CASE SERIES AND REVIEW ON THE MANAGEMENT OF BLADDER CALCULI CAUSED BY IUD MIGRATION

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ABSTRACT

Objective: *Comparing two cases of the management of bladder calculi caused by Intra Uterine Device (IUD) migration with other similar cases worldwide.* ***Case(s) Presentation:*** *A forty-eight-year-old woman diagnosed by Abdominal Non-contrast Computed Tomography (NCCT), already done IUD extraction through the bladder approach also hysteroscopy to evaluate the position from the womb side, and continued with the stone removal by vesicolithotripsy. The second case revealed a bladder stone with IUD tail presence based on Kidney Ureter Bladder (KUB), performed vesicolithotomy, and IUD was found attached to the stone. Both patients' conditions improved after surgeries. IUD migration into the bladder causes perforation, stone formation, and Urinary Tract Infection (UTI). NCCT, KUB, and Ultrasonography can be used as imaging modalities for initial screening when IUD migration is suspected.* ***Discussion:*** *The managements consist of open cystolithotomy, transurethral grasping forceps, or minimally invasive laparoscopy. Open and laparoscopic surgery should be considered for the IUD removal with partial penetration due to vesicouterine fistula and high-risk stone removal, especially for the large stone with IUD embedded inside.* ***Conclusion:*** *Minimally invasive methods are efficient, safe, and frequently preferred for the bladder stone caused by IUD migration.*

Keywords: *Bladder stone, IUD, migration.*

ABSTRAK

Tujuan: *Mengkaji dan membandingkan tatalaksana dua kasus tentang batu kandung kemih yang disebabkan karena migrasi Intra Uterine Device (IUD) dengan kasus serupa di seluruh dunia.* ***Presentasi kasus:*** *Wanita usia empat puluh delapan tahun yang didiagnosis menggunakan Non-contrast Computed Tomography (NCCT) Abdomen, telah dilakukan ekstraksi IUD melalui pendekatan kandung kemih serta histeroskopi untuk mengevaluasi posisi dari sisi rahim, dan dilanjutkan dengan pengangkatan batu melalui vesikolithotripsi. Kasus kedua menunjukkan adanya batu kandung kemih dengan adanya ekor IUD berdasarkan Kidney Ureter Bladder (KUB), dilakukan vesicolithotomy, dan ditemukan IUD yang menempel pada batu tersebut. Kondisi kedua pasien membaik setelah operasi. Migrasi IUD ke dalam kandung kemih menyebabkan perforasi, pembentukan batu, dan Infeksi Saluran Kemih (ISK). NCCT, KUB, dan Ultrasonografi dapat digunakan sebagai modalitas pencitraan untuk skrining awal ketika dicurigai adanya migrasi IUD.* ***Diskusi:*** *Tatalaksana terdiri dari sistolitotomi terbuka, tang genggam transuretra, atau laparoskopi invasif minimal. Pembedahan terbuka dan laparoskopi perlu dipertimbangkan untuk pengangkatan IUD dengan penetrasi parsial akibat fistula vesikouterin dan pengangkatan batu yang berisiko tinggi, terutama untuk batu yang berukuran besar dengan IUD yang tertanam di dalamnya.* ***Simpulan:*** *Metode invasif minimal adalah metode yang efisien, aman, dan seringkali lebih disukai untuk batu kandung kemih yang disebabkan oleh migrasi IUD.*

Kata kunci: *Batu buli, IUD, migrasi.*

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INTRODUCTION

IUD is widely used all over the world with reportedly used by 7.6-14.5% of women of reproductive age.[1-2] The rate of serious complications associated with IUD is very low (<1%). Common complications include infections, uterine bleeding, contraception failure, dyspareunia, irregular menstrual cycle, excessive menstruation, and uterine-adjacent organ perforation.[2-5] One of the most serious complications of IUD insertion is IUD migration.[3]

Migration of IUD spontaneously from the uterine to other periuterine areas, such as the bladder, happens in approximately 1-3 of 1000 IUD insertions with unknown etiology.[6-8] The bladder is the most common destination of IUD migration. Kart et al. reported a total of 200 IUD migration cases with 90 cases involving migration to the bladder.[9]

Migration to the bladder may cause symptoms, such as dysuria (59.1%), suprapubic pain (10.2%), recurrent urinary tract infections (10.2%), and urinary retention leading to stone formation (6.1%). These complications sometimes mimic a chronic urinary tract infection. Treatment options vary depending on the location of the ectopic IUD in the bladder. Endoscopic procedures and laparoscopic surgery are considered the least invasive approaches.[2,10] The migration may also be incomplete when the IUD has not fully migrated to the bladder. Removal of an IUD that has not completely migrated requires a more complicated surgery.[6-7]We report two cases of IUD migration to the bladder and discuss how the in-depth management of bladder calculi caused by IUD migration around the world.

