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Original Research Article

Modified Minimal Invasive Stone Treatment: Tubeless Mini PCNL in Supine Position

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Abstract

The objective of the study was to show the feasibility and efficiency of a mini PCNL in a modified supine (Valdivia) position, as well as sealing the nephrostomy channel using a haemostyptic (gelatine matrix with thrombin) in a random comparative study.

Between 6/2014 and 10/2015, 57 prospective randomised patients were analysed. All patients presenting with stones up to 4 cm were included in the analysis. The procedures were performed in the Valdivia position, using a mini nephroscope with 18 Charr Amplatz shaft. At the end of surgery the nephrostomy channel was sealed and secured using a haemostyptic (tubeless group, n=30). In the control group (n=27), the mini PCNL was performed using the abdominal approach and nephrostomy closing procedure. The surgery time, duration of the ureter stents, post-operative analgesic requirements, haemoglobin clearance, stone free rates and complications were recorded according tq the Clavien-Dindo classification tables.

The surgery time (78 vs 90 min), duration of ureter stent retention (3,2 vs 4,0 d), duration of hospital stay (4,8 vs 6,2 d), haemoglobin clearance (0,61 vs 0,63 mmol/l), macro-haematuria (1,6 vs 2,3 d), analgesic requirements (2,1 vs 2,6 times post-operative Novalgin), stone free (90 vs 81,5%) and complications (3 vs 7) were reduced in the tubeless group.

The initial data relating to the tubeless mini PCNL in a Valdivia position shows that this modification may be implemented without an increase in complications. The total treatment process is, from all patient perspectives, easier and faster. However, the results shown must be verified in a larger cohort to confirm reliability.

Key Words: PCNL, Kidney stones, Supine position Tubeless.

الخلاصة

الغاية من الدراسة بيان فعالية وقدرة ناظور الكلية بالحجم الصغير للمرضى في حالة الرقود على الظهر (وضعية فالدفيا) وغلق مجرى تفوية الكلية باستخدام مادة جلاتينية مع مادة الثرومبين .

شملت الدراسة 57 مريض وامتدت من شهر حزيران 2014 الى تشرين الاول 2015 تمت معالجتهم عن طريق ناظور الكلية الصغير (حجم 18) لتفتيت حصاة الكلية بحجم يصل 4 سم والمريض والمريض في حالة رقود على الظهر (وضعية فالدفيا).

في نهاية العملية يغلق مسار تفوية الكلية بمادة جيلاتينية في 30 مريض (المجموعة الاولى) و27 مريض (المجموعة الثانية) وضع لهم انبوب مطاطي لغرض تفوية الكلية كانت النتائج كالتالي للمجموعة الاولى والثانية تباعا مدة العملية 78 و90 دقيقة ومدة بقاء قسطرة الحالب 3،2 و4 يوم وفترة اقامة المريض في المستشفى 2،8و6،2 يوم ومدة التبول الدموي 1،6 و3،2 يوم واستخدام المسكنات بعد العملية 2،1 و2،6 عدد مرات الاستعمال ونسبة تحرير الحصو من الكلية نهائيا 90% و 81،5 %والمضاعفات ما بعد العملية حدثت في 7،3 مرضى تباعا

نستنتج من الدراسة ان استعمال ناظور الكلية الصغير والمريض راقد على الظهر (وضعية فالدفيا) وبدون تفوية الكلية بالإمكان تطبيقها دون الزيادة في المضاعفات وانها اسهل واسرع لكننا نحتاج الى عدد اكبر من المرضى لدعم الدراسة اكثر .

Introduction

Based on the world-wide increase in the prevalence of renal stone conditions, a patient-centred rapid stone freeing procedure must enjoy priority. Despite extensive use of the relative complications-free ESWL in the nineties, a swift expectation of stone freedom using the technique could be expected in special circumstances only. It resulted, regularly, ip repeated applications of the procedure, often resulting in fragments remaining in the minor calyx.

