OUTCOME OFEXTRACORPOREAL SHOCK WAVE LITHOTRIPSY IN STONE CLEARANCE WITH AND WITHOUT DJS

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ABSTRACT

We prospectively see the outcome of extracorporeal shock wave lithotripsy in patients with renal and proximal ureteral calculi upto2 cm and 1cm respectively in size with and without djs insitue who were treated at our lithotripsy center. Patients were placed before lithotripsy treatment were subjected to higher levels of total power 3000 shocks (shocks times voltage), yet the rate free of stones did not differ from those treated without a stent. In addition, the patients with internal ureteral stents experienced a significantly higher incidence of lower urinary tract symptoms. Urinary urgency (43 versus 25 per cent) and hematuria (40 versus 23 per cent), Suprapubic discomfort than nonstented patients, respectively. The results suggest that use of an indwelling ureteral stent may not contribute to a higher rate free of stones for the treatment of small to medium sized renal calculi and in fact it may decrease the auxiliary treatment like PCNand DJS at the cost of significant of LUTS. Of course in selected cases (solitary kidney, large stone burden and aid in stone localization) ureteral stenting has a useful adjunctive role in extracorporeal shock wave lithotripsy.

Key words: ESWL, DJS, Hydronephrosis, Stainstrass

INTRODUCTION

Up to 12 percent of the population will have a urinary stone during their lifetime, and recurrence rates approach 50 percent[1] .In the United States, white men have the highest incidence of stones, followed in order by white women, black women, and black men.[2,3] Fifty-five percent of those with recurrent stones have a family history of urolithiasis[4] and having such a history increases the risk of stones by a factor of three.[5]In cases where there is a solitary calculus in the distal ureter, the degree of urinary obstruction caused by the stone does not the success of stone clearance with SWL.[6]Pretreatment stenting provides no advantage over in situ shock wave lithotripsy for significantly obstructing ureteral calculi. Shock wave lithotripsy is reasonable initial therapy for ureteral stones 2cm or less that cause moderate or severe hydronephrosis.[7]Placement of DJ stent for the purpose of improving free stone rate or enhancing the passage of the fragments during SWL is unnecessary in renal stone with diameters less than 2.5 cm.[8]The systematic review suggested significant advantages of stenting before extracorporeal shock wave lithotripsy compared to in situ extracorporeal shock wave lithotripsy in terms of Steinstrasse. However stenting did not benefit stone-free rate and auxiliary treatment after extracorporeal shock wave lithotripsy and it induced more lower urinary tract symptoms.[9]In cases where there is a solitary calculus in the distal ureter the degree of urinary obstruction caused by the stone does not affect the success of stone clearance with SWL[10].The use of double-pigtail stents is not beneficial in patients with a moderate stone burden. Double-pigtail stents are associated with considerable patient discomfort but no decrease in symptomatic ureteral obstruction or final stone eradication rate[11]. Although ureteral stents are associated with more irritative symptoms their use resulted in fewer hospital readmissions and emergency room visits compared to when no stent was used to treat solitary kidney stones of 10 to 20 mm or solitary proximal ureteral stones less than 20 mm. Size 4.7Fr stents may be preferable over 7Fr stents when used in conjunction with shock wave lithotripsy[12].A high success rate and a low complication rate were achieved in renal and ureteral stone cases with and without prior ureteral stent placement. Total energy needed to achieve a stone-free state did not differ between stented and nonstented ureteral cases suggesting the absence of a significant influence of the stent. Overall stents decreased complications necessitating hospitalization and auxiliary invasive procedure[13].ESWL is an effective and reasonable initial therapy in the management of impacted upper ureteral stones measuring up to 2 cm. Pre-ESWL ureteral stenting provides no additional benefit over in situ ESWL. Moreover ureteral stents are associated with significant patient discomfort and morbidity[14].Ureteral stents do not reduce post-ESWL complications. They are clearly associated with morbidity and do not improve stone passage markedly. Therefore patients with a stone burden of more than 2cm should be treated in situ without auxiliary stenting[15]. The use of double-J stents

