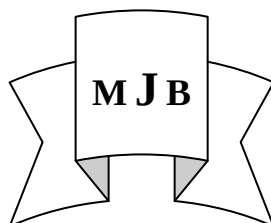


Role of Double J Stent in Patients with Renal Stones Undergo Extracorporeal Shock wave Lithotripsy

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Abstract

Objective: to compare the outcome of extracorporeal shock wave lithotripsy for renal stones with and without double J stent.

Patients and Methods: A comparative cross sectional study was carried out at the urological department of Al-Hilla teaching hospital from February 2011 to August 2011. Forty patients with renal stones measuring from (2cm_2.5cm) were selected for the treatment by extracorporeal shock wave lithotripsy (ESWL). All of these patients were adults with normal renal function and had unilateral radiopaque renal stones, no metabolic abnormalities, no symptomatic urinary tract infection. Children, renal failure and patients with lower caliceal stones were excluded from the study. They were divided in two groups of 20 each. Group A patients underwent ESWL without a double J stent and in group B a double J stent was placed before ESWL. Electrohydraulic lithotripter machine (PCK lithotripter, Turkey), was used to impart shock wave. 2000 shock wave were given in a session. Both the groups were compared for stone fragmentation, incomplete stone clearance, clinically insignificant stone fragment, steinstrasse, stone free rate, renal colic, fever, hematuria, dysuria, and number of ESWL session.

Result: Regarding stone fragmentation in group A (stentless), 19 patients had stone fragmentation from total number of patients of 20 which account 95% while in group B (stented), 18 patients develops stone fragmentation from total number of patients of 20 which account 90%. Incomplete stone clearance occurs in 4 (20%) patients without DJS and in 8 (40%) patients with DJS. Clinically insignificant stone fragments encounter in 3 (15%) patients in stentless group and also in 3 (15%) in stented group.

Steinstrasse developed in 1 (5%) patient without DJS and none in patients with DJS.

Stone free rate encounter in 11 (55%) patients in stentless group and 7 (35%) patients in stented group.

Renal colic developed in 9 (45%) patients without DJS and in 3 (15%) patients with DJS. Hematuria encounter in 12 (60%) patients without DJS and in 15 (75%) with DJS.

Fever not encountered in patients without DJS and developed in 15 (75%) patients with DJS.

Frequency developed in 2 (10%) patients without DJS and in 10 (50%) patients with DJS, while dysuria developed in 3 (15%) patients without DJS and in

10 (50%) patients with DJS.

Conclusion: pre ESWL double J stenting for 2-2.5 cm renal stone was not beneficial regarding stone fragmentation, stone clearance, steinstrasse and stone free rate, however renal colic was significantly less in stented group. Fever and lower urinary tract symptoms (LUTS) was significantly higher in stented patients.

الخلاصة

الغرض من الدراسة: مقارنة النتائج النهائية لعلاج حصاة الكلى بجهاز تقطيت الحصى خارج الجسم مع وضع قسطور الحالب من عدمه.

طريقة العمل: دراسة مقارنة مقطعية اجريت في شعبة الجراحة البولية في مستشفى الحلة التعليمي للفترة من شباط ٢٠١١ الى اب ٢٠١١.

أربعون مريضاً لديهم حصاة الكلى وبطول (٢-٥.٢) سم عولجوا بجهاز تفتيت الحصى خارج الجسم وجميعهم من البالغين مع وظائف كلية طبيعية ولديهم حصاة الكلى الوحيدة المشخصة شعاعياً وتم استبعاد جميع المرضى الذين لديهم فعاليات أبطية غير طبيعية والذين لديهم أمراض في المجاري البولية والذين لديهم أعراض فشل كلوي والذين لديهم حصى في الفص السفلي للكلية.

