IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 6 Ser. 15 (June. 2019), PP 01-05
www.iosrjournals.org

A Huge Complete Staghorn Calculus: A Case Report

Dr.Aishwarya Umesh Chavan[1], Dr.Anshoo Gandhi[2], Dr.Viraj Shinde[3]
[1](*General Surgery ,Shrimati Kashibai Navale Medical College and General hospital,India)*
[2] *(General Surgery,Shrimati Kashibai Navale Medical College and General hospital ,India)*
[3]*(General Surgery,Shrimati Kashibai Navale Medical College and General hospital,India)*

Abstract: *INTRODUCTION: Staghorn renal stones in a developing country, very often associated with insidious growth, late presentation, complications and recurrence, present an economic burden to the patient and a challenge to the treating surgeon."Complete staghorn calculus" designates a branched stone that occupies the entire pelvicaliceal system.Staghorn calculi cause severe morbidity due to renal failure; infections and death. CASE REPORT: A 38 years old lady resident of Pune, came with the chief complaints of Pain in abdomen on right side intermittently since 5 years not associated with nausea and vomiting.Pain was radiating to the back and increased in frequency since the last 8 days. On per abdomen examination, patient had right renal angle pain.CT KUB was done which suggested of a well defined radiodense staghorn calculus extending into renal calyces 9 x 5.8 x4.3 cm noted in the right kidney.An open Anatrophic nephrolithotomy was done.There was evidence of large complete staghorn calculus with multiple tiny calculi.The calculus weighted 170 gm and its dimensions were 10.2x6.5x4.5cm .Patient was started on oral diet postoperatively on day 2.The postoperative course was uneventful. CONCLUSION: A complete staghorn calculus is very rare.Moreover ,in spite of wonderful advances in endourologic stone surgery, open stone surgery still has its role. In this case such a huge calculus in terms of weight and dimensions is very rare .*

Keywords: *staghorn calculus, anatrophic nephrolithotomy,supersaturation of urine,mechanism of stone formation*

Date of Submission: 08-06-2019 Date of acceptance: 25-06-2019

I. Introduction

Staghorn renal stones in a developing country, very often associated with insidious growth, late presentation, complications and recurrence, present an economic burden to the patient and a challenge to the treating surgeon.[1]

Staghorn calculi can damage the kidney and/or lead to life threatening urosepsis.[2] Upper urinary tract stones that involve the renal pelvis and extend into at least 2 calyces are classified as staghorn calculi . Staghorn stones are large branching stones that fill part of all of the renal pelvis and renal calyces and they can be complete or partial depending on the level of occupancy of the collecting system.[3] The term "partial" or "complete" staghorn calculus designates a branched stone that occupies part or the entire pelvicaliceal system.[2]

Although kidney stones are commener in men , staghorn staghorn stones are less often reported in men compared to women and they are usually unilateral. Due to significant morbidity and potential mortality attributed to staghorn stones, prompt treatment and assessment is mandatory.[3] . Approximately 70% of staghorn calculi are composed of mixtures of magnesium ammonium phosphate (struvite) and/or calcium carbonate apatite. [2.]

II. Case Report

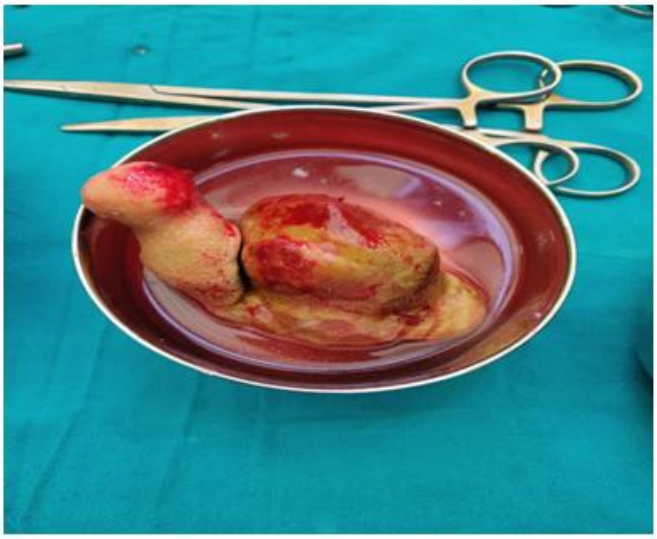
A 38 years old lady $G_3P_3A_0$, resident of Pune came with the chief complaints of Pain in abdomen on right side intermittently since 5 years. Pain was radiating to back, non radiating to pelvis, The pain increased in frequency since the last 8 days .There was no history of nausea , vomiting or irritative lower urinary tract symptoms. No history of any co morbidities or consumption of any medication present.

