Lower Pole Caliceal Stone Clearance After ESWL : The Effect of Infundibulopelvic Angle

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Abstract

Extracorporeal Shock Wave Lithotripsy (ESWL) represents the first choice therapy for renoureteral stone disease. Clinical controversy exists concerning the efficacy of ESWL for lower pole kidney stones. Nowadays, the factors that hinder the spontaneous passage of stone debris that results from ESWL of lower caliceal stone are the gravity - dependent position of the lower pole calices and particular features of the inferior - pole collecting system anatomy.

We studied the influence of the lower infundibulo-pelvic in the success of ESWL of lower caliceal stones 10-20 millimeters in size in 50 patients with STORZ MODULITH SL-20 machine. At the mean follow-up of 6 months, only 44 per cent of the patients presenting with an infundibulo-pelvic angle of less than 90° became stone free. On the other hand, 86 per cent of the patients presenting with an infundibuo-pelvic angle of greater than 90° became stone free. Our data suggest that acute infundibulo-pelvic angle of the lower pole hinders the spontaneous passage of fragments after ESWL.

Key word : Lower Pole Caliceal Stone, Clearance, ESWL

Extracorporeal shock wave lithotripsy (ESWL) is the preferred management for the majority of patients who require intervention for kidney stones including in calices due to its noninvasive nature, low complication rate and high patient acceptance[1-4]. The success of ESWL depends on the size of the stone, composition of the stone and location of the stone within the kidney. Nowadays, there is a consensus that the poor success rate of ESWL is in the treatment of lower caliceal stones of more than one centimeter in size and multiple stones[3]. The main factor that hinders the spontaneous passage of stone debris that results from ESWL of lower caliceal stone is the gravity - dependent position of the lower-pole calices. The other important factor is the particular features of the inferior - pole collecting system anatomy that could be important in fragment retention[1,5,6].

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For this work, we studied the influence of the lower infundibulo-pelvic angle in the success of ESWL of lower caliceal stone.

MATERIAL AND METHOD

Patients

We prospectively analyzed 50 patients admitted for ESWL for treatment of single lower pole caliceal stone using a STORZ MODULITH SL-20 machine. All of the stone sizes were between 10-20 millimeters. The patients were divided into two groups according to the lower infundibulo-pelvic angle. The angle was measured considering the calix where the stone was located. The mean number of shockwaves per treatment was 5,000.

Infundibulaum - Pelvic Angle Measurement

For measurement of the angle, two lines must be drawn.

The first line is the line between the central axis of the upper ureter and the central axis of the ureteropelvic region. (line 1A, 2A)

