Abstract

Background

Endoscopic combined intrarenal surgery (ECIRS) using retrograde fURS and PCNL was developed as a singlestep treatment for removal of renal calculi. Both prone split-leg (PSL) and Mod-V (MV) position are available for ECIRS, but there is no data regarding their differing benefits and disadvantages. To investigate the ideal position for ECIRS, this study examined (1) the characteristics of surgical results and (2) the changes in renal anatomy by using computed tomography (CT) for the different positions.

Subjects and Methods

(1) The subjects were 89 of 112 patients who underwent ECIRS registered in the SMART Study Group from January 2014 and May 2015 (PSL: MV = 49:40). Surgical data including intraoperative renal pelvic pressure were compared between two groups.

(2) Contrast-enhanced CT images in the PSL and MV positions were analysed for each patient. The distance from the skin to the kidney and the tilt of the major renal axes (anterior, lateral) were measured. Results

(1) The renal punctures in the PSL position were predominantly executed through the inferior calyces (79.5%), whereas those in the MV position were through the middle calyces (72.5%). Intraoperative renal pelvic pressure was significantly higher in the PSL than MV position. The stone clearance rate (81.5%:85.0%) did not significantly differ between the positions. Five (10%) patients in the PSL position group and 2 (5%) patients in the MV position group showed a fever of >38C after the surgery, and this difference between the groups was significant.

(2) The results of CT images showed that the distance to the kidney was significantly shorter and the tilt of the major renal axis was significantly greater in the anterior direction (21.7:9.6; p < 0.01) and significantly lesser in the lateral direction (21.5:32.7; p = 0.03) in the PR position than the corresponding values in the MV position.

Discussion

We consider that the MV position is better for puncture of the middle calyces but not the lower calyces, because the lower kidney may be displaced medially and ventrally in the MV position due to gravity. Additionally, because the extent of increase in the renal pelvic pressure is lesser in the MV position, thereby posing a low risk of post-surgical fever. Flexibility in alteration of the positions depending on the stone position, body type, and infection status will lead to an ideal treatment.



Background

- The prone position (P position) has long been the standard position for PCNL. Recently, the modified supine Valdivia position (MV position) has been applied, because it allows quick patient positioning, low risk of anaesthesia, and ureteroscopic access^[1].
- However, the disadvantages of the MV position include constant collapse of the pyelocaliceal system and the small range of potential access angles^[2].
- Various different positions including prone split-leg (PSV) ^[3] and MV position are available for endoscopic combined intrarenal surgery (ECIRS), but there is little data regarding their differing benefits and disadvantages.
- [1] Ibarluzea G et al. BJU int 2007; 100: 233-236
- [2] Daels F et al. J Endourol 2009; 23: 1615-1620
- [3] Hamamoto S et al. Urology 2014; 84: 565-570

Objectives

To investigate the ideal position for ECIRS

- **1** Examine the characteristics of surgical outcomes between two positions (Clinical examination)
- **2** Compare the changes in renal anatomy by using 3D-computed tomography (CT) for the different positions (3D-CT investigation)

Positioning in ECIRS



Prone split-leg position Modified Valdivia position (PSL position)



(MV position)

Investigation of the ideal position for endoscopic combined intrarenal surgery: Prone split-leg position vs. modified Valdivia position

Shuzo Hamamoto^{1,4}, Shinsuke Okada^{2,6}, Takaaki Inoue^{3,6}, Tomoki Okada¹, Ryosuke Chaya¹, Kengo Kawase¹, Kazumi Taguchi¹, Atsushi Okada¹, Hiroyasu Miura⁴, Tadashi Matsuda⁵, Takahiro Yasui¹

- 1. Department of Nephro-Urology, Nagoya City University Graduate School of Medical Sciences
- 2. Department of Urology, Gyotoku General Hospital
- 3. Department of Urology, Hara Genitourinary Hospital

Patients and Methods [1. Clinical examination] 1. Clinical examination ■ The patients were 89 of 112 patients who underwent ECIRS between January 2014 and May 2015. The 89 Variable patients selected were those with a major stone axis sum of $\leq 70 \text{ mm}$ (PSL position: MV position = 49:40) Sex (Male (%)) Multicenter study (SMART Study Group in Japan) Age (year) BMI (kg/m^2) <u>Skilled Endoscopic</u> <u>Management of</u> <u>Renal</u> & Ureteral Stones Study Group Hb (g/dl) Side (Left (%)) * Nagoya City University graduate school * Gyotoku General Hospital Stone length (mm) * Hara Genitourinary Hospital % Staghorn calculi Operative parame Surgical technique Variable 1. All procedures were performed in either positon throughout the treatment (PSL or MV position). Access location 2. Renal puncture was achieved using ultrasonography upper pole middle pole guidance. 3. An 18Fr or 19.5Fr mini-PCNL tract (Karl Storz) was lower pole % multi-tract used to dilate the tract and establish working access. Surgical time (min) 4. ECIRS was performed by two urologists working SFR simultaneously to fragment the renal stones; one Hb drop performed RIRS, and the other performed PCNL. % fever up (>38°) Compare the surgical outcomes data between two groups. % transfusion [2. **3D-CT** investigation] Prone position Oblique position [2. **3D-CT** investigation] Before surgery, 7 patients underwent enhanced CT image in the prone and oblique $(35^{\circ} above the bed)$ positions. 10 n.s. Anatomical variation were analysed between the prone and oblique position. D Nephrostomy tract length calculated using axial images (minimum length between posterior calyx and the skin) ② The tilt of the major renal axes by 3D images (anterior) **Upper pole** ③ The tilt of the major renal axes by 3D images (lateral) ②Tilt of the renal ④ The distance between the 12th rib and the iliac axes (⊺**P<0.01** Prone position

Oblique

position

- 4. Department of Urology, Hachinohe Koyo clinic
- 5. Department of Urology, Kansai Medical University Medical Center
- 6. SMART Study Group, Japan

Results

^a Chi-square-test; ^b Mann-Whitney Utest ■ The characteristics of the patients and stone features

p value	
	a
b	



anterior

Paired t-test

① Nephrostomy tract length (mm)





Conclusions & Discussion

Anatomical variation PSL positon



- The distance to the calyx was significantly longer in the Mod-V than the prone position.
- > The tilt of the major renal axis was significantly lesser in the anterior direction and greater in the lateral direction in the Mod-V than the corresponding values in the prone position.
- □ This variation occurs because low of the kidney may be displaced medially and ventrally in the MV position because of gravity
- **□** The MV position is better suited than the PSL position is for puncture of the middle calyces but not the lower calyces.
- The direction of the PNL tract

PSL positon



> The perfusion fluid flows naturally from the tract in the MV position .

The extent of increase in the renal pelvic pressure is lesser in the Mod-V position than in the P position, thereby posing a low risk of post-surgical fever.

Because the surgical results are not altered when the tract is safely established, flexibility in alteration of the positions depending on the stone position, body type, and infection status will lead to an ideal treatment.