تم تقسيم المرضى الى مجموعتين، المجموعة أ: تم تفتيت حصاة الكلى بدون قسطور الحالب. المجموعة ب: تم تفتيت حصاة الكلى مع وضع قسطور الحالب. كلتا المجموعتين عولجوا بجهاز تفتيت الحصى خارج الجسم من نوع تركي المنشأ، تم اعطاء المريض ٢٠٠٠ ضربة في كل جلسة علاجية. تمت المقارنة بين المجموعتين اعتماداً على: تفتيت كامل للحصى، عدم التخلص من حصاة الكلية بشكل نهائي، أجزاء من حصاة الكلى غير مهمة سريريا، تكون ظاهرة حصاة الطريق اسفل الحالب، نسبة التخلص من حصاة الكلى، المغص الكلوي، التبول الدموي، الحمى، عسرة البول، عدد جلسات العلاج وكثرة التبول.

النتائج: اعتماداً على تفتيت حصاة الكلى الكامل المجموعة أ: ثمانية عشر مريضاً من أصل عشرين (٩٠٪)، أما المجموعة ب: تسعة عشر مريضاً من أصل عشرين (٩٥٪). أما بالنسبة لعدد المرضى الذين لم يتم التخلص من حصاة الكلية بشكل نهائي، بما يخص المجموعة أ: أربعة مرضى من أصل عشرين مريضاً (٢٠٪). أما المجموعة ب: ثمانية مرضى من أصل عشرين (٤٠٪). وبما يخص عدد المرضى الذين لديهم أجزاء من حصاة الكلية الغير مهمة سريريا، المجموعة أ: ثلاثة مرضى من أصل عشرين (١٥٪)، أما المجموعة ب: ثلاثة مرضى من أصل عشرين. وبالنسبة لظاهرة حصاة طريق اسفل الحالب، المجموعة أ: مريض واحد فقط من أصل عشرين (٥٪)، أما المجموعة ب: فلا يوجد مريض تكون لديه ظاهرة حصاة طريق اسفل الحالب. أما بما يخص نسبة التخلص من حصاة الكلى الكلية المجموعة أ: أحد عشر مريضاً من أصل عشرين مريضاً (٥٥٪)، المجموعة ب: سبعة مرضى من أصل عشرين مريضاً (٣٥٪). المغص الكلوي تسعة مرضى من أصل عشرين في المجموعة أ: (٤٥٪)، وثلاثة مرضى من أصل عشرين في المجموعة ب (١٥٪). التبول الدموي خمسة عشر مريضاً من أصل عشرين (٦٠٪)، وتسعة مرضى من أصل عشرين (٤٥٪)، وفي المجموعة أ والمجموعة ب على التوالي. أما بالنسبة للحمى فلا يوجد اي مريض كانت لديه حمى في المجموعة أ وهناك خمسة عشر مريضاً في المجموعة ب (٧٥٪). كثرة التبول فهناك مريضاً (١٠٪) في المجموعة أ، وعشرة مرضى في المجموعة ب (٥٠٪). واخيراً عسرة التبول هناك ثلاثة مرضى من أصل عشرين في المجموعة أ (١٥٪) وعشرة مرضى من أصل عشرين (٥٠٪) في المجموعة ب.

الاستنتاجات: وضع قسطور الحالب قبل اجراء التفتيت بجهاز تفتيت الحصى الخارجي لحصاة الكلى ذات الطول (٢-٢.٥) سم غير مجدي بما يتعلق بتكسير الحصى، الشفاء من حصاة الكلى، ظاهرة حصاة الطريق اسفل الحالب، ونسبة التخلص من حصاة الكلى، ولكن ذا فائدة بما يتعلق بتقليل المغص الكلوي.

Introduction

Urinary stones are common problem in our country because of our geographical location (Iraq lies within stone belt area extending from Indonesia to Egypt)[1]. Urinary calculi are the third most common affliction of the urinary tract, exceeded only by urinary tract infections and pathological conditions of the prostate[2]. It is estimated that at least 10% of the population in the industrialized part of the world is afflicted by urinary tract stone disease. In some geographical area the prevalence is even greater, for instance, in the Arabian countries [3]. Environmental or occupational factors, as well as the presence of any bowel disease associated diarrhea and/or malabsorption, each can predispose to

stone disease. In this case, two factor have been hypothesized: climate induced perspiration resulting in a more concentrated urine, and sunlight-induced vitamin D conversion promoting calcium absorption from the food [4]. For both sexes, the peak age at first is between twenty and thirty years. About three males are afflicted for every female. However there appears to be a changing pattern in as much as stone disease now is becoming more common in young females because stones in the urinary tract may be present but asymptomatic[5,6].

