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Requirement of Analgesia for Extracorporeal Shock Wave Lithotripsy and Efficacy of a Nonsteroidal Antiinflammatory Drug: Piroxicam

Key Words
Analgesia
Extracorporeal shock wave lithotripsy
Piroxicam

Abstract

Objective: In this study, the requirement of analgesia and the analgesic efficacy of a long-acting nonsteroidal antiinflammatory drug (NSAID), piroxicam, were investigated in patients with renal stone disease treated with extracorporeal shock wave lithotripsy (ESWL). **Methods:** This randomized, placebo-controlled study included 60 patients. Patients were divided into two groups randomly. A single dose of saline (2 ml) was given to the patients in group 1 (n = 20) and 2 ml of 40 mg piroxicam to the patients in group 2 (n = 40). All injections were administered into the gluteal muscle 45 min before ESWL. A verbal rating scale (VRS) was used to evaluate the pain. Groups were compared according to age, sex, weight, height, stone size, number of shock waves, duration of ESWL and VRS scores. **Results:** There was no statistically significant difference between both groups in demographic data, stone size, number of shock waves and duration of ESWL procedure ($p > 0.05$). However mean VRS scores were significantly lower in group 2 than in group 1 during and after the ESWL procedure. **Conclusion:** We considered that analgesic agents should be used to control the pain in second-generation lithotriptors. Piroxicam has clinically significant effects on the pain and also antiinflammatory effects, inhibits ureteric activity, and helps in stone passage.

Introduction

In recent years, extracorporeal shock wave lithotripsy (ESWL) has become one of the most used procedures in the treatment of stone disease. Although the first-generation lithotriptors have a high power of disintegration, the procedure is very painful and requires epidural or general anesthesia [1]. With the further development of ESWL technology, analgesic requirement during the procedure decreased but still continues. The second-generation lithotriptors produce lower shock-wave energy that causes less pain. However analgesia is mostly required during the procedure [2]. The opioid analgesics (alfentanyl, fentanyl, pethidine sodium) used during ESWL may cause respiratory depression, a fatal side effect. This side effect can be seen even in patient-controlled analgesia (PCA) [3]. To avoid these side effects, during ESWL sessions we offer to use a safe and long-lasting nonsteroidal antiinflammatory drug (NSAID), piroxicam. Additionally, the antiinflammatory effects of piroxicam help in stone passage while reducing the pain during and after ESWL.

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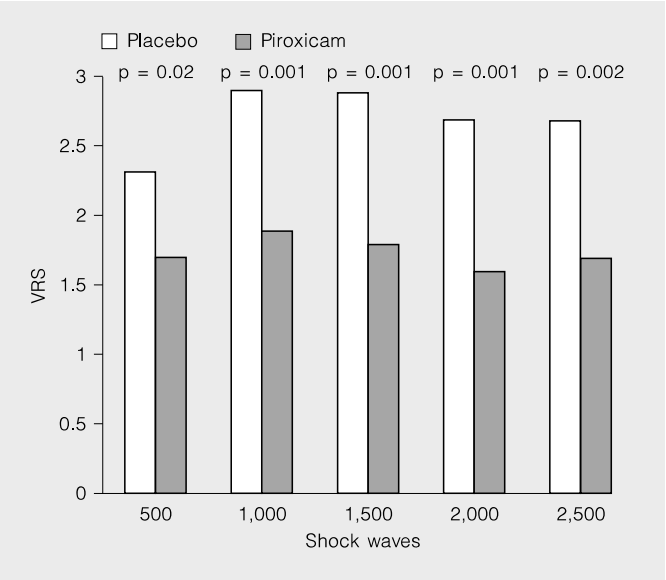

Fig. 1. VRS scores during ESWL treatment.

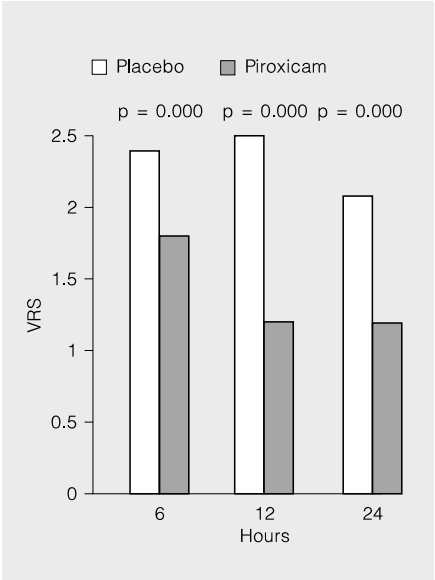

Fig. 2. VRS scores after ESWL treatment.