As a result of the associated additive nature of surgical intervention over the past years, intensive work had been done to reduce the size of instruments used for the treatment of renal stones.

Flexible endoscopic instruments enable improved removal of stones in anatomically difficult positions. For patients this meant far swifter stone removal and freedom from stones. Despite technological advances, it is not always possible to remove larger stones using endoscopic procedures through the ureter, because the access route is limited by poor lumen.

The situation gave rise to a renaissance in the percutaneous treatment of stones, using miniaturised instruments of 15-18 Charr (mini PCNL). The latest developments led to ultra-mini (12-14 Charr) and micro PCNL (8-10 Charr) instruments, but these are meaningful for use on small, inaccessible stones and in small children only.

The benefits of smaller instruments clearly include less bleeding and renal damage [1,2]. In addition, the latest design of these instruments enable efficient treatment of stones larger than 20 mm in diameter [3-5].

Further, the best treatment of stones < 20 mm, situated in the minor calyx remains unclear as no large randomised study of ESWL, PCNL and flexible URS is available to review this patient group[6]. Modifications such as the supine position and avoiding a nephrostomy, further reduce the complications of PCNL and increase patient comfort [7- 10].

The objective of this investigation was to show the viability and efficiency of a mini PCNL in a modified supine position (Barts "flank-free" Position, Figures 1 and 2), as well as the sealing of the nephrostomy channel using a haemostyptic (gelatine matrix with thrombin) in a randomised comparative study.

Materials and Methods

The study involved 57 prospective randomized patients analyzed between 6/2014 and 4/2015 (tubeless n=30, control n=27). All patients presenting with stones up to 4 cm were included in the analysis.

Prior to the intervention an 8 Charr MJ catheter was placed in the renal pelvis before adding contrast. The MJ catheter remained in position after the procedure (Figure 1).

Position:

The patients were positioned on an x-ray operating surface. The interventions were performed in a semi-sloping modified supine position (Barts "flank-free"; Figure 2 and 3) [11]. In determining a secure puncture point, it is important not to cross the posterior axillary line. It has been proven that good instrument handling ***is*** facilitated by supporting the renal area using positioning cushions and securing a semi-sloping position of 30°, as well as contra-laterally bent hips. In this position the kidneys remain in a secure puncture position and the position enables good x-ray and ultrasound control images.

In all cases the puncture must be supported by ultrasound images. Threading the wire in the ureter, is followed by a single step bougienage and the insertion of an 18 Charr Amplatz shaft. It involves using a mini Storz® nephroscope.

These steps were followed by laser (Dornier® Medilas) or Sonotrode disintegration. At the end of the surgery the nephrostomy channel is secured and sealed using a haemostyptic.

In the control group the mini PCNL was performed using the prone position and nephrostomy insertion procedure. The surgery time, duration of the ureter stents,

post-operative analgesic requirements, haemoglobin clearance, stone free rates and complications were recorded according to the Clavien-Dindo classification tables.

Results

Results are shown in Table 1. There were no distinctions between surgery time, post-operative Hb clearance, analgesic requirements and freedom from stones. We could show that there were no major complications in the nephrostomy-free group. In three cases re-ipsertion of the DJ was necessary due to urinary retention. In the control group, two infections and five re-interventions were recorded. Of these, one required a second intervention due to stone remnants. In three cases an URS was required due to ureter concrements. These also required DJ insertions.

