

An observational study of staghorn calculi in south Sri Lanka

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(Index words: Male preponderance, urinary pH, open surgery, postoperative complications)

Abstract

Objectives To ascertain patient characteristics, management strategies and outcome of patients with staghorn calculi in southern Sri Lanka.

Methods All patients with staghorn calculi seen at the urology unit in a teaching hospital during a period of eighteen months were included in this prospective study. Data in relation to patient demography, investigations, treatment and postoperative complications were collected.

Results There were 60 patients with a mean age of 54 years. Eight (13%) of them were female. Urine pH was less than 7.0 in 52 (87%) patients. Urine culture was positive for bacteria in four (7%) patients. 58 patients underwent open surgery, and two patients were managed non-operatively. Seven (12%) patients developed postoperative complications.

Conclusions Staghorn calculi elsewhere are usually commoner in females and associated with alkaline urine. But in our study there was a clear male preponderance (M:F=6.5:1), and urine pH was alkaline in 8 (13%) patients only. Hence the aetiological factors for staghorn calculi in Sri Lanka appear to be different. Although open surgical procedures which form the mainstay of treatment of staghorn calculi in Sri Lanka can be performed safely and effectively, there is a necessity to provide minimal access surgical facilities.

Introduction

A staghorn renal calculus is one that fills the renal pelvis and extends into at least two major calyceal systems (1). Management of patients with staghorn calculi is a challenging problem. High incidence of intra-operative complications such as damage to the kidney, renal pelvis and ureter, frequent occurrence of residual stones, sepsis related complications, and tendency to recur are some of the problems associated with staghorn calculi (2). Staghorn calculi are unusually common in southern Sri Lanka and constitute a significant portion of the workload of a urological surgeon (unpublished observation). However, information on staghorn calculi in Sri Lanka is limited and reasons for its common occurrence in certain parts of the country remain unclear.

In this hospital based prospective study, we assessed the patient characteristics and management strategies of patients with staghorn calculi seen at the only dedicated urology unit in southern Sri Lanka.

Methods

Data from patients with staghorn calculi treated at the Urology Unit of the Teaching Hospital, Karapitiya over a period of eighteen months (from 1.7.2000 to 31.12.2001) were collected prospectively in a registry. The data included patient demography, investigations done, urine culture and intravenous urography (IVU), treatment given and post-operative complications.

Results

There were 60 patients with 2 patients having bilateral staghorn calculi, making a total of 62 kidneys with staghorn calculi. The mean age at presentation was 54 years (SD 17.3). The age range was 19 to 85 years. There were 52 males, giving a male to female ratio of 6.5:1. In both men and women the highest frequency was in the fifth decade.

Urine pH was less than 7.0 in 52 (87%) patients, and the remaining 8 patients had a urine pH of 7.0 or more. Urine culture yielded a bacterial growth in 4 (6%) patients. The isolated bacteria included coliforms in 3 patients and *Staphylococcus aureus* in one patient. None of the coliforms had characteristics suggestive of *Proteus*.

IVU was performed in all patients and showed function on the affected side in 57 (92%) kidneys of 55 patients. Isotope renogram was performed in 3 patients who had a non-functioning kidney in the IVU. Isotope studies could not be performed in two patients due to logistical problems.

Fifty eight patients (60 kidneys) underwent surgery and two patients were managed conservatively, one with serious cardiac morbidity precluding general anaesthesia and another who was 86 years old with minimal symptoms. The surgical procedures done included pyelolithotomy (28), nephropyelolithotomy (13), extended pyelolithotomy (10), nephrolithotomy (7), lower pole nephrectomy (1) and simple nephrectomy (1). Simple nephrectomy was done in the patient who presented with pyonephrosis and who had a persistent, discharging sinus after drainage of the obstructed kidney and removal of the stone.

Seven (12%) patients developed postoperative complications, including a perinephric abscess after nephrolithotomy (1 patient), superficial wound sepsis (3 patients) secondary haemorrhage (2 patients) and postoperative acute urinary retention when a residual stone fragment fell into the bladder (1 patient). There were no intraoperative or postoperative deaths.

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Discussion

The number of patients with staghorn calculi treated in a single urology unit in UK and USA averages from 7 to 15 annually (1-5). In our study an average of 40 patients with staghorn calculi have been managed during a year, confirming our initial observation that staghorn calculi constitute a significant portion of the workload of a urological surgeon in southern Sri Lanka.

Urinary calculi are commoner in males with a male to female ratio of 3:1 (1). Increased urinary citrate concentration in the urine of women may aid in protecting females from calcium urolithiasis (6). However, one of the persistent findings in European and North American studies is the lower incidence of staghorn calculi in the males (1-9). In some studies females are affected about twice as often as males. This is believed to be due to the higher incidence of urinary infection in the females. In our study male to female ratio was reversed with a clear male preponderance (M:F=6.5:1).

Struvite calculi which usually constitute about 75% of staghorn calculi occur only when the urinary pH is over 7.19 and urine alkalinity is associated with ammonuria (6,7). Such conditions are caused by organisms that produce urease. Only eight (13%) patients had a urine pH of 7.0 or more in our study. *Proteus* species are the most common urea-splitting organism and are identified in more than 75% of patients with struvite stones (6,7). However, in our study *Proteus* species were never isolated.

This indirectly indicates that struvite calculi, which constitute the majority of staghorn calculi in the western world are rarely responsible for them in Sri Lanka.

Non-functioning kidney is a frequent complication of staghorn calculi with some series having nearly 23% of the affected kidneys (1). Most (92%) of the kidneys with staghorn calculi in our study showed some function in the IVU. This could be related to the low incidence of urinary sepsis in our patients.

Staghorn calculi are not "silent" and should always be removed (3,10,11). Surgical removal of staghorn calculi is the preferred treatment, not nephrectomy. In our study 95% of the staghorn calculi were removed surgically. The incidence and pattern of early postoperative complications noted in our study are similar to others (1, 3, 4, 5, 9).

The advent of percutaneous nephrolithotomy (PCNL) and extracorporeal shockwave lithotripsy (ESWL) have significantly changed the management of patients with staghorn calculi. These are used increasingly in the treatment of staghorn calculi replacing open stone surgery (6). However, high volume stone burden and moderate or high pelvicalyceal dilation have been associated with multiple procedures, longer hospitalisation and higher cost when treated percutaneously (5, 8). Hence open surgery is indicated in a subgroup of patients. Mainly due to the lack of facilities, open surgery remains the mainstay of treatment of staghorn calculi in Sri Lanka. Although open surgery has been safe and effective in our study, minimal access surgical procedures have undeniable advantages such as low perioperative morbidity, short hospital stay and quicker return to work (6, 8).

Our study indicates that there are striking differences between Sri Lankan patients with staghorn calculi and similar patients in the developed world. Male preponderance, lower incidence of alkaline urine, less positive urine cultures and less non-functioning kidneys point towards a different aetiology for staghorn stones in Sri Lanka. Open surgery, which is the main modality of treatment in Sri Lanka, can be performed safely with few postoperative complications. But considering the proven advantages of minimal access surgery and the large number of patients seeking treatment for staghorn calculi, provision of facilities for PCNL and ESWL to the Teaching Hospital, Karapitiya is a necessity. More comprehensive clinical and laboratory research is needed to identify the aetiology of Sri Lankan staghorn calculi.

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