Treatment of ureteric and renal calculi continuous to be refined and improved. Majority of patients with upper urinary calculi are treated with non invasive or minimally invasive methods [7]. Current treatment

modalities of the upper urinary calculi are extracorporeal shock wave lithotripsy (ESWL), various endoscopic techniques like ureterorenoscopy with intracorporeal shock wave lithotripsy, percutaneous nephrolithotomy (PNL), laparoscopic and open surgery[8]. Advent of ESWL as non invasive technique revolutionized therapy for renal tract stones; it is safe and effective in large number of patients [9].

The introduction of shock wave lithotripsy (SWL) for the treatment of renal stones by Chaussy et al. in 1980 has been the revolution of the century[10]. SWL has been proven to be an effective noninvasive treatment modality for most upper urinary tract calculi. The treatment of renal calculi is based on various factors such as size, location, composition of stones, and associated anatomical abnormalities [11]. Stone burden (size and number) is perhaps the single most important factor in determining the appropriate treatment modality for a patient with kidney calculi [12].

ESWL, the least invasive of the surgical methods of stone removal, utilizes an underwater energy wave focused on the stone to shatter it into passable fragments.

It is especially suitable for stones that are smaller than 2 cm and lodged in the upper or middle calyx [13]. It is contraindicated in pregnancy, untreatable bleeding disorders, tightly impacted stones, or in cases of ureteral obstruction distal to the stone. In addition, the effectiveness is limited for very hard stones (which tend to be dense on CT scan), cystine stones, and in very large patients [14].

Renal and ureteral calculi at all locations that require surgical treatment can be treated with ESWL. The overall success for stone less than 2cm is 80-90%[15]. Stone in the lower pole calyceal location and impacted ureteral calculi have a 60-70% chance of

successful fragment [16]. Impacted ureteral calculi may benefit from pre-ESWL manipulation into nonobstructing upper tract position. Ureteral stent is usually placed at the time of manipulation to help fragment clear. In general patients require some type of anesthesia to control pain during ESWL procedures[17]. There is many complications of ESWL like failure to fragment the stone or inadequate fragmentation that occur in 10-20% of treatments, multiple or large fragment that may cause obstruction of the ureter and pain. Additional treatment will be requiring such as repeat ESWL or ureteroscopy [18].

Patients with calculi size between 10 and 20 mm are often treated with SWL as first-line management. Percutaneous nephrostolithotomy (PNL) is often the modality of treatment for stones of more than 20 mm in diameter and some prefer PNL for stone larger than 2.5cm. This is due to the higher retreatment rates and lower likelihood of achieving stone-free state with SWL in comparison of PNL [19]. Some prefer to do pretreatment prophylactic DJ stenting when they prefer to treat larger renal stones (>2 -2.5cm) with SWL due to fear of having complications. In our department, as a policy we do not follow prophylactic DJ stenting even for larger renal stones since patients are closely followed during whole treatment session.

Since its first description in 1967 by Zimskind, the double-J ureteral stent has been an indispensable tool in the urologist's surgical armamentarium. By definition, the double-J or pigtail stent is a catheter or tube placed within the ureteral lumen in a retrograde or antegrade fashion in order to maintain its patency [19]. The pigtail catheter provides a self-retaining capability due to a double coil design at proximal and distal ends that work to securely anchor the stent in the upper urinary tract (renal

pelvis and upper calyx) and the bladder. This prevents stent migration proximally or distally despite urinary flow, patient movement, and ureteral peristalsis.

Ureteral stents play a major role in a wide range of situations where urinary drainage is needed. Urgent indications include cases of obstructive pyelonephritis and intolerable acute renal colic [21], safety indications following endoscopic procedures include ureteral edema or perforation, steinstrasse[22], history of renal failure, and solitary or transplant kidney. Relative indications would still include stone burden larger than 2 cm undergoing extracorporeal shockwave lithotripsy, pregnancy, long- standing impacted stone, recent history of urinary tract infection or sepsis, stent to passive dilate the ureter and or ureteral orifice, prolonged endoscopic operative time (over 45 minutes) and any patient with imminent post-operative plans such as a second-look ureteroscopy [23].