The modified method showed significant benefits in terms of the duration of

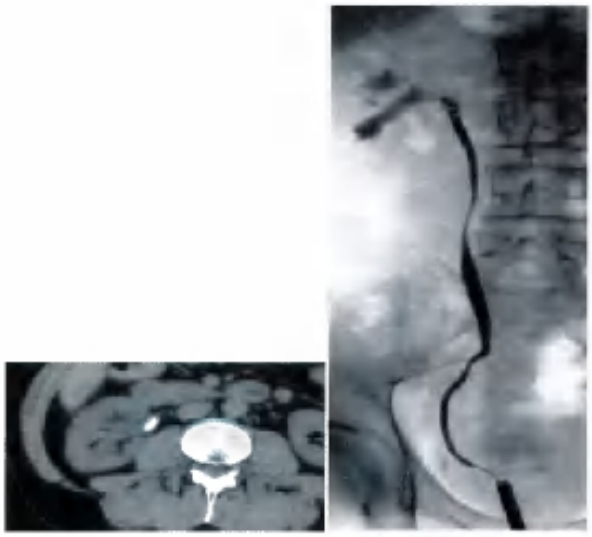

Figure 1: CT, UPG, pre-operative, 15 mm stone

Figure 2: Landmarks in supine position (ribs, posterior axillary line, iliac crest)

Figure 3: Barts "flank-free" position, landmarks

Figure 1: CT, UPG, pre-operative, 15 mm stone
Figure 2: Landmarks in supine position (ribs, posterior axillary line, iliac crest)
Figure 3: Barts "flank-free" position, landmarks

Table 1: Overview of results

	Tubeless (n=30)		Control (n=27)
Average stone diameter (in mm)	16,2 (5-34)	14,0 (6-24)	p=0,297
Instrumental pre-treatment	12 (40%)	10 (37%)	p=0,819
Surgery time (in min)	77,9 (38-133)	90,2 (43-188)	p=0,182
Pure PCNL time (in min)	47,4 (15-120)	59,9 (24-138)	p=0,072
Hb clearance (in mmol/l)	0,61 (0-1,4)	0,63 (0-1,8)	p=0,897
Number of metamizole doses	2,1 (0-8)	2,6 (0-8)	p=0,448
MJ duration (in d)	3,2 (1-5)	4,0 (2-7)	p=0,039
Remnant stones	3 (10%)	5 (18,5%)	p=0,355
Haematuria (in d)	1,6 (0-5)	2,3 (1-5)	p=0,013
Complications	3 (10%)	7 (25,9%)	p=0,114
Re-intervention	3 (10%)	5 (18,5%)	p=0,457
Hospitalisation (in d)	4,8 (3-8)	6,2 (4-10)	p=0,002

catheterization, haematuria duration and the duration of hospitalization.

Discussion

In terms of intestinal injuries, the supine position method has proven itself secure. Due to the small number of negative incidents, no analysis of sub-group complications vyas done, but the probability of an infection without a nephrostomy seems to be smaller.

There was no definite increased benefit in terms of time spent on the interventions, mostly because of the initial positioning that may requires some refinement. On average, the determined start/finishing times were higher for the modified positioning than those for the conventional method (119,5 vs 116,5 min). There is subjective total frictionless progress, because the abdominal approach is no longer essential, as well as in terms of the reduced stress for surgical staff.

In addition, more time may be saved by the use of a laryngeal mask for patients in the supine position. In the initial phases this was not used for all patients and as such the time-saving aspects could not be reported in this analysis.

Most of the patients without nephrostomies showed very little post-operative pain. This seems to be mostly due to the absent nephrostomy than due to positioning [10]. It remained difficult to obtain an objective measurement of pain, because there is no visible scale to determine levels. All patients that were not allergic, received metamizole. Despite this, comparability remained difficult because the medication was administered either orally or intravenously.

There were significant differences between bleeding times, duration of catheterization and duration of hospitalization within the non-nephrostomy group.

This is partially covered according to the results of a meta-analysis of Yuan et al. According to the analysis, experiences with the supine position showed better results only in terms of blood transfusions and surgery time. There were no differences in hospitalization times and complications, although the supine position experience showed that fewer patients developed fever

[10] .

The stone free rates were, compared to other procedures 90%, although a few other studies showed that the stone free rates were higher with the abdominal method [11,12].

In terms of economic considerations a shorter surgical time and stone free rates become increasingly important. Apart from that, the comfort of patients and a shorter hospital stay also remain important [13]. Without a nephrostomy the post-operative recovery progress for patients and procedures the caregiving staff is simpler. It involves faster mobilization with less expenditure on care and less bleeding [14].

