

Case Report

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Development of bladder plate calculus on missed sutured surgical sponge following primary bladder exstrophy repair

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Introduction

Bladder Exstrophy (BE) has been considered as a rare congenital malformation of the genitourinary system, with an estimated incidence of approximately 1 per 50,000 live births [1]. The management of this anomaly is complex, involving several surgical reconstructions with numerous challenges to achieve anatomically, functionally, and cosmetically satisfactory outcomes [2]. Furthermore, the management must be early in the first months of life for better functional and cosmetic results [3,4]. Wound dehiscence, urethral outlet obstruction, bladder prolapsed, renal and bladder calculi are among the main com-

plications following failed primary BE closure [5]. Urinary stone formation is estimated to be around 15% following bladder closure, in repaired BE patients, especially in cases living in poor or rural regions [6]. Bladder stone formation may occur following infra-vesical obstruction, neurogenic voiding dysfunction, urinary tract infection, foreign bodies, and metabolic risk factors years after reconstructive surgery [7]. Here, we report a 6-year-old boy with failed BE repair at an early age that was complicated by late surgery outcomes and secondary stone formation on missed sutured surgical sponge post-operatively.

Case presentation

A 6-year-old boy from overseas and a history of two previous failed corrective BE surgical procedures of reconstruction was admitted to the pediatric urology clinic on January 2019. The patient was presented with a large bladder stone visibly protruding through a wide-open bladder outlet. During his previous BE repair in his city, non-absorbable suture was applied for closure of pubic bone which served as a nidus for bladder stone formation. Briefly, he developed bladder plate calculus on missed sutured surgical sponge following primary bladder exstrophy repair. The Committee of Human Research and institutional review board approved the study and informed consent was obtained from parent. Patient underwent the cystolithotomy operation and a 65.2 X 38.2 mm stone was successfully extracted from multiple nylon sutures which were remained from prior surgeries and were connected to pubic bone (Figure 1). After that, the bladder cavity was cleared preciously and a sample of the stone was sent for further stone analysis. Scanning Electron Microscopy (SEM) analysis was applied in stone sample, as a basic method used for routine urinary stone identification. The technique provides compound information regarding the compositional and architectural variations of bladder stone. The stones was washed in distilled water and dried at ambient temperature. The bladder stone samples were broken into smaller fragments, for better investigation of the outer surface and the interior of the stone. Instrument used in our study was TESCAN VEGA scanning electron microscope. Rod-like particles demonstrated in SEM micrographs are supposed to be mono-ammonium urate crystals. Struvite crystals referred to as "Triple Phosphate" stones are also depicted in the center of the stone (Figure 2). The results of the stone analysis revealed a white-gray stone with a mixed component of 52% triple phosphate, 30% phosphate, 25% calcium, 10% oxalate, 10% uric acid, and 5% ammonium. The post-operative course was uneventful and the patient is now in our waiting list in order to undergo the single-stage reconstruction technique without osteotomy.

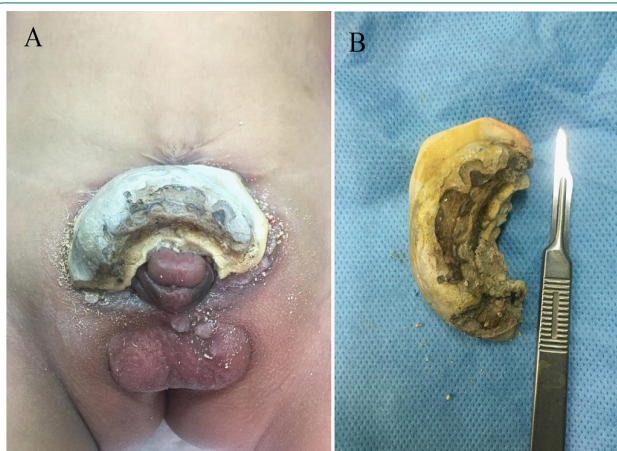


Figure 1: (A) The appearance of bladder stone in a case with BE **(B)** biopsy taken after the surgery.

