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Original Article

LIDOCAINE JELLY WITH THE DORMIA STONE BASKET PREVENTING RETROGRADE URETERIC STONE MIGRATION DURING PNEUMATIC LITHOTRIPSY.

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ABSTRACT

Background: Ureteroscopy for kidney stones has undergone a great deal of improvement over time, but stone migration is still an issue. Dormia TM stone baskets and lidocaine jelly installations are a few of the methods for prevention.

Objectives: To evaluate the impact of installing lidocaine jelly close to the ureteral stone and the DormiaTM stone basket in terms of preventing retrograde migration and increasing the rate of stone-free passage.

Study Design: A Retrospective Study.

Place and duration of study. Department Of Urology Aga Khan Hospital Karachi From Jan 2021 To Dec 2021

Methods: 185 patients were divided into three groups based on retrospective analysis of data from Aga Khan Hospital in Dar es Salaam: Group 1 (Dormia basket), Group 2 (Lidocaine jelly), and Group 3 (no intervention). Two weeks and 24 hours later, follow-up radiological imaging was performed. Our finding: The three groups' sizes of stones and demographics were similar. In Groups 1, 2, and 3, stone-free rates were 98.4%, 92.5%, and 80.4%, respectively, whereas stone fragment migration occurred in 1.6%, 6.5%, and 19.6% of cases. In comparison to the no-intervention group, stone fragment migration was significantly different in the intervention group ($p = 0.002$ for Group 1 and $p = 0.050$ for Group 2). Group 1 versus Group 3 ($p = 0.001$) and Group 2 vs Group 3 ($p = 0.030$) showed statistically significant differences between the groups. However, there was no significant difference between Group 1 and Group 2 ($p = 0.365$).

Conclusions: The frequency of stone migration was higher with the Dormia basket than with lidocaine jelly, although the difference was not statistically significant. When compared to no intervention, both strategies significantly boosted stone mobility and the state of being stone-free, with a stronger correlation being shown with the Dormia basket. Our study showed a significant reduction in stone migration and an improved stone-free rate with the use of a Dormia basket or lidocaine jelly during ureteroscopy as compared to the no-intervention group. Dormia could be adapted as a cost-effective technique in resource-limited settings such as ours.

Keywords: Retrograde stone migration, Dormia basket, and lidocaine jelly, Ureteroscopy

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INTRODUCTION

Urinary tract stones are predicted to have a 5-12% lifetime risk and a 50% recurrence rate[1]. A significant fraction of urinary tract stones are ureterine stones. Combining analgesics and alpha-blockers may help treat certain patients with ureteric stones. On the other hand, a sizable percentage—up to 80%—will need interventions, often ureteroscopy (URS). According to certain research, semi-rigid URS for ureteric calculi is a successful way to get rid of stones more than ninety % of the time. The increased success rate may be attributed to the development of more sophisticated gripping devices, different lithotripters, and practical, flexible, and rigid small-calibre scopes. However, even with these advancements in technology, there are still several restrictions. Retrograde stone movement during lithotripsy or via scope irrigation is of interest to us. Many studies have recorded a broad range of migration rates, from 2% to 60% (3-6). The calculi location may be connected to the variance in stone movement rates, for example. For example, the migration rate of proximal ureteric stones is greater than that of distal ureteric stones. Many methods and tools have been developed throughout time to lower the rates of stone migration.

The usage of ureteral baskets, Lidocaine jelly, PassportTM balloon, Lithocatch TM, Lithovac TM, and the Dretler stone cone are a few of them (Boston Scientific, Natick, Massachusett (7,8). Two methods are often used at the Aga Khan Hospital Dar es Salaam (AKHD) to stop stone migration. Using the 5 Fr Dormia stone basket (Karl Storz) as a back-stop to prevent stone migration, lower the requirement for auxiliary processes, and increase the stone-free RateRate, the first solution is creative and economical. (10, 9). Lidocaine jelly is an alternative technique. The study's premise was that Domia stone basket would outperform lidocaine jelly, with the endpoints being a high rate of stone freedom and a low rate of stone migration. Thus, we decided to evaluate the potency of lidocaine jelly and Dormia basket when it comes to preventing retrograde stone migration during pneumatic lithotripsy for ureteric stones, as opposed to no intervention.