Our study did not include post-operative x-ray controls with contrast and a sonographic control. In terms of the safety of the puncture procedure, there were no disadvantages compared to the abdominal procedure. Neither intestinal injuries, nor faulty punctures or injuries to neighboring structures were reported. Using sonographic controls provided good visual limits to protect neighboring structures. The kidneys remained mostly secure in position, to allow the unproblematic bougienage and placement of the Amplatz shaft.

Conclusion

Our data for the non-nephrostomy mini PCNL in modified supine position shows that the modification may be implemented without an increase in complications at higher stone free rates. The total treatment process, particularly from a patient perspective, is better and faster, while involving less pain. The recorded results should be tested and verified in a larger cohort to confirm reliability.

List of abbreviations

DJ Double-J-catheter MJ Mono-J-catheter PCNL Percutaneous nephrolitholapaxy ESWL Extracorporeal shock wave lithotripsy URS Ureteroscopy.

References

1. Lahme S, Zimmermanns V, Hochmuth A, et al: [Minimally invasive PCNL (mini-perc). Alternative treatment modality or replacement of conventional PCNL?]. Urologe. A 2008; 47: 563-8.
2. Mishra S, Sharma R, Garg C, et al: Prospective comparative study of miniperc and standard PNL for treatment of 1 to 2 cm size renal stone. BJU Int. 2011; 108: 896-899.
3. Lu Y, Ping J-G, Zhao X-J, et al: Randomized prospective trial of tubeless versus conventional minimally invasive percutaneous nephrolithotomy. World J. Urol. 2013; 31:1303-1307.
4. Nicklas AP, Schilling D, Bader MJ, et al: The vacuum cleaner effect in minimally invasive percutaneous nephrolitholapaxy. World J. Urol. 2015; 33:1847-1853.
5. Mager R, Balzereit C, Gust K, et al: The hydrodynamic basis of the vacuum cleaner effect in continuous-flow PCNL instruments: an empiric approach and mathematical model. World J. Urol. 2016; 34: 717-724.
6. Donaldson JF, Lardas M, Scrimgeour D, et al: Systematic review and meta-analysis of the clinical effectiveness of shock wave lithotripsy, retrograde intrarenal surgery, and percutaneous nephrolithotomy for lower-pole renal stones. Eur. Urol. 2015; 67: 612-616.
7. Knoll T, Wezel F, Michel MS, et ah Do patients benefit from miniaturized tubeless percutaneous nephrolithotomy? A comparative prospective study. J. Endourol. 2010; 24: 1075-1079.
8. Garofalo M, Pultrone CV, Schiavina R, et ah Tubeless procedure reduces hospitalization and pain after percutaneous nephrolithotomy: results of a multivariable analysis. Urolithiasis 2013; 41: 347-353.
9. Wang Y, Wang Y, Yao Y, et al: Prone versus modified supine position in percutaneous nephrolithotomy: a prospective randomized study. Int. J. Med. Sci. 2013; 10: 1518-1523.
10. Yuan D, Liu Y, Rao H, et al: Supine Versus Prone Position in Percutaneous Nephrolithotomy for Kidney Calculi: A Meta-Analysis. J. Endourol. 2016; XX: end. 2015.0402.
11. Bach C, Goyal A, Kumar P, et al: The Barts "flank-free" modified supine position for percutaneous nephrolithotomy. Urol. Int. 2012; 89: 365-368.
12. Wu P, Wang L and Wang K: Supine versus prone position in percutaneous nephrolithotomy for kidney calculi: a meta-analysis. Int. Urol. Nephrol. 2011; 43: 67-77.
13. AI-Dessoukey AA, Moussa AS, Abdelbary

AM, et al: Percutaneous nephrolithotomy in the oblique supine lithotomy position and prone position: a comparative study. J. Endourol. 2014; 28: 1058-1063.

14. Hüsch T, Reiter M, Mager R, et ah The management of the access tract after percutaneous nephrolithotomy. World J. Urol. 2015; 33: 1921-1928.