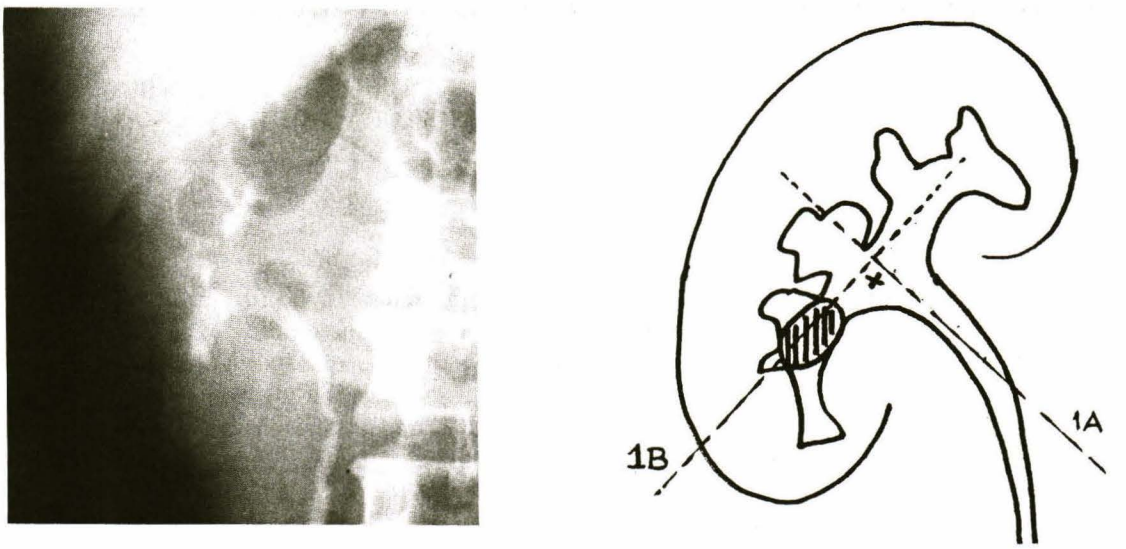

Fig. 1. Anterior view of right pelviocaliceal system, I-P angle measures 100° (Obtuse Angle).

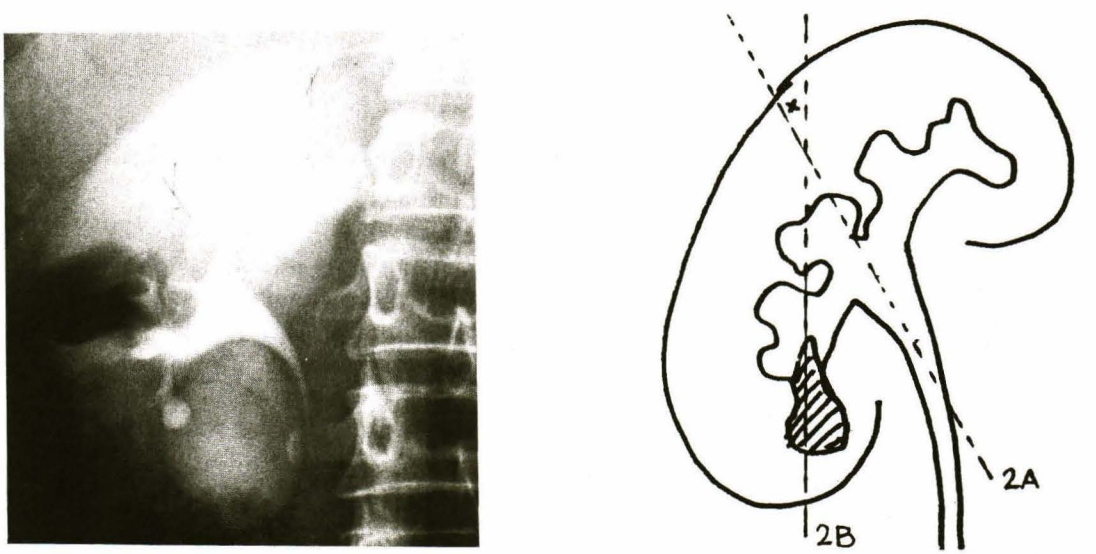

Fig. 2. Anterior view of right pelviocaliceal system, I-P angle measures 35° (Acute Angle).

The second line is the line drawn through the central axis of the main infundibulum if the stone is located in a calix whose neck follows the axis of the main inferior-infundibulum. (line 1B in Fig. 1) If the stone is in the minor calix, the line is drawn through the central axis of the neck of the calix where the stone is located. (line 2B in Fig. 2)

After the first and second lines have been drawn, the angle is measured in the intersection of the lines.

In 36 patients, an angle of >90° (obtuse angle) in Fig. 1 was formed between the inferior - pole calix where the stone was located and the renal pelvis. In the other 14 patients, the angle was < 90° (acute angle) in Fig. 2.

RESULT

The mean follow-up of the patients is 6 months. The results are shown in the following Table.

