

LEARNING FROM IMAGES

Staghorn CalculiPramod Gupta^{*1}, Tushar J. Vachharajani² and Manoj Ketkar¹¹Radiology Department, Dallas VA Medical Center, Dallas, TX, USA²Nephrology Section, W. G. (Bill) Hefner VA Medical Center, Salisbury, NC, USA**Keywords:** Renal stone, *staghorn* calculus, urinary tract infection, struvite, kidney stone.

Staghorn calculi can damage the kidney and/or lead to life threatening urosepsis. On plain radiograph, vast majority of *staghorn* calculi are radio-opaque. Associated caliceal dilatation with *staghorn* calculi is identified on computed tomogram (CT) scan as shown in Fig. (1). A CT scan of a complete *staghorn* calculus with 3D volume rendered image is shown in Fig. (2).

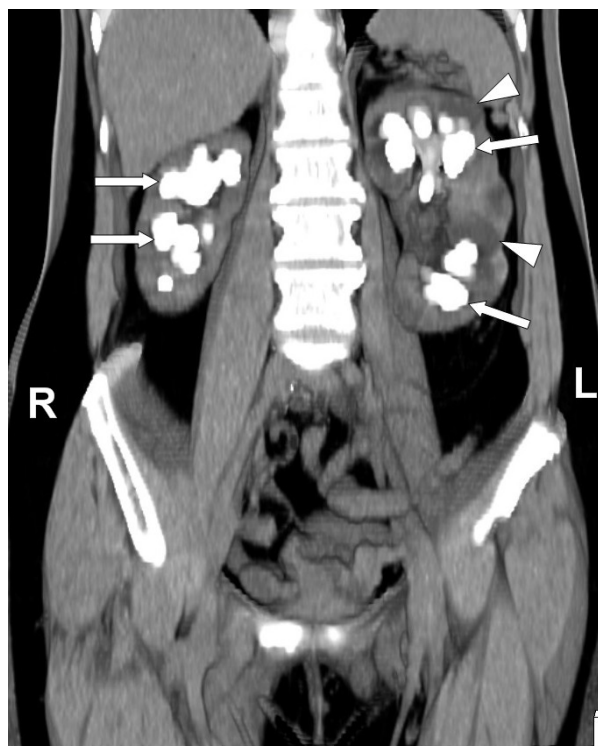


Fig. (1). Bilateral *staghorn* calculi in a 50 year old female patient with recurrent urinary tract infection. Coronal maximum intensity projection non-contrast CT scan image shows calculi filling the renal calices (arrows). Dilated calices are also present in the left kidney (arrowheads).

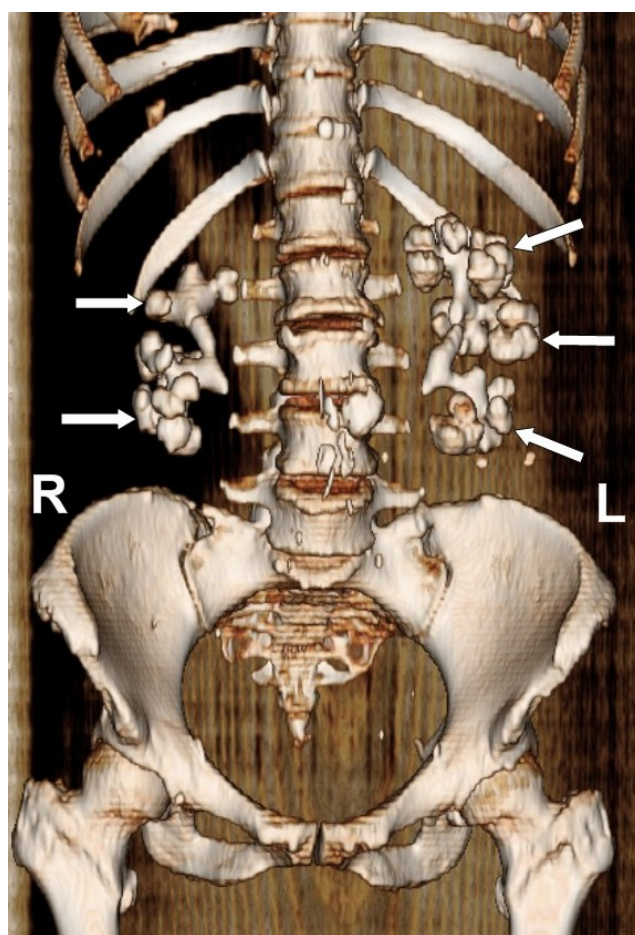


Fig. (2). 3D volume rendered image shows calculi forming a cast of the renal calices and pelvis (arrows), simulating excretory phase pyelogram.

The term “partial” or “complete” *staghorn* calculus designates a branched stone that occupies part or the entire pelvicaliceal system. Approximately 70% of *staghorn* calculi are composed of mixtures of magnesium ammonium phosphate (struvite) and/or calcium carbonate apatite. Cystine, uric acid and calcium oxalate/phosphate components rarely form *staghorn* calculi. The clinical

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characteristics that are commonly associated with *staghorn* configuration include: women, neurogenic bladder, ureteral diversion to ileum and recurrent urinary tract infection with urease producing bacteria (such as *Proteus*, *Klebsiella*, *Pseudomonas* and *Enterobacter*). The generation of ammonia and hydroxide from urea by these bacteria creates an alkaline environment that promotes crystallization of struvite in the urine [1].

Treatment involves complete removal of the stone, as small residual fragments can act as a nidus for infection and recurrent stone formation. The American Urological Association (AUA) has proposed four modalities as potential therapeutic alternatives for *staghorn* calculi: 1. Percutaneous nephrolithotomy (PNL) monotherapy; 2. Combination of PNL and shock-wave lithotripsy (SWL); 3. SWL monotherapy; and 4. Open surgery. AUA recommends nephrectomy for non-functioning kidney with *staghorn* calculi and

avoid SWL for *staghorn* formed predominantly with cystine [2].

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

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Declared none.

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