Despite these ultimate indications, ureteral stents are thought to be overused in contemporary urology practice[24].

Stent discomfort can vary from one patient to another in an idiosyncratic manner, but is believed to affect over 80% of patients[25, 26].

Several studies in literature describe the symptoms related to ureteral stents and their respective estimated incidence: irritative voiding symptoms including frequency (50-60%), urgency (57-60%), dysuria (40%), incomplete emptying (76%), flank (19-32%) and suprapubic pain (30%), incontinence, and hematuria (25%) are included [27,28,29,30,31].

This study is aimed at to assess the efficacy of SWL as monotherapy for larger renal stones (2-2.5) cm because this size of stone is controversial whether to start with SWL or PNL and also to assess the safety and the efficacy of the prophylactic DJ stent, after

knowing patients various options treatment.

Patients and Methods

This study had been performed in the urological department of AL hilla teaching hospital between February 2011 to august 2011. It was comparative cross sectional study. We analyzed the hospital record of forty patients (27 male, 13 females) with average age of 31 years.

Those patients underwent ESWL as monotherapy for nonstaghorn radio-opaque renal stone in which the lowest diameter 2cm and the greatest diameter 2.5cm, the following inclusion criteria was used for selecting patients. Adult patients with unilateral radio-opaque renal stone apart from lower caliceal stone in which the greatest diameter 2.5cm and the lowest diameter 2cm, all patient had no metabolic abnormalities, normal renal function, no major renal abnormalities, no previous surgery and no symptomatic urinary tract infections.

Detailed history and clinical examination was performed followed by baseline investigations including serum urea and creatinine and general urine examination. Pretreatment kidney, ureters, and bladder (KUB) plain films, an intravenous pyelography and an abdominal ultrasound were performed in all patients.

Forty patients randomly taken and divided into 2 groups, 1st group underwent ESWL session without insertion of double J stent and the second group planned for insertion of double J stent under local or general anesthesia and then underwent ESWL sessions. All patients of both groups were subjected for shockwave via same electrohydraulic lithotripter machine (PCK lithotripter, Turkey).

Stone localization performed under fluoroscope, treatment was started at 3 Kv and energy increased up to 17 Kv, 2000 shock wave was given for each

patient and the shock wave rate of 100 per minute and some of those patient perform session of ESWL every 2 weeks for a period of 3 months according to the response. All patients were advised to have fluid intake of about 2.5–3 L day. All were instructed to report even the minor complications after treatment and were kept under a close follow-up.

Patients followed after 1week, then every 2 week for period of 3 month. In each visit details history and clinical examination had been taken, asking about fever, number of colic, severity of lower urinary tract symptoms.

Ultrasound and KUB had been performed to show fate of stones, stone fragmentation, stone clearance, development of steinstrasse.

So, for each patient in both groups we evaluated: renal colic, fever, lower urinary tract symptoms, development of steinstrasse, stone clearance, number of ESWL sessions.

A statistical software package (SPSS) was used for all statistical analysis. Comparison between groups were done using Mann U test.

Result

Forty patients complaining of renal pelvic stone were subjected for treatment with ESWL divided into 2 groups. Group A underwent ESWL sessions without insertion of double J stent and

the group B planned for insertion of double J stent under local or general anesthesia and then underwent ESWL sessions.

Mean age of patients in group A 33.8 years, median age in group A 29.5 years while in group B mean age of patients 35.5 years, and median age 31 years, so P value for both mean and median age in both groups > 0.05.

Mean and median stone size of group A are 22.15mm, 22mm respectively, while mean and median stone size in group B are 22mm, 22mm respectively. P value is more than 0.05 for both mean and median stones size. Regarding number of shock wave, mean shock wave number in group A are 7575, while in group B are 8550, P value <0.05.

Regarding stone fragmentation in group A (stentless), 19 patients had stone fragmentation from total number of patients of 20 which account 95% while in group B (stented), 18 patients develops stone fragmentation from total number of patients of 20 which account 90% .

