketorolac respectively ($p=0.001$). The hospital stay was 2.56 ± 0.50 days in T group and 2.32 ± 0.47 days in TT group ($p=0.09$) [Table 2].

Table 2: Postoperative parameters

Characteristics	Tubeless PCNL group(T)	Total Tubeless PCNL group(TT)	P value
VAS (Mean \pm SD)	2.72 \pm 1.02	2.00 \pm 1.22	0.03
Hemoglobin (Mean \pm SD)	11.52 \pm 1.03	11.24 \pm 1.30	0.40
Creatinine (Mean \pm SD)	1.03 \pm 0.21	1.08 \pm 0.17	0.38
Operating time (Mean \pm SD)	90.60 \pm 15.50	78.60 \pm 12.29	0.004
Analgesic required (Mean \pm SD)	73.20 \pm 17.49	52.80 \pm 21.70	0.001
Hospital stay (Mean \pm SD)	2.56 \pm 0.50	2.32 \pm 0.47	0.09

Discussion

This study aimed at comparing outcome of patients undergoing tubeless PCNL and total tubeless PCNL performed by a single urologist in a tertiary care hospital in the eastern part of Nepal.

The mean age in T group was 36.96 years and 37.20 years in TT group which are comparable similar to the studies of Jagadeeshwar et al⁸ (31.9 and 39.2 years) and Abott et al⁹ (48.88 and 49.83) years respectively. The mean stone size was also comparable in both groups (2.34 vs 2.12 cm) and with the studies of Jagadeeshwar et al⁸ (2.7 cm vs 2.5 cm) but slightly larger than the study of Abott et al⁹ (1.95 cm vs 1.53 cm).

Present study indicates that the operating time (90.60 min vs 78.60min) was significantly shorter in TT group compared to T group ($p=0.004$) similar to the study of Jagadeeshwar et al⁸ ($p=0.03$) but longer compared to them (35min vs 31min). Other studies which has compared standard with tubeless and standard with total tubeless PCNL has resulted heterogeneity in operating time between the two groups without statistical significance difference¹⁰.

The VAS for pain on first postoperative day was lower in total tubeless PCNL group (2.00 vs 2.74) to the level of statistical significance ($p=0.03$) in present study. Mandhani and colleagues also reported VAS of 2.96 ± 1.24 and 2.82 ± 0.81 respectively in tubeless and total tubeless PCNL group¹¹. Analgesic requirement (Ketorolac 52.80mg vs 73.20mg) in total tubeless group was significantly less compared to tubeless PCNL group ($p=0.001$) which is contrary to the study of Mandhani and colleges (163.24mg vs 170mg of Diclofenac) where it was comparable between the groups. But when tubeless or total tubeless PCNL was compared with standard PCNL, both VAS and analgesic requirements were significantly less in the groups though different analgesics were used ranging from opioids to non-steroidal anti-inflammatory drugs.^{8,12,13}

Preoperative hemoglobin and serum creatinine were comparable in both groups ($p=0.42$ and 0.15). Postoperatively also there was no significant change in hemoglobin and creatinine level in both groups ($p=0.40$ and 0.38) indicating absence of drainage tube or double J stent is not associated with increased tendency of bleeding or impaired urinary drainage in selected cases.^{8,9,13}

Complications occurred in three cases in T group (12%) with two cases developing stent related symptoms managed by alpha-blocker (Tamsulosin) and one case developed superficial surgical site infection managed by local wound care. Likewise, two cases in TT group (8%) developed urinary fistula managed by debridement and re-suturing of the tract. Similarly, two cases and one case in each group respectively required transfusion as their hemoglobin was in lower range preoperatively. Though the rate of complications in this study seems slightly higher than other studies with total tubeless PCNL (4.5% to 10%), complication rate in both groups were comparable.^{7,14}

The duration of hospital stay in both groups did not differ to the level of statistical significance ($p=0.09$). The results are consistent with other similar studies.^{9,11}

Limitation of the study

The study is limited by observer bias as it was not blinded.