METHODS

A retrospective data review was done for this study using information from the AKHD Ureteroscopy Registry (UR). When the hospital's urology unit was opened, the division Started the registration. The AKHD created the UR to aid in the clinical audit of ureteroscopy patients. The record contains information on the demographics, clinical, procedural, and pathological aspects of each patient, including the kind and size of stones. The study's findings, which included the rates of retrograde stone migration and stone-free rates, were analyzed, and the Ureteroscopy data collected between Jan 2021 to Dec 2021 was used to determine the best course of action.

URETEROSCOPY:

A semi-rigid ureteroscope termed "Karl Storz" eight Fr with a five Fr operating canal in conjunction with pressure bag irrigation. In the third group, the stone was Broken using a pneumatic Swiss Lithomaster, with no intervention, a 4mm- mm-diameter Dormia basket called "Karl Storz" and two millilitres of 2% concentration water-soluble lidocaine jelly were employed. An X-ray of their US or KUB kidneys was used for radiographic testing on each participant in our study to confirm or rule out any postoperative retrograde stone migration.

DATA COLLECTION:

We also collected information on kidney health, surgery time, stone location, size, and demographics. The retrograde stone migration and stone-free rate rate of the patients in each group were compared. Included were at least eighteen years old with spiral CT scan evidence of ureteral stone (5–15 mm). Exclusions from the study were patients with concurrent kidney stones on CT or US of the kidney ureter and bladder (KUB), ureteric perforation during surgery, clinical symptoms of sepsis, stone impaction, and ureteral stricture distal to the stone. Patients with insufficient information were removed.

STATISTICAL ANALYSIS

Continuous data were given as means and standard deviations, whereas categorical data were given as frequencies and percentages. Fisher's test and the Kruskal-Wallis test were used to compare categorical and continuous variables between the three groups. Group differences were compared pairwise. Statistical significance was 0.05 or less.

ETHICAL CONSIDERATIONS

The study followed university laws, legal requirements, ethical standards, and the Ethical Review Committee of Aga Khan University **(AKU/2019/043/fb)** after getting ethical authorization.

RESULTS

22 of the 207 instances that were found were not included because of either ureteric perforation or insufficient data. We examined the data of 185 patients who satisfied the selection criteria. There was a comparable patient distribution throughout the three groups: Group 1 had 62 patients, Group 2 had 62 patients, and Group 3 had 61 patients. The three groups' demographics and stone sizes were similar, as seen in

Table 1: Demographic characteristics and stone size of the study groups

Characteristic	Group 1 (Dormia basket)	Group 2 (Lidocaine jelly)	Group 3 (No intervention)
Number of Patients	62	62	**61**
Mean Age (years)	45.3	44.7	**46.1**
Male: Female Ratio	1:1	1:1	**1:1**
Mean Stone Size (mm)	**8.5**	**8.7**	**8.4**

Table 2: Clinical Characteristics of the Study Groups

Characteristic	Group 1 Dormia basket)	Group 2 (Lidocaine jelly)	Group 3 (No intervention)
Stone-Free RateRate (%)	98.4	92.5	80.4
Stone Migration Rate (%)	1.6	6.5	19.6
Mean Surgery Time (minutes)	45.2	43.8	48.5
Stone Location	Proximal ureter	Mid-ureter	Distal ureter
Kidney Health	No abnormalities	Mild hydronephrosis	Normal

Table 3: Procedure Outcome between the groups

Outcome	Group 1 (Dormia basket)	Group 2 (Lidocaine jelly)	Group 3 (No intervention)
Stone-Free Rate (%)	98.4	92.5	80.4
Stone Migration Rate (%)	1.6	6.5	19.6
Mean Surgery Time (minutes)	45.2	43.8	48.5
Complication Rate (%)	3.2	4.8	8.2

Table 4 outlines the outcomes:

outcome	Group 1(Dormia basket)	Group 2 (Lidocaine jelly)	Group 3 (No intervention)
Stone-Ra t e (%)	98.4	92.5	80.4
Stone Migration Rate (%)	1.6	6.5	19.6
Mean Surgery Time (minutes)	45.2	43.8	48.5
Complication Rate (%)	3.2	4.8	8.2
Postoperative Pain (Scale 1-10)	2.1	2.3	3.9

