

## Comparative study in extracorporeal shock wave lithotripsy with and without the use of local anaesthetic (Lidocaine 1%) infiltration at the shock wave site

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### Abstract

**Background:** Extracorporeal Shock Wave Lithotripsy (ESWL) is a simple and non-invasive technique in which renal and ureteric calculi are pulverised into small fragments by shockwaves and then allowed to pass spontaneously in small fragments along with urine. Effective ESWL requires a co-operative patient who will remain immobilize on the lithotripsy table comfortably for which different anaesthetic techniques are used. Occasionally discharge of patient is delayed due to persistent sedation, nausea and vomiting.

**Objective:** The aim is to assess the use of local anaesthetic agent (20 ml Lidocaine 1% ) infiltration in 60 patients (Experiment Group ) and no infiltration in 60 patients ( Control Group ) on patients undergoing Extracorporeal shock wave lithotripsy (ESWL) procedure.

**Materials and methods:** is a study done in 120 patients of ASA I and ASA II patients undergoing ESWL procedure. The infiltration technique is standardized so that the local anesthetic agent was infiltrated five minutes before the procedure along the line of shockwave site in Experiment Group.

**Result:** In this study, the age, sex, weight, time of shockwave treatment was almost similar in both groups. The mean need of Ketamine and duration of stay after procedure was significantly more in control group than experiment group.

**Conclusion:** In this study, it is concluded that the need of Ketamine and duration of stay after procedure is significantly more in control group.

**Key words:** ESWL, infiltration, Ketamine, Lidocaine 1%

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The introduction of Extracorporeal Shockwave Lithotripsy (ESWL) by Chaussy and his co-workers in 1980 had revolutionised the management of urinary calculi as they discussed about the ESWL is an alternative to open surgery<sup>1,2</sup>. ESWL was approved by FDA in 1984. Since then ESWL dramatically changed the management of renal and ureteric calculus disease. Now ESWL represents the first line therapy for the majority of urinary tract calculi. ESWL is a simple and safe technique in which renal and ureteric calculi are pulverised into small fragments by shockwaves and then allowed to pass spontaneously in small fragments along with urine. ESWL is a non-invasive procedure and need lesser anaesthesia than other procedures. In Nepal, It was first introduced in Birendra Army Hospital in 1990. Later on due to its popularity, it was introduced in other centres as well.

A majority of the patients undergoing lithotripsy procedures are outpatients. Anyhow, the sharp, stinging pain with discomfort produced by the impact of the shockwave at the cutaneous entry site and movement of the patient during the procedure may necessitate repeated

radiographic localisation for effective lithotripsy. Thus effective ESWL requires a co-operative patient who will remain immobilize on the lithotripsy table comfortably. Different anaesthetic technique along with analgesic drugs like Opioids, NSAIDs, Ketamine along with sedative agents like Propofol, Benzodiazepams are used to achieve this goal.

Occasionally discharge of patient is delayed due to persistent sedation, nausea and vomiting. Analgesic adjuvant may reduce the requirements and related side effects of Opioids and also the recovery time thus enabling patient to early discharge. This study attempted to evaluate in a randomized fashion, the efficacy of local anaesthetic infiltration at site of shockwave impact. Thus this local infiltration of local Anaesthetic agent will reduce the need of analgesic agent and early discharge.

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## Objective

- To determine whether infiltration of local anaesthetic agent at the shock wave site will reduce the need of intravenous analgesic requirement (Ketamine)
- To determine its effect on the duration of stay after the procedure in the recovery room.

## Materials and methods

This is a study done in randomised fashion in 120 patients of grading ASA I and ASA II undergoing elective ESWL for Renal calculi, calculi at pelviureteric junction and upper ureteric calculi. Patients were asked to maintain at least six hours of nil per oral (NPO) on the day of ESWL.

On arrival in lithotripsy unit, all patients were well explained about the procedure, written informed consent was taken. They were advised not to make any movement during the procedure. They were also instructed to ask for analgesic drugs for intolerable pain or discomfort during the procedure. All patients received supplemental oxygen via nasal prongs (2lit/min). Monitoring included that of blood pressure every 5 minutes by automated non invasive method and continuous monitoring of pulse oximetry and electrocardiogram. An intravenous line was opened with Normal saline (1 lit. bag). All patients received injection Diclofenac Sodium 50-75 mg intramuscular STAT (Those with weight below 50 Kg received 50 mg and above 50Kg received 75 mg) 15 mints before the procedure, to counter intra and post procedural pain. All patients also received injection Metoclopramide 10 mg, and injection Gentamicin 60-80 mg intravenous STAT. Injection Diazepam 10 mg and then Injection Ketamine 10 mg I/intravenous very slowly given with close monitoring. Fluoroscopy and localisation of stone was done by consultant urologist. After localisation of stone, the impact site was identified in randomised 60 **study group**, where 20 ml of 1%Lidocaine was infiltrated. ESWL was started 5 minutes after the infiltration, where as in **control group**, no infiltration was done and procedure started directly after localisation of stone. In the middle of the procedure all patients received 20 mg intravenous injection of Lasix immediately. During the procedure, when the patient complained pain or could not lie still due to discomfort, additional dose of Ketamine (10mg) was added. At the end of procedure, total duration (time) of shockwave treatment and total received dose of Injection Ketamine was noted. Shockwave lithotripsy was performed by ESWL Machine (Direx Medical System, Compact Tripter, Ellipsoid reflector with shockwave coupling of water cushion. (**Electro hydraulic lithotripsy**) C-arm Digiscope RX2.