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prior to ESWL treatment is not beneficial[16].The study conducted by Kanao K et al demonstrated that stone size, location and number are significant predictors of extracorporeal shock wave lithotripsy outcome[17].Pre eswl JJ stenting for a 2 cm +/- 2 mm renal stone was not beneficial in terms of steinstrasse, fever, stone clearance and number of ESWL sessions. However ureteric colic was significantly less in the stented group. Lower urinary tract symptoms (LUTS) were also significantly high in the patients having a JJ stent. JJ stenting does not prove to be a cost effective procedure when compared to the reduction in complications[18].Extracorporeal shock wave lithotripsy is the treatment of choice for proximal ureteral calculi because it is less morbid than percutaneous approaches and provides significantly better results than ureteroscopy. An attempt at manipulation of proximal ureteral calculi back into the kidney should be made before extracorporeal shock wave lithotripsy[19]. Stone size and site, renal morphology and shock wave energy are the significant predictive factors controlling steinstrasse formation. If a patient has a high probability of steinstrasse formation, close followup with early intervention or prophylactic pre-eswl ureteral stenting is indicated. The site and transverse diameter of the stone and the presence of a ureteral stent are the only significant predictors of success of ESWL therapy for ureteric stones.The use of J stenting before lithotripsy significantly lowers the incidence of steinstrasse in patients with a stone burden of 1.5-3.5 cm. The incidence of steinstrasse increases with the size of the calculi whether or not a J stent is present. J stenting has no apparent effect on the mode of presentation or the subsequent management of steinstrasse[20] .ESWL in situ is the treatment of choice in ureteral lithiasis and has been demonstrated by many groups[21]. The size and degree of stone impaction have a negative influence on the results. Resistance to fragmentation, which is basically determined by stone chemical composition, influences the results. Monohydrate calcium oxalate stones have been found to be the most resistant. Previous insertion of a catheter (double-J or nephrostomy) does not enhance the results. It appears to be useful during an episode of renal colic. Distal ureteral calculi can be treated by ESWL and URS. If a lithotripter is available, ESWL without endoscopic procedures is the first choice.[22]

MATERIALS AND METHODS

This comparative randomized control study was performed in institute of kidney disease hayatabad Peshawar from March 2011 to July 2013**.** The mean size of nonstentedvs stented renal and proximal ureteral stones was upto 2cm and 10 mm respectively. All the patients were randomly allocated to ESWL and half of them were stenting with double coil 6fr stent and half were without stent. Patients were treated with the Dornier HM3 lithotripter. Plain X-ray film was done for all patients after one and 3 months and monitored for stone-free rate;number of days lost from work, number of patients requiring rehospitalization, emergency room visits, irritative voiding symptom score and pain symptom score, fever and steinstrasse .Patients was followed up for at least 3 months.

RESULTS

A total of 200 patients who met the aforementioned criteria were randomized between March2011 to July 2013 into group 1-no stent and group2- 6Fr multi-length stented patients.Among 200 patients the male patients were 140(70%) and female patients were 60(30%). The mean age of presentation was 30 years+10SD.The mean size of nonstented vs stented renal and proximal ureteral stones was upto 2 cm and 10 mm respectively patients were treated with the Dornier HM3 lithotripter. The renal stones were in the pelvis,upper and middle calyx and the ureteric stones were proximal ureteric stones. The total energy applied per stone was 110 +/- 83 vs 150 +/- 89 J and 183 +/- 131 vs 209 +/- 125 J respectively .One session was required in 22% of patients, whereas multiple sessions were required in 78% of patients .The patients were monitored for stone-free rate, number of days lost from work, number of patients requiring rehospitalization, emergency room visits, irritative voiding symptom score and pain symptom score. Pain was graded on a scale from 0 to 10 with 0 meaning no pain, 1-3 mild, 4-6 moderate, and 7-10 severe pain. Patients were followed up for at least 3 months. Plain X-ray film was done for all patients after one and 3 months. The overall stone-free rate in nonstented vs stented renal and ureteral stone cases was 81% vs 79% and 92.4% vs 91.5%. There was no statistical difference in flank or abdominal pain, nausea, vomiting, transient hematuria, temperature or use of analgesics on the first and second day after ESWL in the stented or unstented group. The overall incidence of steinstrasse was 4%. Steinstrasse incidence significantly correlated with stone size and site, the power level of energy which was used for the treatment of stones. The number of days lost from work was approximately 2 with no significant differences between stented and nonstented groups. The hospitalization rate and number of emergency room visits in group1stented (21%) were statistically higher compared to groups 2 nonstented (6%). The irritative voiding symptom score (predominantly dysuria, urgency, frequency, and Suprapubic pain) was statistically higher in the stented group 2(85%) compared to the nonstented group 1-3%. After 3 months we evaluated the results of treatment and post-ESWL morbidity. The group-1 (100 patients) treatment complications consisted of fever in 7, pyelonephritis in 3 and steinstrasse in 6. Of the stented population (100 patients) treatment complications consisted of fever in 3, pyelonephritis in 1, steinstrasse in 4 patients. Auxiliary measures (PCN, DJS,URS) were required after shock wave lithotripsy for renal and ureteral stones in 4% and 11% of nonstented and in 1.3% and 2% of stented cases respectively.