Group	I-P angle	Number of patients	Stone free (%)
I	<90° (~25.5°)	36	16 (44%)
II	>90° (~95.25°)	14	12 (86%)

The total stone free is 56%

DISCUSSION

Extracorporeal Shock Wave Lithotripsy (ESWL) represents the first choice therapy for renoureteral stone disease because of its noninvasive nature, low complication rate and high patient acceptance. Considerable clinical controversy exists concerning the management of lower pole kidney stones. The debate relates to the efficacy of shock wave lithotripsy and percutaneous nephrolithotomy. Several factors are involved, such as stone size, composition, type of lithotriptor and lower pole caliceal anatomy[4,7]. Lingeman et al reported that the efficacy of percutaneous nephrolithotomy remains independent of stone size (approximately 90% stone free), but the efficacy of shock wave lithotripsy decreases rapidly as the stone size increases (stone-free rates from 74% for stones less than 1 cm to 33% for stones greater than 2 cm). Lingeman et al advocated the use of percutaneous nephrolithotomy as primary treatment for lower pole stones, especially if the stone size exceeds 1 cm[2,7]. Residual stone debris in the collecting system might lead to pain, hydronephrosis, urosepsis, nidus for future stone formation and recurrent urinary tract infection[1].

The reasons for delayed, insufficient, or absent discharge of residual lower-pole fragments are the gravity-dependent position of the lower calices and some particular features of the inferior - pole collecting system anatomy.

Sampaio et al reported the success rate for ESWL of lower pole caliceal stone depends on the inferior pole collecting system anatomy (Infundibulopelvic angle, angle of infundibulum to the verical and infundibular diameter)[1].

Sampaio et al and Kelley et al reported the factor of infundibulopelvic angle in the success of ESWL of lower pole caliceal stone. The stone free rates of solitary lower pole stones with the angle less than 90° and more than 90° were 23-38 per cent and 57-75 per cent, respectively[1,6].

Determination of the infundibulum-pelvic angle considering the inferior calix where the stone is located is very important because the angle will differ in the same kidney depending on the stone location.

SUMMARY

Our data showed that an acute angle between the calix where the stone is located and the real pelvis is a significant negative factor in the rate of success after ESWL for stones 10-20 mm in size located in the lower pole.

(Received for publication January 28, 1999)

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การหลุดออกของนิ่วในไตบริเวณเคลิกซ์ ส่วนล่างหลังจากรักษาโดยการสลายนิ่ว "ปัจจัยของมุมระหว่างเพลวิสและอินฟันดิบูลัม"

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ในปัจจุบันการสลายนิ่ว เป็นทางเลือกแรกในการรักษานิ่วในไตและท่อไต มีข้อถกเถียงกันเกี่ยวกับผลการรักษาของวิธีสลายนิ่วของนิ่วในไตบริเวณ calix ส่วนล่าง ซึ่งในปัจจุบันเป็นที่ยอมรับกันแล้วว่าปัจจัยที่มีผลต่อการหลุดของนิ่วจาก calix ส่วนล่าง คือ ตำแหน่งที่ด้านแนวโน้มถ่วง และปัจจัยทางกายวิภาคของระบบทางเดินปัสสาวะของไตส่วนล่าง

ทางผู้วิจัยได้ศึกษาผลของกายวิภาคที่มีผลต่อการรักษานิ่วโดยวิธีสลายนิ่วของนิ่วในไตบริเวณ calix ส่วนล่าง ขนาด 1-2 เซนติเมตร ในผู้ป่วย 50 รายโดยเครื่อง STORZ MODULITH SL-20 โดยติดตามผลการรักษา 6 เดือน ซึ่งพบว่า ร้อยละ 40 ของผู้ป่วยที่มีมุมระหว่าง pelvis และ infundibulum น้อยกว่า 90 องศา ประสบความสำเร็จในการรักษาโดยทางตรงข้าม ร้อยละ 86 ของผู้ป่วยที่มี pelvis และ infundibulum มากกว่า 90 องศา ประสบความสำเร็จในการรักษา จากข้อมูลของเราพบว่า กายวิภาคของ pelvis และ infundibulum ของไตส่วนล่าง มีผลต่อความสำเร็จในการรักษานิ่วในไตบริเวณ calix ส่วนล่างโดยวิธีสลายนิ่ว

คำสำคัญ : นิ่วไตบริเวณเคลิกซ์ส่วนล่าง, การรักษา, การสลายนิ่ว

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