Stone fragmentation define as radiological evidence of stone fragmentation after extracorporeal shock wave lithotripsy , so there is no significant difference in the stone fragmentation in both groups as it does not depend on the present or absence of the double j stent ,P value > 0.05.

Table 1 show stone fragmentation

Group	Number of patients	Percent %
Group A	19	95%
Group B	18	90%

Incomplete stone clearance which define as radiological evidence of stone fragmentation of more than 5 mm. In group A ,4 patients had incomplete stone clearance which account 20% of total number of

patients in group A , while in group B, 8 patient had incomplete stone clearance which account 40% of total number of patient in group B(20). P value < 0.05.

Table 2 show incomplete stone clearance

Group	Number of patients	Percent %
Group A	4	20%
Group B	8	40%

Clinically insignificant stone fragments define as radiological evidence of stone after shock wave lithotripsy of less than 4 mm, had been evaluated in both groups radiologically by ultrasound and KUB during follow up period after patient receive sessions of extracorporeal shock wave lithotripsy and we found in group A , only 3 patient from total number of

patients (20), had clinically insignificant stone fragments which account 15%, while in group B , also 3 patients from total number of patients (20), had clinically insignificant stone fragments during follow up period after shock wave lithotripsy which account 15%. P value = 0.3112, which is >0.05.

Table 3 show clinically insignificant stone fragments

Group	Number of patients	Percent %
Group A	3	15%
Group B	3	15%

Regarding steinstrasse, which define as street of stones accumulated in the ureter following extracorporeal shock wave lithotripsy for renal stone, the stone fragment after shock wave

lithotripsy pass down through the ureter into the bladder sometimes their passage may block resulting in accumulation of these stone fragments in the ureter resulting in steinstrasse.

Only one patient from the group A develops steinstrasse, which account 5%, while no one from group B develop steinstrasse.

Table 4 show incidence of steinstrasse

Group	Number of patients	Percent %
Group A	1	5%
Group B	0	0%

P value = 0.3112 which is more than 0.05 and there is no significant difference in both groups in the development of steinstrasse.

Regarding stone free state defined as no radiological evidence of stone after sessions of shock wave lithotripsy during follow up period asses radiologically; in group A, 11 patients had stone free state after sessions of

shock wave lithotripsy which account 55% of total number of patients (20), while in group B, only 7 patients had stone free rate which account 35%, P value < 0.05.

Table 5 show stone free state

Group	Number of patients	Percent %
Group A	11	55%
Group B	7	35%

Ureteric colic develops after sessions of shock wave lithotripsy; which asses during period of follow up by history and physical examination. In group A from total number of patient(20), 9 patient develop ureteric colic after session of shock wave lithotripsy during follow up period which account 45% of patients, all of them treated

conservatively as an outpatient, while in group B only 3 patients develop ureteric colic after sessions of shock wave lithotripsy during follow up period and they account 15% of the total number of patients in group B (20). P value=0.038, which is less than <0.05.

Table 6 show ureteric colic

Group	Number of patients	Percent %
Group A	9	45%
Group B	3	15%

Regarding hemmaturia develop after sessions of shock wave lithotripsy; which assessed by history during follow up period. In group A, 12 patients develop hemmaturia, account 60% of total number of

patients in group A, while in group B, 15 patients develop hemmaturia which account 75% of total number of patients in group B (twenty). P value >0.05.

Table 7 show incidence of hemmaturia

Group	Number of patients	Percent %
Group A	12	60%
Group B	15	75%

Regarding fever; In group A no one develop fever, while in group B 15 patients develop fever which account

75% of group B. P value =0.00012, which is < 0.05.

Table 8 show incidence of fever

Group	Number of patients	Percent %
Group A	0	0%
Group B	15	75%

Regarding frequency of urination; In group A , only 2 patients from total number of patents in group A (20),

develop frequency which account 10%, while in group B, 10 patients develop frequency of urination which

account 50%. So there is clinical and statistical difference between two

groups as P value =0.0058, mean it < 0.05.

Table 9 show incidence of frequency

Group	Number of patients	Percent %
Group A	2	10%
Group B	10	50%

Dysuria define as burning sensation during urination which evaluated in both group by history during follow up period; in group A , only 3 patients developed dysuria which account

15%, while in group B,10 patients develop dysuria which account 50% of total number of patients in group B (20). P value =0.018 mean P value <0.05.