CASE(S) PRESENTATION

CASE 1

A forty-eight-year-old woman with a chief complaint of pain when urinating for 7 months before admission to the hospital. The pain was felt in the lower abdomen at the end of micturition, felt as if being stabbed, and radiated to the stomach. The patient underwent abdominal ultrasound with the result extrauterine IUD. The history of being put on an IUD after giving birth to a second child (8 years ago) at the primary hospital by an obstetric gynecologist. Physical examination within normal limits with the urinalysis revealed microscopic hematuria and leukocyturia with the urine culture found E. coli ESBL bacteria. A partial IUD migration with the bladder stone formation was found based on abdominal NCCT. The patient was diagnosed with bladder foreign body (IUD) and bladder stones.

We found the tail and half body of the IUD through the bladder approach (cystoscopy). To evaluate the IUD position from the womb side, we also performed hysteroscopy concomitantly, and there was a finding of the IUD's arms. In the next step, foreign body (IUD) extraction was performed, continued with the destruction and removal of the bladder stones formed by vesicolithotripsy. There was no fistula from the methylene blue evaluation.

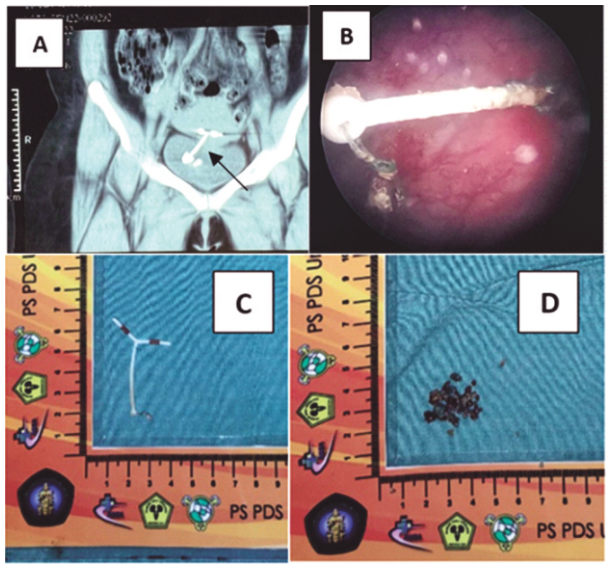

Figure 1. Presentation of Case 1 (A) Non-contrast Computed Tomography (NCCT) of the abdomen with black arrow depicting an IUD migration and bladder stone (B) The laparoscopic appearance of IUD migration and stone in the bladder (C, D) IUD and bladder stone result after IUD extraction and vesicolithotripsy.

CASE 2

A 52-year-old woman came to the urology clinic with pyuria in the previous 3 months. In the last 7 years she has suffered from dysuria but has never been treated and has worsened in the past 3 months. The patient had a history of intrauterine device (IUD) insertion 36 years ago. After the patient did an IUD insertion, she never went to an obstetrician or midwife perform examination. Two months after the IUD installation, the patient was pregnant. The patient gave birth to her baby even though the baby passed away at the age of 2 months.

On physical examination, it was found tenderness in the suprapubic area. Urinalysis revealed pyuria, leukocyturia, and microscopic hematuria with the urine culture found E. coli bacteria. On complete blood count revealed normochromic normocytic anemia (Hb: 9.3 g/dl) with slight increase of creatinine (cr: 1.88 mg/dL; ur: 58.6 mg/dL). Ultrasonography revealed that there

was a calculus in the bladder and the KUB photo revealed a calculus in the bladder projection with the presence of an IUD tail.

The patient underwent vesicolithotomy and bladder biopsy. An 11 x 7 cm bladder stone was found with a smooth and flat surface. IUD was found embedded in the calculus and performed vesicolithotomy, the IUD was found attached to a bladder stone. The bladder biopsy results showed tissue inflammation.

