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Laparoscopic Y-V Pyeloplasty on a Horseshoe Kidney with Perc-Ncircle Mediated Stone Extraction from the Trocar Port

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Abstract

This study features laparoscopic stone surgery and Y-V plasty procedure performed on a 26-year-old female patient presenting with a horseshoe kidney and multiple renal calculi. Port site extraction of ureteric stone allowed successful removal of stones from the renal pelvis and the upper calyx, thereby maintaining the minimally invasive nature of the surgery and obviating the need for the use of specimen retrieval bags. This case underscores the intricacies of managing stone disease with congenital anomalies and emphasizes the utility of laparoscopic surgery combined with endourological elements for its flexibility and adaptability.

Keywords: Horseshoe kidney, laparoscopy, V-Y pyeloplasty

Introduction

Horseshoe kidney is a congenital malformation with an incidence of 1/500 (1,2). This specific malformation occurs as a result of the kidney's ascent being impeded by the inferior mesenteric artery (3). A significant portion, roughly 30-60%, of individuals with horseshoe kidneys may present with kidney stones. These individuals are at a higher risk for ureteropelvic junction obstruction development and prone to developing stone disease with metabolic origin throughout their lives (4). Depending on the size and location of the stones in affected patients, treatments such as ureteroscopy (URS), extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL), or laparoscopic pyelolithotomy can be opted for.

Studies comparing the surgical outcomes of URS and ESWL in patients with horseshoe kidney anomalies and nephrolithiasis signify that URS tends to offer higher stone-free rates (5-9); yet there is still no consensus regarding the superiority of the treatment modalities over the other for horseshoe kidneys with stones larger than 2 cm (9). While percutaneous nephrolithotomy is the preferred treatment in most cases, a meta-analysis conducted by Wang et al. (10) in 2013 revealed that laparoscopic pyelolithotomy outperformed PCNL in terms of both stone-free rates and postoperative complications for patients with stones larger than 2 cm and a horseshoe kidney. Today, with advancements in laparoscopic techniques (i.e., hand assisted laparoscopy, single port surgery), varieties of URS-nephroscopes, and emerging laser technologies stone treatment can be carried out in various ways during a laparoscopic surgical setting. The ports used in laparoscopy allow the use of various endourological instruments in both transperitoneal and retroperitoneal routes (11-13). In this study, we aimed to share video footage of a patient with a horseshoe kidney and a 2 cm stone at the right ureteropelvic junction, using a combination of laparoscopic and endourological tools (Video 1).

Case Presentation

A 26-year-old female patient presented to our outpatient clinic with an excruciating left-flank pain and left-sided abdominal pain. Patient underwent a subsequent computed tomography scan which revealed a horseshoe kidney with a bifid fused extrarenal pelvis on left side. A calculus with a diameter of 18 mm was observed inside the left portion of the pelvis alongside 4 mm and 4.5 mm calyceal stones on the left kidney. After a shared decision-making process, the patient agreed to undergo laparoscopic stone removal and Y-V pyeloplasty.

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In the operating room, under general anesthesia, the patient was placed in a left semi-lumbotomy position. After surgical prepping and draping, a Veress needle-guided access was undertaken through the left edge of the umbilicus. As the inflation had been completed, a 10 mm trocar was inserted into the Veress puncture site. By using the camera through the initial port, an additional 10 mm port was inserted 8 cm caudal to the camera port midway between iliac spine and umbilicus, and a 5 mm port was inserted below the subcostal arch corresponding to "Palmer Point". Following the transperitoneal access, a window into the mesentery was opened and the bulging pelvis was exposed circumferentially. A sling suture was applied using 3.0 polypropylene suture material to ident renal pelvis. Using laparoscopic scissors, sharp dissection was performed along the renal pelvis. A laparoscopic hook and grasper were used together to extract the large stone. The stone was then grasped using Perc-Ncircle and extracted from the 10 mm trocar in proximity to the iliac spine. The trocar port was then replaced and a semirigid 7 Fr URS was introduced through the 10 mm port in adjunct with a laparoscopic aspirator inserted through the 5 mm port. The calyceal stones were also removed using a nitinol stone retrieval basket advanced through the URS. The ureter was spatulated 2-3 cm along its vertical axis, and the defect was closed using 4.0 polyglactin suture in a watertight fashion. A drain was placed through the 5 mm trocar port at the end of the surgery. The drain was removed on the 5th day. No complications regarding the surgery were identified during the follow up at the 1st and 3rd month after the surgery.

Discussion

Horseshoe kidney occurs around the 8th gestational week due to the fusion of the inferior poles of both kidneys below the level of the inferior mesenteric artery (1). Patients are generally prone to stone formation and infections (2,4,5). Laparoscopic pyelolithotomy on anomalous kidneys was first described by Maheshwari et al. (14) in 2004. Since then, several publications have been published featuring the laparoscopic treatment of stone disease in anomalous kidneys. The surgery usually requires flexibility and there is no predefined cut-and-dried methodological approach hence the stone composition, accessibility of the stones, stone burden and the anatomy of the patient may necessitate varying approaches to provide a stone free outcome (1,3,5,7-9). Despite the lack of evidence-based data, there are several case-based studies combining the elements of endourology with laparoscopy reporting excellent outcomes (12,15,16). Even though the anterior PCNL combined with flexible URS is the emerging trend defined in recent years, minimally invasive characteristics and the surgical outcome of the procedure on the anomalous kidney remain controversial (17). The laparoscopic approach combined with endourological elements, on the other hand, was found to be feasible and safe in case-based studies. The evidence level of these data are also low, due to lack of prospective and retrospective cohort studies (12,15,16).

Conclusion

Surgical interventions in patients with horseshoe kidneys necessitate flexibility. This case exemplifies the management of a complex stone disease on an anomalous kidney and demonstrates that laparoscopic approach combined with endourological elements is feasible and safe to perform.

Video 1.

Ethics

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: M.H.G., E.D., S.B.Ö., B.Ö., Concept: M.H.G., E.D., S.B.Ö., B.Ö., Design: M.H.G., E.D., S.B.Ö., B.Ö., Data Collection or Processing: M.H.G., E.D., S.B.Ö., B.Ö., Analysis or Interpretation: M.H.G., E.D., S.B.Ö., B.Ö., Literature Search: M.H.G., E.D., S.B.Ö., B.Ö., Writing: M.H.G., E.D., S.B.Ö., B.Ö.

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