After completion of procedure, patients were transferred to recovery room. In recovery room patients vitals are

monitored and any other complications like nausea, vomiting, hallucination were noted.

When patient was fully conscious, well oriented and could walk without assistant, they were discharged with all necessary advice. Duration of stay in recovery room was also noted. Results was analysed using SPSS 11.5. Study period was of 15 month (July 2006-Oct 2007).

## Results

In regards to age distribution, in Control Group, minimum age was 20 yrs and maximum age was 70 yrs with mean age 36.95yrs, where as in Study group minimum age was 15 yrs and maximum age was 65 yrs with mean age 35.37yrs. P value of the age difference of the two groups is 0.462 which is not significant.

Regarding Sex distribution, in control group out of 60 patients 39 were male (65%), and 21 were female(35%), where as in Study Group , 34 patients were male(57%) and 26were female(43%) and P Value is 0.35 which is also not significant.

Regarding Weight distribution in Control group, minimum weight was 42 Kg and maximum Weight was 103 Kg with mean weight 64.40 where as in Study Group, minimum weight is 40 Kg and maximum weight was 81 Kg with mean weight 61.05. Thus P Value in these two group is 0.124, which is not significant.

Regarding duration of shockwave treatment, In Control Group, Minimum time required to complete procedure was 10 minute and maximum time required was 58 minute with mean time required was 38.68, where as in Study Group minimum and maximum time was 12 and 15 minutes respectively with mean value 35.60. Thus P Value in these two Group is 0.76 which is not significantly difference.

In Control Group Minimum dose of Injection Ketamine required for the procedure was 20 mg and maximum dose was 100 mg with mean required dose is 52 mg where as in Study Group minimum dose required was 10 mg and maximum dose was 40 mg only with mean dose is 25.08. Thus the P value is 0.00 which is significantly different.

In Control Group , Discharge time after procedure, minimum time was 40 minute and maximum time was 300 minute with mean 162.50 where as in Study Group, minimum time was 30 minute and maximum time was 180 minute with mean value 81.35. Thus P value is 0.00 which is significantly different.

Thus in conclusion of above study result, there was no significant difference, between the two treatment

groups with respect to age, weight, sex distribution and total duration of shockwave treatment. Whereas there was significantly difference, between the two treatment groups in total dose requirement of Ketamine and duration of stay in recovery room.

After procedures, Patients were kept in recovery room with close monitoring till discharge. During stay in

recovery room, there was mild hallucination in nine (9) patients, out of which 5 were from control group and 4 from study group. Thirteen patients experiences Nausea, 8 were from control group and 5 were from study group, where as 4 patients vomited, 3 from control group and 1 from study group. These complications might be due to Ketamine.

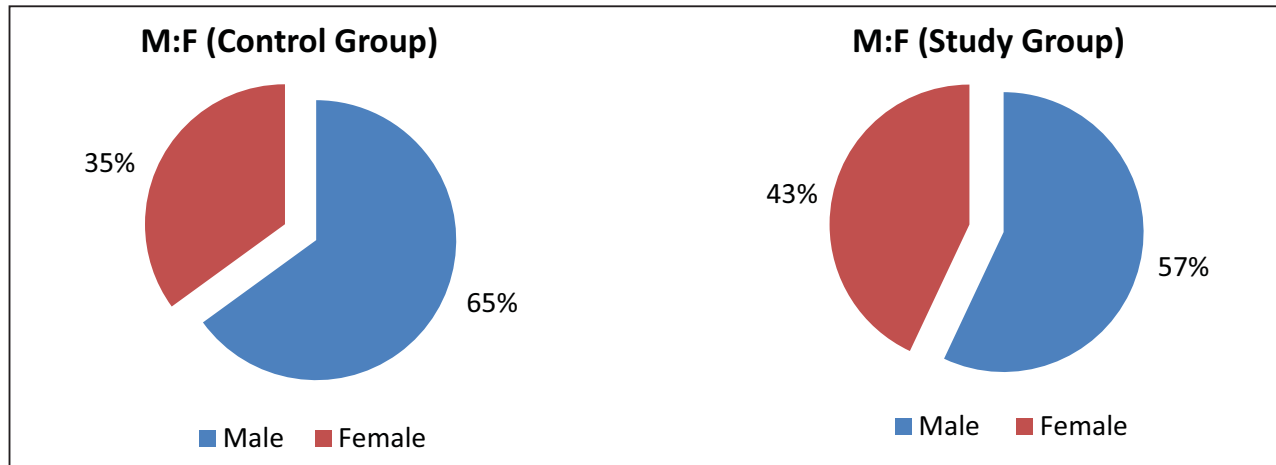


Fig 1: Sex distribution of control and study group

Table 1: Age distribution of control and study group

	Minimum	Maximum	Mean	Std. Deviation	P value
Control Group	20	70	36.95	12.243	0.462
Study Group	15	65	35.37	11.237	