Table 1. Patient characteristics (mean ± SD)

	Plecebo (n = 20)	Piroxicam (n = 40)	p value
Age, years	44.5 ± 16	45.9 ± 13	>0.05
Sex, F/M	8/12	17/23	>0.05
Weight, kg	68.7 ± 11.6	72.4 ± 14.1	>0.05
Height, cm	163.4 ± 9.8	163.6 ± 7.9	>0.05
Stone size, cm^2	1.46 ± 1.64	1.68 ± 2.3	>0.05
ESWL time, min	37.5 ± 10.1	36.1 ± 10.2	>0.05
Shock waves	2,200 ± 516	2,498 ± 527	>0.05

Patients and Methods

Between January and November, 1997, 60 consecutive patients with renal calculi who underwent ESWL were assigned to two groups for a prospective, single-blind, placebo-controlled study. We excluded those patients who were under 18 years old and those over 70 years, those who had drug and alcohol dependency and those who used any analgesic drug during the previous 7 days. None of the patients were premedicated. The patients in group 1 (n = 20) received 2 ml %09 NaCl and patients in group 2 (n = 40) 2 ml of 40 mg piroxicam i.m. All injections were done into the gluteal muscle, 45 min before the procedure in order to achieve the maximum effect.

The lithotriptor used in this study was a second-generation device 'Breakstone 100'. The number of shock waves was 3,000 or lower if the fragmentation of the stone was observed under fluoroscopy. Treatment was begun at an initial discharge voltage of 6 kV and increased to the maximum of 16 kV within 10 min, as rapidly as could be tolerated by the patient. Pain scores were assessed by a verbal rating scale (VRS; 1 = no pain, 2 = low pain, 3 = moderate pain, 4 = strong pain, 5 = intractable pain) [4]. We stopped ESWL and gave opioid analgesics (pethidine 1 mg/kg) in case of VRS grade 5. In these cases ESWL were reapplied after relief of the pain.

During the procedure, the cases were evaluated according to VRS score with 500 shock intervals. VRS scores were also noted at 6, 12, 24 h after ESWL session. Values are expressed as mean ± standard deviations. Mann-Whitney U test was used to evaluate the statistical significance of differences. A $p < 0.05$ was accepted as significant.

Results

There was no significant difference between piroxicam and placebo groups with regard to age, weight, height, sex, stone size and duration of ESWL session initially (table 1). VRS scores during ESWL were significantly lower in group 2 than in group 1 ($p < 0.05$; fig. 1).

ESWL session was stopped because of intractable pain in 4 patients in group 1 and 1 patient in group 2. Pethidine relieved the pain in these patients. VRS scores after ESWL were significantly lower in group 2 than in group 1 ($p < 0.05$; fig. 2).

No side effect was encountered in group 2. In group 1 there was mild dyspepsia in 3 patients relieved with antacid and mild urticaria in 1 patient relieved with antihistaminic.

Discussion

ESWL procedure has become one of the most essential treatment modalities of urinary stone diseases. The pathogenesis of the pain during ESWL is still doubtful. However shock waves have a cavitation effect on tissues and this effect stimulates sensitive pain neurones [5]. The pain is closely related to the lithotriptor type, shock wave peak pressure, focal zone size and the area of the shock wave entry through the skin [6]. The first-generation lithotriptors were more effective as they produced more energy but this caused intense pain that required general or epidural anesthesia [1]. On the other hand treatment with second-generation lithotriptors is less painful but less effective [2]. Nevertheless many patients treated with second-generation lithotriptors still require different forms of analgesia. A lot of techniques, from local anesthesia to opioids, have been used to overcome the pain [2].

Piroxicam differs from most NSAIDs in its derivation from enolic acid instead of carboxylic acid: it is of the oxicam family of NSAIDs characterized by a long half-life that warrants 24 h of therapeutic serum concentration after a single daily dose [7]. Monk et al. [8], in their study, reported that the use of the local anesthetics does not decrease the dosage of opioids. Respiratory depression is a rare but fatal side effect of opioid analgesics. Recently PCA has become a very popular method for pain relief in ESWL but it is very expensive and also may have fatal side effects [3]. In one study alfentanyl, an opiod analgesic, has been reported to cause respiratory depression especially with sedative drugs. In such cases partial oxygen saturation should be monitored continuously during ESWL session [9]. However piroxicam does not cause respiratory depression.

Apart from this, it is not necessary to administer another dose of opioids within 24 h. Additionally their antiinflammatory effect helps in stone passage.

Rasmussen et al. [10] reported that there were no differences in pain scores between the group that received intravenous saline and the group that received fentanyl during ESWL with a second-generation lithotriptor. On the other hand, our study emphasizes the need to use analgesics. Total pain scores were less in group 2 than in group 1 and the treatment was stopped because of intractable pain in 4 patients in group 1. Those patients who received piroxicam did not require additional analgesia for the passage of stone fragments.

Friedman et al. [11] showed that diclofenac sodium decreases the need for opioids during the second-generation ESWL treatment. Rasmussen et al. [10] emphasized that suppository naproxen sodium, in addition to subcutaneous lidocaine, was effective in pain relief and opioids were not always necessary in such cases. But these NSAIDs used for additional analgesia require repetition after ESWL.

We conclude that analgesia is necessary for the ESWL procedure using second-generation equipment not only for patient satisfaction but also for obtaining appropriate timing and applying the adequate energy necessary to break the stone. Piroxicam with its antiinflammatory effects is a safe and effective drug in ESWL treatment. If NSAIDs are not enough to overcome the pain in ESWL, opioid analgesics can be used considering their side effects such as respiratory depression.

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