There was history of taking Ayurvedic Medications for the same since 5 years with improvement in symptoms intermittently. Patient gave surgical history of tubal ligation done 13 years back. On physical examination , patient was found haemodynamically stable. Patient had right renal angle tenderness. Urine analysis showed many bacilli and pus cells 18-20. CT KUB showed a well defined radiodense staghorn calculus 10 x 6.5 x 4.5 cm extending into renal calyces is in the right kidney. Renal DTPA scan showed right kidney function GFR 44 with split function 39.9. Anatrophic nephrolithotomy was done.

Operative procedure

With patient in Left lateral position , Right flank incision was taken. Incision widened, rib cut. Gerotas fascia was longitudinally incised and perinephric fat carefully dissected off the entire renal capsule. Longitudinal Incision was taken on the convex surface of kidney just posterior to the line of Brodel, taking advantage of the converging anterior and posterior blood supply. The stone was exposed and completely taken out. There was evidence of large complete staghorn calculus with multiple tiny calculi along with it. The collecting system was closed , followed by attachment of patch of GEROTAS fascia.

The calculi was of the dimension 10.2x6.5x4.5 cm and it weighed 170 gms. The post operative course was uneventful . Patient was started on oral diet on post operative day 2. And check dress was done on postoperative day 3 showing no evidence of any SSI.



III. Discussion

Renal stone disease is common, with a worldwide prevalence of between 2 and 20% .[4] With its increasing prevalence, they are imposing a significant economic burden for both developing and developed nations.[5] Highest lifetime risk of stone formation has been reported in men in the United Arab Emirates (UAE) and Saudi Arabia (KSA) . Prevalence within Europe ranges more narrowly between 2 and 8%; however , a recent study in Greece found prevalence as high as 15% in a rural population in Thebes . Epidemiological studies in the United States show a trend for increasing prevalence in women

and those living in more southern latitudes: males in the southeast have a prevalence rate of 12% compared with 7% in the northwest.[4]

Nephrolithiasis is responsible for 2 to 3% of end-stage renal cases if it is associated with nephrocalcinosis . Recent studies have reported that the prevalence of urolithiasis has been increasing in the past decades in both developed and developing countries. This growing trend is believed to be associated with changes in lifestyle modifications such as lack of physical activity and dietary habits and global warming.[6]

Renal stone formation is a biological process that involves physicochemical changes and supersaturation of urine. Supersaturated solution refers to a solution that contains more of dissolved material than could be dissolved by the solvent under normal circumstances . As a result of supersaturation, solutes precipitate in urine leads to nucleation and then crystal concretions are formed. That is, crystallization occurs when the concentration of two ions exceeds their saturation point in the solution . The transformation of a liquid to a solid phase is influenced by pH and specific concentrations of excess substances. Thus, crystallization process depends on the thermodynamics (that leads to nucleation) and kinetics (which comprises the rates of nucleation or crystal growth) of a supersaturated solution . [6]

However, it should be noted that stone formation is usually dependent on the level of imbalance between urinary inhibitors and promoters of crystallization. The sequence of events that trigger stone formation includes nucleation, growth, aggregation, and retention of crystals within the kidneys [6]

A staghorn calculus is any stone that branches into more than one part of the collecting system. Staghorn calculi are most frequently composed of mixtures of magnesium ammonium phosphate (struvite) and calcium carbonate apatite; they are strongly associated with UTIs caused by organisms that produce the enzyme urease. [7].Struvite stone was first described by a Swedish geologist named Ulex in 1845.[3] Struvite stones occur to the extent of 10–15% and have also been referred to as infection stones and triple phosphate stones. It occurs among patients with chronic urinary tract infections that produce urease, the most common being Proteus mirabilis and less common pathogens include Klebsiella pneumonia, Pseudomonas aeruginosa, and Enterobacter . Urease is necessary to split/cleave urea to ammonia and CO_2, making urine more alkaline which elevates pH (typically > 7). Phosphate is less soluble at alkaline versus acidic pH, so phosphate precipitates on to the insoluble ammonium products, yielding to a large staghorn stone formation . Women's are likely to develop this type of stone than the male. Escherichia coli is not capable of splitting urea and is not associated with struvite stones[6].Staghorn stones are large branching stones that fill part of all of the renal pelvis and renal calyces and they can be complete or partial depending on the level of occupancy of the collecting system [3].