DISCUSSION

Stonecomposition can play an important role in the processes of fragmentation and subsequent elimination of these fragments. Calcium oxalate dehydrate stones have a better coefficient of fragmentation than calcium oxalate monohydrate stones.Hochey et al described a higher retreatment rate for calcium oxalate monohydrate stones,compared to stones composed of calcium oxalate dehydrates [23]. In conjunction with ESWL most urologists prefer to use a stent for stones larger than 20 mm to prevent the risk of Steinstrasse. Most guidelines recommend ESWL as the first line treatment for ureteral and renal calculi smallerthan 20 mm[7].In our study we use a 6fr djs stent with a size of renal stone upto 2cm. Successful stone-free rates with ESWL were reported by several authors [21]. The evaluation of success after ESWL implies not only the complete disintegration of the calculus but also the subsequent spontaneous passage of the fragments. Therefore the success of ESWL is closelyrelated to the problem of residual fragments after ESWL.[24] Bier kens and kirkali found that stone-free rate in the stented group was not significantly different from the non stented group.However D-J stenting before ESWL provided no additional benefit compared to in situ ESWL. Stenting did not improve the stone-free rate. We also found no significant difference of stone free rate after ESWL with djs and without djs.The use of ureteral DJS prior to extracorporeal shockwave lithotripsy is controversial.[2]The incidence of Stein strasse in the stented group was similar to that in the stent less group. It was noted that DJ stenting had no statistical significance over stone clearance. A recent randomized study also reported that the routine use of internal stents before ESWL does not improve outcome in terms of stone-free rate .[17]In the last few years several centers have investigated the effects of ureteral stenting before ESWL on Steinstrasse and other post-ESWL complications.[6]Most patients with Stein strasse were reported in the study by Al-Awadi et al and the stone size was larger than 20 mm[21].We found insignificant difference of steinstrasse formation after ESWL with stenting and without stenting. Sulaiman et al[25] found that the incidence of steinstrasse was 6.3%. The clearance rate of stone (77–85%) within 3 months is reportedand establish SWL as a treatment of choice for renal and proximal ureteral stones without stone manipulation.[11]Success rates of >90% reported by several authors for SWL.[16] Recently most studies have reported clearance rates ranging from 78% to 86.7% for renal, and 84.2% to 88.7% for ureteric stones [4]. The most important factor in predicting the outcome of ESWL in urinary calculi was the stone size and found that the smaller <8-10mm renal and ureteric stones are significantly better cleared than larger ones. Lam et al who achieved stone clearance rates of 74% and 43% for stones <10mm and >10mm respectively[26].Logarakis et al El-Damanhoury et al and Mobley et al who showed that increase in stone burden either by an increase in the stone size or number (i.e. multiple stones), leads to decreased effectiveness of ESWL and increased necessity of ancillary procedures. Recently in an excellent article clearance rates for stone located at upper, mid and distal ureter were 82%, 73% and 74% respectively [10]. Delakas et al [27] declared distal ureteric stones and stone>10mm to be the strongest independent predictors of failure of ESWL in ureteric stones. Yet we did not find any significant difference between clearance of proximal ureteric calculi (75%), and renalpelvic and upper and middle calyx ureteric calculi (78.6%). Stenting is not mandatory for medium to large renal calculi before ESWL without increasing incidence of Stain Strasse also avoids stent related morbidity, such as pain, discomfort, bladder irritability, infection and encrustation. In addition, forgotten stents can lead to significant morbidity as result of severe encrustation.[28]The systematic review suggested significantly advantages of stenting before extracorporeal shock wave lithotripsy compared to in situ extracorporeal shock wave lithotripsy in terms of Steinstrasse. However stenting did not benefit stone-free rate and auxiliary treatment after extracorporeal shock wave lithotripsy and it induced lower urinary tract symptoms[29]. Thus patients with a D-J stent have frequent and evident LUTS attributed to bladder irritation by the stent itself acting as a foreign body. Moreover in our review the incidence of LUTS was significantly higher in the stented group than in the nonstented group. Furthermore these symptoms may be sufficiently severe to affect patient quality of life. In our review significantly differences were not found in hematuria, fever, urinary tract infection, pain and analgesia, auxiliary treatment, nausea and vomiting between the 2 groups. Some of the included trials reported that patients may be prescribed an antibiotic for UTI before ESWL or routinely used analgesic after ESWL[30]. We also used in our series the antibiotic before ESWL in stenting group and analgesic after ESWL without stenting group but did not find any statistical difference between the two populations.

CONCLUSIONS

A high success rate and a low complication rate were achieved in renal and ureteral stone cases with and without prior ureteral stent placement. Overall stone-free rate was notsignificantly different between stented and nonstented ureteral cases, suggesting the absence of a significant influence of the stent in improving stone passage markedly. Although ureteral stents are associated with more irritative symptoms but Overall stents decreased complications necessitating hospitalization and auxiliary invasive procedure

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