Conclusion

Tubeless and total tubeless PCNL are safe options in selected cases. However, total tubeless PCNL is associated with significantly less postoperative pain, analgesic requirement and avoids revisit for stent removal minimizing stent related complications and treatment cost.

Recommendation

We recommend higher quality trials with longer follow-up.

Conflict of interest

None.

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References

- Moe OW. Kidney stones: pathophysiology and medical management. *Lancet* 2006; 367: 333–344, doi: 10.1016/S0140-6736(06)68071-9.
- Limb J, Bellman GC. Tubeless percutaneous renal surgery: review of first 112 patients. *Urology* 2002; 59: 527–531, doi: 10.1016/S0090-4295(01)01627-2.
- Bellman GC, Davidoff R, Candela J, Gerspach J, Kurtz S, Stout L. Tubeless percutaneous renal surgery. *J Urol* 1997; 157: 1578–1582, doi: 10.1016/S0022-5347(01)64799-2.
- Istanbulluoglu MO, Ozturk B, Gonen M, Cicek T, Ozkardes H. Effectiveness of totally tubeless percutaneous nephrolithotomy in selected patients: a prospective randomized study. *Int J Urol Nephrol* 2009; 41: 541–545, doi: 10.1007/s11255-008-9517-6.
- Moosanejad N, Isapour A, Fazli M, Bahari M, Barzegarnejad A, Esfarayen I. Effectiveness of totally tubeless percutaneous nephrolithotomy; a retrospective study. *Int J Med Invest* 2014; 3: 123–126.
- Gupta V, Sadasukhi TC, Sharma KK, Yadav RG, Mathur R. Tubeless and stentless percutaneous nephrolithotomy. *BJU Int* 2005; 95: 905–906, doi: 10.1111/j.1464-410X.2005.05432.x.
- Crook TJ, Lockyer CR, Keoghane SR, Walmsley BH. Totally tubeless percutaneous nephrolithotomy. *J Endourol* 2008; 22: 267–271, doi: 10.1089/end.2006.0034.
- T. Jagadeeshwar, Ravi Jahagirdhar, A. Bhagawan, N. Rama Murthy, G. Ravichandar, G. Mallikarjun et al. P. Naveen "Comparative Study of 'Percutaneous Nephrolithotomy Placement' Versus Percutaneous Nephrolithotomy without Nephrostomy Placement (Tubeless PCNL)". *Journal of Evolution of Medical and Dental Sciences* 2014; Vol. 3, Issue 61, Page: 13551-13556
- Abbott JE, Deem SG, Mosley N, Tan G, Kumar N, Davalos JG. Are we fearful of tubeless percutaneous nephrolithotomy? Assessing the need for tube drainage following percutaneous nephrolithotomy. *Urol Ann* 2016; 8: 70–5.
- Joo Yong Lee, Seong Uk, Jeh Man Deuk, KimDong Hyuk, KangJong Kyou, KwonWon Sik Ham et al. Intraoperative and postoperative feasibility and safety of total tubeless, tubeless, small-bore tube, and standard percutaneous nephrolithotomy: a systematic review and network meta-analysis of 16 randomized controlled trials. *BMC Urol* (2017) 17: 48. <https://doi.org/10.1186/s12894-017-0239-x>
- Mandhani A, Goyal R, Vijjan V, Dubey D, Kapoor R. Tubeless percutaneous nephrolithotomy-should a stent be an integral part? *J Urol*. 2007; 178: 921–4.
- Gupta NP, Mishra S, Suryawanshi M, Seth A, Kumar R. Comparison of standard PCNL with tubeless PCNL. *J Endourol*. 2008; 22(7): 1441–6
- Chang CH, Wang CJ, Huang SW. Totally tubeless percutaneous nephrolithotomy: A prospective randomized controlled study. *Urol Res* 2011; 39: 459–65.
- Gupta V, Sadasukhi TK, Sharma KK, Yadav RG, Mathur R. Tubeless and stentless percutaneous nephrolithotomy. *BJU Int*. 2005; 95: 905–6