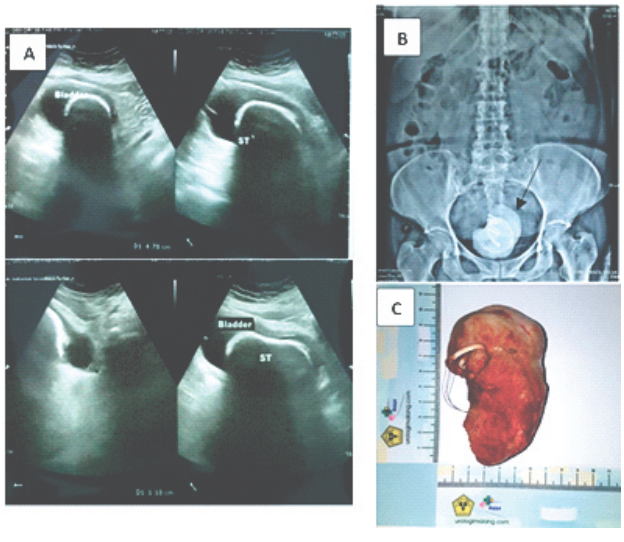

Figure 2. Presentation of Case 2 (A) There was an acoustic shadow in the bladder from ultrasonography. (B) The KUB image resembles an IUD (arrow) surrounded by radiopaque shadow in the pelvic region (C) Post vesicolithotomy obtained bladder stones with the size of 11 x 7 cm with an IUD.

DISCUSSION

Urinary tract stones are defined as the formation of stones in the urinary tract which include kidney, ureter, bladder, and urethral stones. The stone formation can be classified based on etiology, namely: infection, non-infection, disorder genetics and medicine. Bladder stones can be classified into primary and secondary causes based on whether there is an accompanying disease. The primary definition in question is the formation of stones in the absence of anatomic, functional, and infections that can lead to stone formation. Meanwhile understanding secondary is the etiology of the underlying disease.[11]

The most common symptom of bladder stones is pain when voiding, intermittent, and hematuria. In particular, pain near the end of urination is the impact of the bladder stone. We can use ultrasound and x-ray as initial examination, while cystoscopy is used to be sure the presence of bladder stones.[11]

IUD is currently the most favored contraception method worldwide because it is safe, readily available, and cost-effective. More than 150 million women use IUD, mainly in emerging countries. However, its administration can be accompanied by several complications such as uterine perforation and pregnancy or infection. Uterine perforation and migration of the IUD into abdominal or pelvic organs, especially the bladder, is a major complication of IUD insertion. with an incidence of 1.9 - 3.6 per 1000 insertions.[12-13] Perforation is one of the most serious complications secondary to the insertion of IUD, eventually leading to its migration from its normal position in the fundus either into the abdominal cavity or into other organs adjacent to the uterus.[14-15]

The exact pathophysiology of spontaneous IUD migration is unknown, but migration always starts with uterine perforation. Physiological events, such as spontaneous uterine contraction, bowel peristalsis, and bladder contraction, might result in uterine perforation.[6] Infection and tissue damage caused by the vaginal speculum used during IUD placement can lead to adhesions and thus facilitate the perforation of the uterus. The risk factors influencing this perforation include the type of IUD used, the insertion time, the technique of insertion, and cervix-uterus anatomy.[12] Another notable issue is that IUD migration is more frequent in women who undergo labor with their IUD in place. Due to the reduction in the size of the uterus and thinning of the uterine walls in the postpartum and lactation periods as a result of hypoestrogenism, the uterus becomes more susceptible to perforation.[12-13]

Bladder-embedded ectopic IUD accompanied with calculus is an uncommon condition. Approximately, 5% of bladder stones occur in female patients, as a result of the complete migration of the IUD.[15] To date, approximately 70 cases of IUD migration to the bladder have been reported in the literature, and about half of them resulted in stone formation, with established stone sizes varying from 1 cm to 8 cm. Therefore, foreign bodies should be considered when assessing the presence of bladder stones, such as IUD, that has

been reported, with their lithogenic potential, act as a nidus for stone formation.[12,15]

IUD materials, like Fe (iron) and Cu (copper) play a role as promoters as calcium oxalate stone formations.[13-14] Although perforation of the uterus by IUD is often a silent phenomenon, erosion of the bladder wall is usually symptomatic, lower urinary tract symptoms are the most common.[15] Recurrent urinary tract infections, vaginal discharge, irritation on voiding, and sexual complaints such as dyspareunia can be part of the clinical manifestations, even without complete migration inside the bladder.[12,15] We observed the symptoms of irritation on voiding and pyuria in these cases with the partial and complete migration of the IUD.

Various imaging modalities can be used in the evaluation of IUD and in establishing the etiological diagnosis of lower urinary tract symptoms. Abdominal ultrasonography can easily help to determine whether the IUD is correctly positioned. IUD displacement, myometrial perforation, and stone-forming IUD can be fully

Table 1. Ten similar cases of iud migration with different therapeutic approaches.