Over time, staghorn calculi often cause loss of renal parenchyma and function and sometimes lead to potentially fatal sepsis. The primary goal of treatment is to completely remove the stone, preserve renal function, eradicate infections, and relieve obstruction. Failure to completely eradicate the struvite stone virtually ensures the regrowth of the stone.[7] Due to the significant morbidity and potential mortality attributed to staghorn stones, prompt assessment and treatment is mandatory. Conversely, conservative treatment has been shown to carry a mortality rate of 28% in 10-year period and 36% risk of developing significant renal impairment . Staghorn stones are, therefore, significant disease entity that should be managed aggressively and effectively.[3] American Urological Association guidelines for the surgical management of stones emphasize PCNL as first-line treatment. Shockwave lithotripsy is a poor modality to treat staghorn calculi and should be avoided. [7]

Anatrophic Nephrolithotomy

Anatrophic Nephrolithotomy (AN) as proposed by Smith and Boyce in 1968 also known as SMITH BOYCE OPERATION is the most preferred technique for such surgery . Stone free rate of 80%-100% can be achieved as compared with SWL or PNL with preserved renal function . In which an incision into the posterolateral renal parenchyma that provides access to the calyceal system through an avascular plane between anterior and posterior branches of the renal artery ; used for removal of calyceal and branched renal calculi, with maximum exposure yet minimal bleeding or parenchymal damage.[8]

Surgical management of nephrolithiasis has changed dramatically in the last few decades. While previously, the majority of patients required an open surgical approach, today less invasive procedures, such as extracorporeal shock waves lithotripsy (ESWL), ureterorenoscopy (URS), and percutaneous nephrolithotripsy (PNL), have promoted a rapid decrease of the use of open surgery for both ureteral and renal stones . [9]

The subsequent introduction of laparoscopic approach has almost eliminated the need for open operations in the treatment of renal and ureteral stones. Even if anatrophic nephrolithotomy is currently performed laparoscopically, in patients affected by severe cardiac or pulmonary diseases or with a previous laparotomy, laparoscopic approach may not be indicated . AN was designed to minimize renal parenchymal damage but few complications have been reported. A temporary and occasionally a permanent decrease in renal function, significant postoperative bleeding requiring transfusion, vascular wall damage and ischemia/reperfusion injury of kidney due to renal artery clamping and it is technically much more difficult than doing an extended pyelolithotomy.[9]

Han SH et al., reported 24 cases of AN. There were no operative deaths and eight transient postoperative complications. The mean operative time was 250 minutes and mean cold ischemia time was 22.44 (15-25) minutes. They reported an average LOH of 10.3 days and 17.4 days in complicated cases. Postoperative evaluation in 16 out of 24 patients, seven out of 16 (43.8%) had residual calculi (due to lack of intraoperative X-ray) and nine out of 24 had complete clearance. About 14 patients had residual fragments .[9]

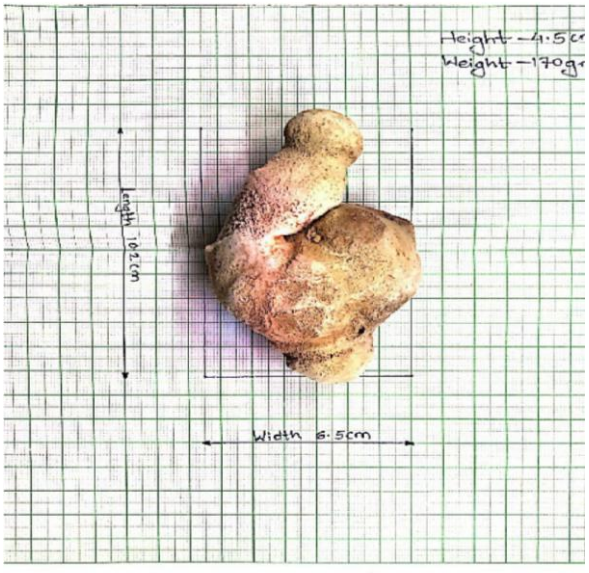
Morey AF et al., reported their experience of 15 cases with a mean operative time of 3.7 hours, mean blood loss of 325 ml and mean hospital stay of 4 days. Three patients had residual stones .[9].In a retrospective study on the 780 procedures performed for stone removal, 42 were open surgical procedures (5.4%) including pyelolithotomy and anatrophic nephrolithotomy in 29 cases (69%). The most common indications for open surgery were complex stone burden (55%); failure of extracorporeal shock wave lithotripsy or endourological treatment (29%) and anatomic abnormalities such as ureteropelvic junction obstruction, infundibular stenosis and/or renal caliceal diverticulum (24%). Average hospital stay was 6.4 days. The stone -free rate after surgery was 93%. In conclusion, open stone surgery continues to represent a reasonable alternative for a small segment of the urinary stone population . For the kidney, the anatrophic nephrotomy is an effective procedure which spares renal function . AN is effective in management of large staghorn calculi, failed minimally invasive approaches and achieves 80%-100% clearance without much need for secondary interventions. Renal function is preserved and with emergence of laparoscopy and robotics, postoperative stay is minimized with expedited recovery and comparable results with open surgery.[10]