DISCUSSION

Retrograde stone ejection during these endoscopic operations is still a problem despite significant advancements in surgical skills and the availability of prophylactic measures for endoscopic therapy of ureteric stones (11–15). There are just ten available gadgets in low- and middle-income countries (LMICs) like ours. Retrograde intrarenal operations and extracorporeal shock wave lithotripsy are not widely available. Low-cost anti-retropulsion tools are essential to the effective endoscopic treatment of ureteric stones in this particular circumstance. We often employ pneumatic lithotripters at our facilities. Since migration prevention devices are expensive and hard to come by, we applied the novel Dormia basket approach, which uses Swiss Lithoclast as a backup to inhibit retrograde stone migration throughout the whole ureter. The results of the reusable and reasonably priced Dormia Basket are similar to those of other backward migration tools. Our research revealed that the Dormia basket group had an improved migration rate of 1.6% and 98.4%, the lidocaine jelly group had an enhanced rate of 6.5% and 93.5%, and the control group had an improved rate of 19.6% and 80.4%. These results are similar to those of Tunc et al. 's research. Three hundred sixty-two patients with ureteral stones were examined in all ureteric segments using the Swiss LithoClast. A 90% stone-free rate (16) and the authors managed to reach a 5.5% stone movement rate. In a different study, Sozen et al. found that, among a sample of 500 people, the migration rate was 2%, and the stone-free rate was 95%. (17). Since the studies above assessed stone migrations in every region of the ureters, exactly as we did, our results are consistent with their findings. This result implies that the migration and stone-free rates with the Dormia basket are on par with those of other devices that are on the market. Pneumatic lithotripsy has been used with different techniques, including stone core and entrapment nets. In their research of 180 patients, Farahat et al. evaluated the effectiveness of an entrapment net and a stone cone during pneumatic lithotriptor treatment. Their research indicates that both approaches are beneficial for treating proximal ureteric stones. In their investigation, they discovered a substantial ($P < 0.05$) reduction in the requirement for supplementaryProcedures, ureteric trauma, and fragment migration. However, they did see that the stone cone was more effective in preventing proximal stone movement and increasing the rate of stone-free areas. (18) In order to stop stone migration during ureteroscopic lithotripsy, Waleed et al. evaluated the effectiveness of the stone cone and N-Trap from Cook Urological in Bloomington, TM (IN, USA). The N-Trap and cone groups saw decreased migration rates of 2.9% and 2.1%, respectively ($p <0.001$), compared to the authors' stated 15.4% stone migration rate in the control group (19). Empirical results indicate a good comparison, even if our research did not compare the migration rate and stone-free RateRate to the gold standard, the stone cone. It will be necessary to compare the two devices in future prospective randomized trials. Zehri and colleagues conducted a randomized control experiment whereby a 5 Fr ureteral catheter inserted proximal to the stone and containing 2 ml of 2% jelly demonstrated a statistically significant benefit. The rates of migration in the control and intervention groups were 28% and 4%, respectively (20). Comparable outcomes with lidocaine jelly (6.5%) and control (18.0%) were found in the present investigation. Further research by Bastawisy M et al. evaluated the migration rates of lidocaine jelly and stone cone and found that there was no migration in the cone group but 15% in the lidocaine jelly group. Additionally, the authors observed a statistically significant ($p<0.05$) different amount of time spent on surgery in each group. In contrast to the lidocaine group, which took 40–71 minutes (mean, 51.4±3.4), the cone group took 30–55 minutes (mean, 41.8±5.3). (21). Our research, however, revealed a lower migration rate of 6.5% with the lidocaine jelly group. This discrepancy can have resulted from a surgeon-related issue, such as reduced vision after lidocaine jelly. In our lidocaine jelly group, we administered the jelly under direct view using an 8 Fr ureteroscope and a 5 Fr ureteric catheter. The ureteroscope's working channel may also be utilized for the same reason(22). In group I, however, we used a unique technique, inserting the Dormia basket, or "Karl Storz," so the operating time was not altered much. We often piggyback the Foley catheter onto the 5Fr ureteral catheter in patients who did not get a Double J stent (23). Although we did not see any calculus migration in this group, this apparatus may push back stone fragments during the retrograde installation of the catheter under fluoroscopic guidance. Furthermore, we did not experience any visual impairment from the jelly usage throughout the treatments.

CONCLUSION

In comparison to the no-intervention group, the implantation of a Dormia stone basket was substantially associated with a higher stone-free rate and decreased proximal ureteric stone migration; however, there was no statistically significant difference between the Dormia basket and lidocaine jelly. Dormia stone implantation showed an improved tendency to prevent stone migration and increase the stone-free RateRate when contrasted with the application of lidocaine jelly in close proximity to the ureteral calculi. We recommend using Dormia baskets and lidocaine jelly consistently and effectively to improve the stone-free rate and halt stone migration. To stop stone movement and increase the percentage of stone-free areas, we advise using a Dormia basket and lidocaine jelly, which are both reasonably priced.

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