

Incidental Finding of Bladder Carcinoma during Stone Removal: A Rare Correlation and Upcoming Physician Challenge

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ABSTRACT

Vesical calculi and bladder carcinomas have rarely been correlated and addressed in the literature. Recent publications have noted an association between the two as an upcoming physician challenge. Vesical calculi are now categorized as an etiological factor in bladder carcinogenesis. Chronic bladder stones appear to play a pivotal role in the disruption of the bladder mucosal epithelium. Bladder carcinoma findings tend to be incidental during stone removal; multiple large-scale studies are needed to identify dysplastic changes at an earlier stage.

Screening biopsies and cystoscopies aid in the preliminary diagnosis of bladder tumors. Despite vesical calculi comprising 5% of the cases of urinary tract stones, no effective rationale has been developed to prevent this lethal complication of prolonged stone disease. The size and weight of calculi have been identified as determinants of neoplastic changes. Urinary tract infections have been strongly correlated with the concomitant occurrence of bladder stones. Repeated UTIs may warrant the need to diagnose the presence of calculus and initiate therapeutic intervention. Active surveillance will likely be beneficial for patients with a chronic history of frequent UTIs and bladder stone disease.

Keywords: Bladder carcinoma, vesical calculi, incidental finding, cystoscopy, UTI.

REVIEW

Vesical Calculi: An Upcoming Physician Challenge?

Vesical calculi and bladder carcinomas have rarely been reported as interrelated phenomena in literature. A recent intriguing study highlighted bladder stones as a pivotal factor in bladder carcinogenesis [1, 2]. The specific mechanism through which vesical calculi initiate the occurrence of bladder cancer remains unknown. The occurrence of bladder calculi is quite common; its prevalence has recently increased from 4% to 19.1%, specifically in the Asian subset [3]. The high incidence of bladder calculi poses a threat due to its suspicious role as a carcinogenic precursor and may warrant a high-risk alert to patient subsets who develop urinary calculi as a recurrent pathology [1]. Repeated urinary tract infections according to Wahyudi *et al.* signify the presence of simultaneous bladder calculi [4]. This observation should impose a recommendation for patients with a tendency to develop bladder stones to undergo annual screening for bladder carcinoma *via* cystoscopy.

Bladder Carcinoma, Urinary Tract Stones and Vesical Calculi: An Interrelated Triad

Carcinoma of the bladder has been described as a common condition worldwide; 2.7 million patients either receive a diagnosis of or are treated for bladder cancer annually [5]. It is the second most common malignancy involving the urinary tract system [6, 7]. In 2016, 437,000 new cases of bladder cancer and 186,000 deaths were reported worldwide [8]. In 2020, 573,000 cases of

bladder cancer were diagnosed worldwide, and 212,536 deaths were due to bladder cancer. The World Cancer Research Fund International (WCRF) stated that the rate of diagnosis and death is substantially higher amongst males in comparison to females [9].

A strong family history has been positively correlated with the risk of developing bladder carcinoma [10]. Hematuria has been well-established in the literature as a predominant symptom, with an occurrence in 80-90% of the cases [4, 5, 10]. Calculus size and patient non-compliance towards stone removal have been shown to worsen hematuria, also worsening the prognosis of any underlying concealed tumor [11]. Urinary tract calculi are also mentioned in the literature as frequently occurring, having a worldwide prevalence of 14%. A substantial number of cases are confined to the upper urinary tract; 5% occur in the urinary bladder [12, 13]. These statistics highlight the need to adopt an efficacious management of the disease to prevent fatal complications.

An epidemiologic study of 2982 bladder carcinoma patients established a relative risk of 1.8 between vesical calculi and bladder carcinoma; patients with vesical calculi are 1.8 times more likely to develop carcinomatous changes in the bladder [14]. Studies suggest that all bladder neoplasms are clinically apparent during life [10]. Further literature review shows that the incidence of incidentally detected bladder and upper urinary tract cancers is largely unknown and appears to be low; this suggests that the majority of bladder cancers are not detected incidentally. Frequent bladder scrutinization for tumor detection in middle age and older individuals is necessary for an early diagnosis and better outcome [15].

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Screening Modalities and Incidental Detection of Bladder Carcinoma

Studies delineate cystoscopy as a preliminary standard examination for the evaluation of bladder malignancies. Studies claim that the bladder is a largely ignored and disregarded organ during routine CT interpretation. Ignoring the bladder during interpretation could lead to a life-threatening error, as bladder malignancies may be incidentally visualized on screening CT examinations [16]. One reason of failing to detect bladder lesions on CT could be due to inadequate bladder distention; this applies particularly to small/flat tumors [17]. Tumor size is a factor to be considered when performing cancer detection imaging scans.

A case of a 54 year old woman, initially diagnosed with a solitary 6.5 cm stone but concealing a tumor underneath, was reported in the literature. The tumor was embedded with calcium deposits, exhibiting a stone appearance on CT imaging. The patient was scheduled for a cystolithotomy. During the intervention, fibrotic tissue was discovered which was analyzed and found to be an osteoclast-like giant cell carcinoma – a rare neoplasm [19].

Giant Bladder Calculus: Possibility of Developing A Premature Neoplasm?

A few recent studies, defining giant bladder stones as either having a dimension greater than 4 cm or a total weight of 100 g or more, are claiming its association with a coinciding neoplastic bladder lesion. Persistent mucosal insult by the presence of chronic bladder stones has been described to play a key role in the pathogenesis of ultimate bladder cancer [2, 4]. Large bladder calculi may need regular follow-ups comprising of cystoscopy and random sample biopsies to diagnose cancer at an early stage [20].

In populations where schistosomiasis has been classified as endemic, *Schistosoma haematobium* infection has been named as the primary cause in the majority of cases with squamous cell variant (SCC) type of bladder carcinoma [20, 21]. Such zones signify the need for an effective therapeutic intervention to eliminate the blood fluke combined with diagnostic interventions such as cystoscopies and screening biopsies for detecting bladder carcinoma. Adopting such a strategy may reduce the incidence of SCC variant bladder cancer in blood fluke endemic subsets.

CONCLUSION

Incidental detection of bladder cancer is rare. Cystoscopy in patients with chronic bladder stone disease needs to be implemented as part of routine surveillance for possible dysplastic changes in the bladder. Hematuria, although categorized as a major clinical symptom of bladder cancer, may also present as a complication of a giant vesical calculus. An effective diagnostic and screening protocol needs to be established for the early detection of bladder neoplasm specifically in high-risk

patients who have a chronic history of multiple stone removal procedures.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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