65. Belgian Experience with the Direx Tripter X-1

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Abstract

In the Department of Urology of the University of Liege Medical Center, 207 kidneys were
treated by shock wave lithotripsy using the Direx Tripter X-1. Various forms of anesthesia/sedation
were used. A 93% fragmentation rate was obtained, and 80% of patients were stone free at three
months. Thirteen percent of cases required multiple treatments. In 6% of cases, post-ESWL auxiliary
procedures were performed. No significant complications were encountered. Utilization of the
Tripter X-1, equipped with C-arm fluoroscopy, is quite simple, and the apparatus is reliable. This type
of lithotripter provides affordable treatment of upper urinary tract calculi in any hospital, with results
comparable to those obtained with more sophisticated and expensive machines.

Introduction

Extracorporeal shock wave lithotripsy (ESWL®) has established itself as treatment of choice
for urinary lithiasis. It is effective therapy which has been found to have few problems. Inexpensive
lithotripters have offered access to this modern technique to centers at which 200 to 400 cases
are treated annually. These less expensive lithotripters, however, require clinical documentation as
extensive as that available for first-generation machines.

The first clinical trials in Europe of the Direx Tripter X-1 were carried out at the University
Hospital of Liege Medical Center. This report presents results from 237 treatments in all patients seen

Materials and Methods

From December 1987 to September 1988, 207 kidneys were treated in 237 ESWL sessions. The
average patient age was 52 years in a patient population of 61% males and 39% females. Seven
patients (5%) had staghorn calculi. The rest of the group (95%) had  one to three calculi. A breakdown
of the latter group showed 38% pelvic calculi, 45% calyceal calculi (upper 17%, mid 8%, lower 75%)
and 17% ureteral calculi (treated in situ). The average stone size was 12 mm (excluding staghorn
calculi).

All patients were treated with the Direx Tripter X-1. With this device shock waves are
generated by an electrical discharge released within a semi-ellipsoidal structure. The shock waves
are transmitted to the patient by a rubber cushion that contains specially treated water. The Tripter
X-1 is mobile and easy to use. The unit also includes an independent treatment table which may be

*Dornier Medical Systems, Inc., Marietta, Georgia.
adjusted for height. Stone localization is not difficult because the Tripter X-1 can be used with any standard fluoroscopic unit (CGR Stenoscop in this case). Because all hospitals are already equipped with fluoroscopic units, a substantial savings for the hospital can be realized.

In this series the average treatment lasted 53 minutes with an average of 570 seconds of fluoroscopy. The Tripter X-1 permits coupling of the electrical discharge with the R-wave as shown on electrocardiography and may also allow coupling with the respiratory cycle. The average number of shock waves per treatment was 1,540 at 18 kV. A significant amount of energy is directed to the focal region (15 mm by 15 mm by 40 mm), requiring anesthesia throughout the treatment (general anesthesia 58%, peridural 23%, sedation 19%).

This series shows that anesthesia is often required for endoscopic procedures done in conjunction with ESWL, making optimum use of the anesthesia.

Following treatment intravenous infusion of mannitol and lasix (Furosemide) is given to induce diuresis. First-generation cephalosporins are given prophylactically.

In this series KUB films, upright if possible, were taken the day after treatment and once every month thereafter.

The results were analyzed according to AUA Ad Hoc committee criteria. Computed tomography (CT) of each treated kidney was performed routinely the first day after treatment.

Results

ESWL performed with the Tripter X-1 resulted in a 93% fragmentation rate in this patient group. Failures resulted from problems of localization, from stone resistance to shock waves, and from errors in procedure. In the non-staghorn group, patients followed for three months became stone free in 80.6% of cases. Thirty percent required more than one treatment. In the staghorn group (7 calculi, 11 sessions), only one patient was stone free at three months. Five of seven cases required combined percutaneous nephrolithotomy (PCNL) and ESWL. Auxiliary procedures were performed in 6% of patients. Of this 6%, 42% required PCNL; 17% needed percutaneous nephrostomy; 8% required ureteroscopy, and 33% had retrieval of stone utilizing a basket. The treatment was well tolerated by all patients, and no clinical complications were observed. Therefore, surgical intervention was unnecessary. A minor problem noted was that friction from the rubber cushion during administration of the shock waves induced a superficial cutaneous lesion which healed within three days in these patients.

Discussion

These results from ESWL treatment of non-staghorn calculi are consistent with other published studies. Patients treated for staghorn calculi in this series, for the most part, were sedentary and old (average age, 66 years) which may explain the poor results in that group.

In certain cases (non-staghorn calculi > 20 mm or ureteral stricture) a double-J stent was inserted before treatment. In addition, all ureteral calculi (upper and mid) were flushed using the method recommended by Eisenberger et al. and Alken et al. As a result, in this series few auxiliary procedures were performed after ESWL.

Preliminary CT results show diffuse subcapsular hemorrhages of approximately 2 mm diameter with no apparent clinical repercussions.

The Tripter X-1 was easily mastered by all members of this group. This unit proved reliable, since no repairs were required over a ten-month period. As an economic consideration, in Belgium the Direx Tripter X-1 can be amortized in five years when treating a minimum of 207 patients per year.

One major inconvenience is the noise produced by each discharge. At 90 dB, patients as well as operators require auditory protection. Future Direx development of a lithotripter with a large ellipsoid may solve this acoustic problem.

In conclusion, it appears that ESWL may be performed effectively and inexpensively in any hospital with this type of lithotripter.

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