Table 2: Weight Distribution in control and study group

	Minimum	Maximum	Mean	Std. Deviation	P value
Control Group	42	103	64.40	11.861	0.124
Study Group	40	81	61.05	11.821	

Table 3: Time of shockwave treatment

	Minimum	Maximum	Mean	Std. Deviation	P value
Control Group	10	58	38.62	9.872	0.76
Study Group	12	50	35.60	8.510	

Table 4: Total dose of Ketamine in control and study group

	Minimum	Maximum	Mean	Std. Deviation	P value
Control Group	20	100	52	17.399	0.00
Study Group	10	40	25.08	7.393	

Table 5: Time to discharge in control and study group

	Minimum	Maximum	Mean	Std. Deviation	P value
Control Group	40	300	162.50	63.942	0.00
Study Group	30	180	81.35	30.048	

## Discussion

Extracorporeal shock wave lithotripsy is now considered the treatment of first choice for the majority of urinary tract calculi. Whether the pain perceived is due to cutaneous or deeper visceral afferent stimulation is unknown. Pain during lithotripsy is reportedly due to cavitation mediated stimulation of nerve fiber<sup>3</sup>. Intra and Postoperative discomfort following ESWL is considerably less than with operative techniques stone management. A wide variety of day care anaesthetic technique has been successfully used for ESWL.

However studies of local infiltration of Local anaesthetic infiltration at shock wave impact site are very few in number. Loening et al in 1987 reported the efficacy of local infiltration with Lidocaine for ESWL suggesting there was a cutaneous component to the pain induced by the lithotripter<sup>4</sup>. Similarly Yilmaz E et al also found in their study that Prilocaine infiltration decreases the additional need of analgesic drugs and concluded that Prilocaine infiltration alone can be used for analgesic purposes efficiently and safely during ESWL with minimal morbidity. In their study of 114 patients randomized to two groups- Group I receiving intramuscular Inj. Diclofenac Na where as Group II received prilocaine infiltration. Pain scores for group II was statically lower compare with scores for Group I<sup>5</sup>. But In our study to standardize the study methods, we gave Intramuscular Diclofenac Na to both groups and we got better results. Whereas Arzu K et al reported that in their study they found local anaesthesia infiltration did not decrease the requirement of intravenous analgesic drugs<sup>6</sup>. This disparity in results compared to our study could be explained by the fact that they did not give pre procedure and during procedure analgesia. In Our study we had given injection of Diclofenac to both the groups pre procedure and Inj Ketamine during procedures. Bierkens et al reported reduced Opioid requirement when EMLA cream was used as a supplement during lithotripsy in a second generation lithotripter at the shockwave entry site<sup>7</sup>. However Sugantha Ganapathi et al concluded in their study that EMLA cream does not reduce opioid requirement during ESWL<sup>8</sup>. Similar study done by Tritrakarn T et al concluded that EMLA and placebo creams under occlusive dressing reduced pain during ESWL compared with control group. The presence of the cream itself as a coupling medium contributed to analgesia and is useful, simple, safe, and economical adjuvant technique<sup>9</sup>. Yilmaz E et al did an study evaluating the efficacy of music on sedation during ESWL procedure and concluded that listening to music by patients is a feasible and convenient alternative to sedatives and anxiolytics<sup>10</sup>.

In our study, the higher numbers of complication were noted in the study group compare to the control

group. This may be explained by higher requirement of Ketamine in the study group. It was supported by the fact that in Control group 100 mg Ketamine received by 2 patients and both of them had mild hallucination with vomiting. Similarly, in Study group also, Among the 4 patients who had received highest dose of Ketamine of 40 mgs, two of them had mild hallucination and nausea.

Though this complication of Ketamine is well known, because of its safety profile in outpatient procedures, cheap and easy availability we chose this drug. Expecting such adverse effects of Ketamine we used Inj. Metoclopropamide 10 mg I/V and Inj. Diazepam 10 mg I/V in all patients just before the procedures.

## Conclusion

Thus in this study we concluded that local anaesthetic infiltration will reduce the need of intravenous analgesic agent and decrease the duration of stay in recovery room after the procedure. This may be a useful, simple, safe and economical adjuvant technique to reduce pain and facilitate early discharge from the recovery room.

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