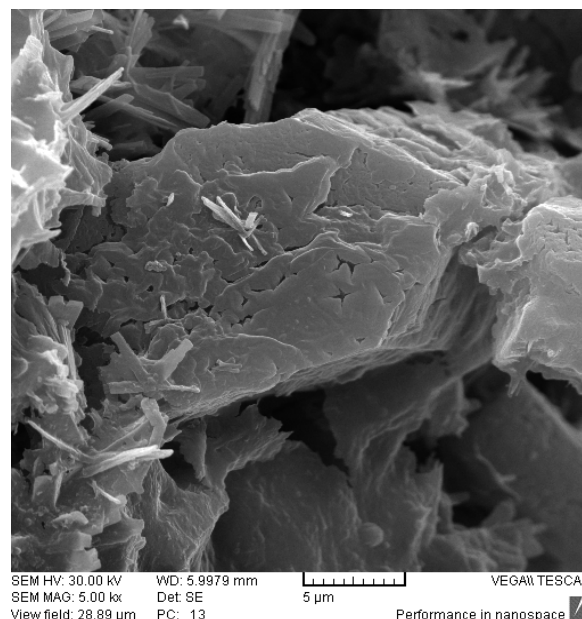


Figure 2: SEM analysis: Rod-like particles micrographs, supposed to be monoammonium urate crystals and also presence of struvite crystals referred to as "Triple Phosphate" stones in the center of the stone.

Discussion

Children born with BE can be successfully treated at pediatric centers with expertise in their management. Bladder stones are widespread in pediatric patients living with poor socioeconomic condition (with incidence of 5% of all urinary system stones). Bladder plate calculus may engage the majority of bladder region and culminates in bladder wall inflammation, obstruction to urinary flow, and renal failure. To avoid this disastrous development due to upper tract damage urgent removal of stone is essential. A successful primary closure in BE surgery without major postoperative complications is the first fundamental step in the first days of life. In the of Silver et al. with 530 BE patients, 15% developed stones which was mostly presented in urinary bladder. About 39% of cases had stone formation recurrence which was related to urinary tract infection of struvite composition. Bladder augmentation or urinary diversion may result in infection and also the application of bowel for augmentation cystoplasty can cause secretion of mucous into the bladder increasing the risk of stone formation as well [8]. In the current study, we reported a case of bladder calculus following failed primary repair of BE who will undergo the single-stage reconstruction technique without osteotomy the results of which may be in line with results of the previous studies [9,10]. In poor socio-economic conditions, we may have cases of so-called neglected BE which were treated at an advanced age with accompanied postoperative complications such as stone formation following the operation. Delayed primary closure may culminate in the deterioration of renal function by the inflammatory and degenerative effect of the vesical mucous membrane, and ureteral meatus obstruction following the chronic irritation [3]. An etiologic factor for bladder calculi includes foreign bodies in the bladder that act as a nidus for stone formation such as a history of the usage of non-absorbable sutures to approximate the pubic bone. These are sub-classified into iatrogenic and non-iatrogenic factors. The iatrogenic factors include suture material,

shattered folly catheter balloons, eggshell calcifications form on catheter balloon, staples, ureteral stents, and erosions of surgical implants. Stones on suture material may have an early presentation if sutures are originally placed within the bladder lumen. Non-iatrogenic factors may be caused by erosion through the bladder wall. Also, in this case, this may seem not a possible complication but a gross error in surgical management and of negligence by previous surgical team in his country. Subsequent bladder calculi are associated with about 15% of bladder exstrophy repairs and are associated with infection, foreign bodies, and urinary stasis [2]. In conclusion, bladder reconstruction surgery is not recommended in adolescence and adulthood due to the high risk of complications such as stone formation and we also suggest the usage of long-term absorbable sutures to diminish the occurrence of bladder stone formation for BE closure. Bladder stones in BE cases are related to risk factors associated with surgical reconstruction. In contrast to Intravesical gossypiboma, the bladder plate stone is very rare and to the best of our knowledge is not reported previously over the bladder exstrophy plate. This study confirmed the nature of non-absorbable sutures which are in contact with urine. It is of great value to monitor and follow-up these patients closely, after the surgery in order to avoid the probable postoperative complications.

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