No.	Author	Year	Condition	Management
1.	Liu, Guangtao et al.[1]	2021	IUD covered with stones. One branch pierced to the right wall and another one was located in the tissue between uterus and bladder	Tried to extract IUD under cystoscopy, but failed → Cystostomy and IUD removal
2.	Liu, Guangtao et al.[1]	2021	IUD near the left ureteral orifice, the posterior side was inserted into the bladder wall with calculus on its surface	Cystotomy to remove the IUD
3.	Makary Joshua and Prem Rathore[3]	2021	A T-shaped foreign object was seen embedded in the calculus	Forceps biopsy by Transurethral Cystolithotripsy
4.	Rasyid, Nur et al.[6]	2021	IUD were embedded in the bladder wall, protruding by 2 mm, with no stone formation	IUD removal with forceps using a cystoscope
5.	Nouioui, Mohamed Ali[15]	2020	Calcified IUD embedded into the bladder muscular wall	IUD extraction using endoscopic forceps
6.	Adi, Kuncoro[18]	2019	Half IUD in the bladder with encrustation and calcification	IUD extraction by transvesical approach
7.	Gharbi M. et al.[19]	2019	Large calculus at the end of the IUD wire penetrating the posterior wall of the bladder.	Endoscopic: Ballistic lithotripsy IUD removal after calculi fragmentationS
8.	Niu et al.[15]	2018	IUD protruding through the anterior uterine wall into the bladder. Needle-like calculus on the IUD	Endoscopic : calculus & IUD laser fragmentation + forceps nephroscope
9.	Sano, et al.[20]	2017	Bladder stone surrounding the IUD	Endoscopic combined laser fragmentation
10.	De Silva et al.[21]	2017	6 × 5 cm bladder stone cover the IUD found inside	Open cystolithotomy

investigated by performing abdominal ultrasonography.[14,16] X-ray recognizes the foreign body which has a metal-like density. This condition is correlated with IUD material (copper), it showed radiopaque density. [14,16] The most accurate imaging method for lost IUD is NCCT.[14] We were able to show very clearly in Case 1 that the NCCT showed the IUD had not completely migrated to the bladder, and that the migration was only partial. Thus, diagnostic cystoscopy allows direct visualization of the bladder, allowing to identify the foreign body, its extraction using mechanical forceps if possible, and the search for any vesicouterine fistula.[16]

The management of any translocated IUD following uterine perforation within the abdomen should be removed whether symptomatic or asymptomatic irrespective of location, according to the World Health Organization (WHO) recommendation.[15] Many authors have stated that a lost IUD should be treated since it can cause pain, infection, injury to neighboring organs, intra-abdominal adhesion, and even fatal complications like sepsis or intestinal obstruction. Foreign material in the urothelium always lead to the risk of stone formation, and they must be treated.[12] An IUD that migrated to the bladder eventually leads to stone formation, making its removal necessary. Three approaches to remove the device include the use of open cystolithotomy, transurethral grasping forceps, or minimally invasive laparoscopy.[17]

Minimally invasive methods such as laparoscopy or endoscopy are frequently preferred. Laparoscopy is usually associated with smaller scars than open surgery, which is more in line with the aesthetic needs of younger women, and with smaller blood loss, less pain, and shorter hospital stay.[12] Open and laparoscopic surgery should be considered for the removal of IUD with partial penetration due to the possibility of a vesicouterine fistula that needs to be repaired. The study suggests that it can be treated successfully with either laparoscopy or open surgery.

In the case of endoscopic approach, both the cystoscope and the transurethral nephroscope can be used. Ballistic or laser lithotripsy should be used for the initial fragmentation of the calculi that formed around the IUD to facilitate its extraction.[15] We treated the case with endoscopy on Case 1, which had a stone within the bladder, and were able to remove the IUD causing partial perforation through the vagina. We performed an open surgery in Case 2 because the IUD was found embedded in the calculus with the size of 11 x 7 cm. Other approaches to similar kind of cases are explained in Table 1.

CONCLUSION

The foreign body like IUD migration in the bladder can lead to calculus formation and UTI. Urethrocystoscopy is the gold standard for diagnosing intrabladder IUD migration. IUD extraction techniques: endoscopic, laparoscopic, or open surgery, were performed based on the IUD migration position and bladder stones condition. Minimally invasive methods such as laparoscopy or endoscopy are efficient, safe, and frequently preferred for the bladder stone caused by IUD migration.

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