Table 10 show incidence of dysuria

Group	Number of patients	Percent %
Group A	3	15%
Group B	10	50%

Discussion

The insertion of double J stent during extracorporeal shock wave lithotripsy of renal calculi is controversial. The old rationale was; the use of ureteral stents reduces complication after extracorporeal shock wave lithotripsy (SWL) and contributes to successful stone passage[12]. However, some report noted complications that are attributed to indwelling ureteral stent and concluded that ureteral stents do not reduce post -SWL complications and they are clearly associated with morbidity and do not improve stone passage markedly[12]. Even in patient

with stone burden of more than 2cm treatment without stenting is recommended[31]. One of the main reasons of f this controversy is, whether the stents interfere or enhance the delivery of the stone fragments.

Prelithotripsy stent placement is associated with higher complications, number of sessions require for stone clearance was also higher in stent group[12]. Anatomical, functional and pathologic changes associated with stents are considered to be cause of increase complications in stented patients[19]. Interference with peristalsis, vesicoureteral reflux, submucosal edema, fibrosis and

thickening of ureteral wall, smooth muscle hypertrophy, and mild hydronephrosis etc, are associated with stent use. These changes not only lead to complications but also delay stone clearance rate. As placement of double J stent before ESWL is associated with significantly more sessions of stone clearance and complications, these should be used judiciously according to stone burden, renal anatomy and body habitus.

In our study the main aim was to define whether the ureteral stent facilitate or interfere with passage of the fragments. We therefore selected patients who had renal stone, radio opaque thus stone fragmentation can be observed fluoroscopically, range between 20 mm-25 mm, lower pole stone excluded from the study, normal renal function, no distal obstruction. We divided those patients randomly into two groups, one without double J stent and other undergo prelithotripsy double J stent and compare the difference between two groups regarding stone fragmentation, incomplete clearance of stones, residual stone fragments, stone free, ureteric colic, hematuria, and irritative voiding symptoms.

In our study regarding number of shock wave for patients with renal stones, we notice that the average number of shock wave in group A 7575 while in group B 8515 in which the P value < 0.05, so there is statistical difference between two groups, these mean that patients with double J stent treated with ESWL may need more numbers of shock wave to reach stone free rate and these agree with study perform by Nazim et al[1].

In our study regarding stone fragmentation after sessions of extracorporeal shock wave lithotripsy there is no statistical difference between both groups as in stentless group 19 patient develop stone

fragmentation, about 95% of patients, while in stented group 18 patients develop stone fragmentation, about 90% of patients, so the P value not significant (>0.05), mean there is no statistical difference between two groups as the double J stent had no effect on stone fragmentation in patients with renal stones undergo extracorporeal shock wave lithotripsy. So our study agree with study performed by Preminger et al that show there is no role of double J stent regarding stone fragmentation after sessions of ESWL[24].

Regarding incomplete stone clearance, in our study about 4 patients in stentless group (20 %) had incomplete stone clearance, while in the stented group 8 patients had incomplete stone clearance (40%), so there is statistical difference between two groups as the double J stent decrease the pathway of stone clearance.

Study perform by Abe et al[33] show the incomplete stone clearance in the stented group of patients with renal stone treated with extracorporeal shock wave monotherapy about 54%, while in stentless group about 28.8 % had incomplete clearance, and this study agree with our study. While study performed by Mohammoud Mustafa et al[12] show the incomplete stone clearance in the stented group 18.19% of patients while in the stentless group 3.71 %, so there is no clinical and statistical difference between two groups and this disagree with our study. This may be due to small size of the stones that sustain ESWL in this study.

Regarding stone free rate, in our study the stone free in the stentless group 11 patients, account 55% while in the stented group 7 patients achieve stone free rate, account 35%, so in our study there is significant difference in the stone free rate between both groups

mean the double J stent especially in large stone size may interfere with passage of the stone fragments, and these agree with study done by Mahmoud et al who found that stone free rate not superior in the stented group to that in the stentless group[31]; and so they agree with authors that reported the double J stent does not enhance the passage of the stone fragments after shock wave lithotripsy.

