In Situ Prone ESWL
for the Treatment of Lower Ureteral Stones:
Experience with 28 Patients

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Twenty-eight patients with lower ureteral stones underwent in situ extracorporeal shock wave lithotripsy (ESWL) in the prone position over the period of 7 months between March 1990 and September 1990. For stone disintegration the spark gap shock wave lithotripter Tripter XI (Direx) was used. Satisfactory disintegration was achieved in 93 per cent of patients. The stone-free rate at 12 weeks was 82 per cent, and 11 per cent had residual fragments less than or equal to 4 mm in diameter. Twenty-one per cent of patients required repeat treatments. For only 2 patients general anaesthesia was required (7 per cent). There were no remarkable complications except for haemospermia which resolved spontaneously 15 days after treatment. It was concluded that in situ prone ESWL is an effective and safe procedure for the treatment of lower ureteral stones.

Introduction

The advent of transurethral ureteroscopy and ESWL have replaced the traditional open surgical management of ureteral stones. It is generally accepted that ESWL is the method of choice for the treatment of upper ureteral calculi [1]. Transurethral ureteroscopy has been the preferred method of treatment for lower ureteral stones since 1982 [2]. Recently, with the use of second-generation lithotripters and new techniques of ESWL, the indications for ESWL have been extended to include lower and mid-ureteral stones. It was suggested in several studies that ESWL should be the primary method of treatment in patients with lower ureteral stones [3, 4, 5, 6, 7]. However, the treatment of lower and mid-ureteral stones is still controversial and there are only limited data reported on in situ ESWL for lower ureteral stones. We report our experience with in situ prone ESWL in 28 patients with lower ureteral stones.

Patients and methods

The medical records of 28 patients with lower ureteral stones who underwent in situ prone ESWL between March 1990 and September 1990 were evaluated retrospectively. Patients with stone streets after previous ESWL, patients with
additional stones in the ipsilateral upper ureter or kidney, as well as those who underwent retrograde stone manipulation prior to ESWL were not included in the study group.

There were 21 males and 7 females, aged between 21 and 68 years (mean age 40). Stone sizes were measured by using a millimetric graph paper. Average stone size was 0.9 cm² (range 0.25–1.9 cm²). According to the kidney–ureter–bladder film (KUB) all stones were located between the ureterovesical junction and the lower border of the sacroiliac joint. Patients under the age of 18 were not subjected to prone ESWL because of the possible harmful effects of shock waves to growing bone tissue [8].

For stone disintegration the spark gap shock wave lithotripter Tripter XI (Direx) was used. The number of shock waves delivered with each treatment ranged between 2200 and 3000 (average 2850) at an average maximum k.v. of 19.2 (range 16 to 20 k.v.). Stone localization was accomplished by moving the treatment table under bi-planed fluoroscopic guidance with a portable C-arm unit. Stone destruction was monitored fluoroscopically at every 100 shock waves. Patient position was prone in all treatments where in some cases the ipsilateral leg was elevated by using additional support and cushioning in order to achieve a better exposure of the body surface onto the rubber membrane.

The procedure was carried out under premedication with 1 mg/kg intramuscular pethidine chloride and/or under intravenous sedation with 5 mg diazepam. In case of intolerance to pain the procedure was continued under general anaesthesia.

A KUB film and renal ultrasound were obtained one day after treatment in order to assess the degree of disintegration (Fig. 1). In case of inadequate disintegration repeat treatment was performed 7 days after the first treatment session.

![Fig. 1. KUB series demonstrating the treatment of a lower ureteral stone in a 28-year-old patient. (A) Prior to treatment 2800 shocks were given at 18 k.v. (B) One day after treatment satisfactory disintegration was achieved. (C) One week after treatment the patient was stone-free.](image-url)