This paper presents a case of complete and huge staghorn calculus as well as a discussion of the technique used for the same.

In our case report the weight of calculi was of the weight 170 gms. While Mohammad Kazem Moslemi and Ali Safari reported a staghorn of weight 123 gms [10]

And Alfredo Maria Bove, Emanuela Altobelli and Maurizio Buscarini reported staghorn calculi of weight 150 gms.[9]

Joseph M. Ciccone, J. Clinton McCabe and Robert C. Eyre reported a calculus of 5cm in their case study. [11]Akbar Jalal, Abdolsalam Ahmadi, Mohamed Mubarak, Ameer Al Arrayedh, Sharif Al Arrayedh reported the staghorn of dimension (7 cm × 4 cm × 2 cm)[12] .While the dimensions of calculi in our case study is 10x6.5x4.5.This should indeed be a world record.



IV. Conclusion

A complete staghorn calculus is very rare.Moreover ,inspite of wonderful advances in endourologic stone surgery,open stone surgery still has its role.In this case such a huge calculus in terms of weight and dimensions is very rare.

References

[1]. Anantkumar etall. Management of complete staghorn stones in a developing countries. Indian journal of urology. 2002;19:42-49.
[2]. Dyer RB, Chen MY, Zagoria RJ. Classic signs in uroradiology. Radiographics 2004; 24: S247-S280.
[3]. Akif Diri, Banu Diri. Management of staghorn renal stones. Renal failure 2018;40(1):357-362
[4]. Johri N , Cooper B, Robertson W, Choong S, Rickards D, Unwin R. An Update and Practical Guide to Renal Stone Management. Nephron Clin Pract. 2010;116:c159–c171
[5]. Ramesh Aggarwal, Anshuman Srivastava, Sachin Kumar Jain, Ritika Sud, Rati Singh. RENAL STONES: A CLINICAL REVIEW. EMJ Urol. 2017;5[1]:98-103.
[6]. Tilahun Alelign , Beyene Petros. Kidney Stone Disease: An Update on Current Concepts. Advances in Urology 2018(1):1-12 .
[7]. Philip Zhao. Staghorn calculi in a woman with recurrent urinary tract infections. Reviews in urology. 2016; 18(4): 237–238.
[8]. Ramaiah Keshavamurthy, Vilvapathy Senguttuvan Karthikeyan, Ashwin Mallya, Jayaram Sreenivas, Girish Gurubasappa Nelivigi , Ananth Janarthan Kamath . Anatrophic Nephrolithotomy in the Management of Large Staghorn Calculi – A Single Centre Experience. Journal of clinical and diagnostic research.2017;11(5): PC01–PC04.
[9]. Alfredo Maria Bove, Emanuela Altobelli, Maurizio Buscarini . Indication to Open Anatrophic Nephrolithotomy in the Twenty-First Century: A Case Report.Case Reports in Urology. 2012; 2012: 851020
[11]. Mohammad Kazeem Moslemi ,Ali Safari.A huge left Staghorn Kidney, case report of inevitable open surgery:a case report.Cases Journal .2009;(2):8234.
[12]. Joseph M, Ciccone J, Clinton McCabe , Robert C. Eyre .Case Report: Successful Staged Ureteroscopic Treatment of a 5 cm Staghorn Renal Calculus . Case reports in urology .2012;2012:873069
[13]. Akbar Jalal, Abdolsalam Ahmadi, Mohamed Mubarak, Ameer Al Arrayedh, Sharif Al Arrayedh . Percutaneous nephrolithotomy of a staghorn calculus in a patient with renal angiomyolipoma. Urology Annals. 2019 ; (11) : 229-231 .

Dr.Aishwarya Umesh Chavan. "A Huge Complete Staghorn Calculus: A Case Report." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 6, 2019, pp 01-05..