Low et al[11]. Compared 152 and 27 patients with small renal stones (<20 mm) who were treated without or with DJ stenting. There was no significant difference in stone-free rates at 1 month and 3 months (61% nonstented vs. 67% stented group). And these agree with our study that there is no role for pre ESWL stenting in enhance or facilitate the passage of the stone fragments but it sometimes interferes with passage of the stone especially in large size of the stone. And so our study agree with study done by Shouman et al[34], has stressed that DJ stenting is not a prerequisite for success with SWL monotherapy even when treating larger stone bulk (25–35 mm).

Regarding steinstrasse in stentless group only one patient develop steinstrasse while in the stented group no one develop steinstrasse and so there is no significant difference between two groups. Our result agrees with study performed by Beirkens et al[12]. Who does not find any difference in the occurrence rate of steinstrasse with or without double J stent, also our study agree with study performed Mahmoud Mustafa et al(stenting in ESWL). Although study perform by Al awadi et al show that the incidence of steinstrasse related to the size of the stone irrespective of the presence or the absence of the double J stent [35].

Regarding ureteric colic, in our study 9 patients develop ureteric colic in the stentless group, 45% of patients while in the stented group only 3 patients develop ureteric colic, account 15%, so there is clinical and statistical difference between two groups and these agree with study performed by Amar et al who show that there is significant difference between stentless and stented groups, as many patients sustain pain after ESWL in the non stented than those in stented group. Also our study agree with study performed by Nazim et al[21] who encounter the ureteric colic occur in 32.5% in stentless group and only 7% in stented group, also same result in study of chandhoke et al[36]. This means that double J stent decrease incidence of ureteric colic after sessions of ESWL for patients with renal stones.

Our study disagrees with study performed by the Mahmoud Mustafa et al[12]. As show there is no role of double J stent in reducing loin pain after session of ESWL, as no patient was on need of intramuscular or intravenous analgesics in addition of oral medications. Although our study disagrees with study performed by Musa et al[32] reported that there is no statistical difference in pain in both the stented and non stented group. This may be explaining due to different in pain threshold between patients and due to small size of the stones fragments.

Regarding fever, in our study fever (mostly low grade), in about 75% of patient in the stented group, while no fever present in patient without stent, this mean that presence of double J stent in the urinary system consider as foreign body in normally urine culture, so it predispose for infection.

Our study agrees with study performed by Nazim et al[11], and also agrees with study performed by

Musa et al⁽³²⁾. Also agree with study performed Amar et al. as all these study show slightly increase in the incidence of fever in the stented group.

Regarding hematuria, 12 patients in the stentless group which account 60% of the patients develop macroscopic hematuria while 15 patients in the stented group develop hematuria, which account 75% develop macroscopic hematuria, so there is no significant difference between two group, so there is clinical but not statistical difference between two groups, as hematuria occur more in the stented group, and our study agree with study performed by the study done by Nazim et al as he show the incidence of hamaturia is statistically and clinically more in the stented group than that of the stentless group (92.5%, 67.5%), respectively, and also our study agree with study performed by El- Assmy et al[37] who show that hematuria is more in the stented than those in the non stented group. although our study agree with study performed Perminger et al who show increase incidence of the hematuria in the stented group[38].

lower urinary tract symptoms frequency and dysuria more common in the stented group 10%,10% respectively which account 50%,50% respectively while those in the non stented group it occur in 10%,15% respectively, so there is statistical clinical significance between two groups and this due to the irritative effect of the double J stent, and these agree with study performed Chandhoke et al[36], and the study done by El- Assmy et al[37], as they show increase incidence of irritative symptoms in the stented group.

Conclusion

Double J stent neither enhance the passage of stone fragments nor reduce the complications following

shock wave lithotripsy. Stenting is unnecessary during ESWL in renal stones with diameters from 2 cm to 2.5 cm. This comparative study supports the fact that the use of double J stent does not alter the outcome of treatment of patients with (2 - 2.5) cm stone with ESWL with and without double J stent. Further prospective trials should be designed to define the criteria for stented ESWL treatment.

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