Case Report on Hemangioma of The Urinary Bladder: two rare cases and literature review

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Case report

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Abstract

Background: Although hemangioma in the genitourinary system occurs relatively infrequently, bladder hemangioma has arisen during medical research. We describe two rare cases of urinary bladder hemangioma (UBH), in which was confirmed histopathology followed by Immunohistochemistry (IHC) and review the literature on the diagnosis and treatment of patients with this disease to raise awareness of urinary bladder hemangioma and appropriate management.

Case presentation: A 41-year-old Chinese female presented with a sudden onset of painless gross hematuria for one month, Multi-Slice spiral computed tomography urography in the urological system showed the anterior and superior wall thickening of the bladder, multiple nodules and masses, exhibited multiple punctate calcifications and marked uneven enhancement. The second case is a 30-year-old female who was asymptomatic and incidentally founded a large bladder tumor during a routine examination from outside hospital, magnetic resonance imaging scan confirmed a 6.2cm x 6.9cm x 5.2cm soft tissue mass arising from the right anterior and superior wall of the bladder, which suggested the possibility of a benign bladder tumor. Postoperative pathology confirmed the diagnosis of urinary bladder hemangioma**.** The radical cystectomy was performed with open-methods surgery associated with an abdominal wall ostomy of the ileal outlet tract for case 1. And case 2 finally underwent a Laparoscopic partial cystectomy. Hematuria resolved postoperatively and no evidence of tumor recurrence in three year follow-ups for case 1. Postoperative urinary and pelvic ultrasonography showed no signs of recurrence in three months follow-ups for case 2.

Conclusion: Urinary bladder hemangioma is a benign non-urothelial tumor that rarely occurred in pediatric and adolescent patients . Clinical and radiological examinations are not adequate for an accurate diagnosis. Careful histopathological and immunohistochemical studies are required to establish the correct diagnosis. There is no ‘gold standard’ treatment for UBH, treatment options are varied for individuals with favorable follow-ups.

Background

Hemangiomas are benign vascular tumors that can occur almost everywhere in the human body, are more frequently located in the skin and subcutaneous soft tissues compared with the urinary bladder. Bladder hemangioma is rare and accounts for 0.6% of all bladder tumors occurring in all ages, but they are even less common during childhood and adolescence. Clinical and radiological examinations are not enough for accurate diagnosis. Careful histopathological and immunohistochemical studies are required to establish the correct diagnosis.[1–2]. Although hemangioma in the genitourinary system occurs relatively infrequently, bladder hemangioma has arisen during medical research. In this article, we describe two rare cases of urinary bladder hemangioma (UBH), in which was confirmed histopathology followed by Immunohistochemistry (IHC) and review the literature on the diagnosis and treatment of patients with this disease. Informed written consents were obtained from the patients for publication of this case report and accompanying images.

Cases Presentation

Case 1 : A Large Urinary Bladder Hemangioma Mimicking Urachal Cancer

A 41-year-old Chinese female presented with a sudden onset of painless gross hematuria for one month visited our outpatient clinic. Cystoscopy and biopsy were done from outside facility which revealed a bluish ovoid tumor with blood clots on the anterior wall. Transurethral resection of the bladder tumor(partial resection) was performed, the initial pathological report showed gland cystitis, local urothelial hyperplasia with nipple formation, but no clear cancer cells were found.(Fig. 1A-B)

In our hospital, vital signs and observations from the physical examination were within normal limits, the results of 11 tumor markers were negative. The blood cell count results were as follows: erythrocyte count, 3.84×10^{12}/L; hemoglobin, 113 g/L; hematocrit, 34.2%; and platelet, 206/L. Random urinalysis with microscopic examination showed hematuria, > 100 red blood cells and 0–3 white blood cells per high-power field, no proteinuria or pyuria. Multi-slice spiral computed tomography urography (MSCTU) in the urological system showed the anterior and superior wall of the bladder was thickened, multiple nodules and masses, the larger one was about 5.0 cm × 3.1 cm × 4.0 cm mass, exhibited multiple punctate calcifications and marked uneven enhancement, which was suspected as urachal (bladder) cancer (Fig. 1C-G).

Under suspicion of urachal cancer, radical cystectomy was performed with open method surgery associated with an abdominal wall ostomy of the ileal outlet tract (in February 2016). The final pathological report indicated a cavernous hemangioma of the urinary bladder extended into the deep muscular layer of the bladder wall, adjacent to the adventitia (an ill-defined, soft and brown tumor measuring 6.0 × 5.0 × 5.0 cm in size was seen outside the anterior bladder wall) (Fig. 1H-K). Hematuria resolved after surgery and no evidence of tumor recurrence was found in three-year follow-ups.

Case 2 : A Large Urinary Bladder Hemangioma in an asymptomatic female

We reported another case of a large urinary bladder hemangioma involving the urinary bladder in a 30-year-old female who visited our outpatient clinic presented without any symptom due to only was founded a large bladder tumor during a routine examination from outside facility.

In our hospital, The blood cell count results were within normal range and the results of 11 tumor markers were negative. However, urinalysis showed > 100 red blood cells and 3–6 white blood cells per high-power field. Computed tomography scan of the abdomen and pelvis with contrast was also performed to evaluate the extent of the lesions and pelvic lymphadenopathy. The CT images indicated soft tissue mass arising from the right anterior and upper wall of the urinary bladder (Fig. 2A-B). The lesion was further investigated using A subsequent contrast-enhanced magnetic resonance imaging(MRI) scan of the abdomen, and the results confirmed that a large 6.2 cm x 6.9 cm x 5.2 cm soft tissue mass arising from the right anterior and superior wall of the bladder, which suggested the possibility of a benign bladder tumor, and several enlarged lymph nodes were seen in the pelvic cavity(Fig. 2C-E).

Subsequently, we performed cystoscopy and the tissue sample was sent to the pathological examination. Cystoscopy confirmed that blue to reddish sessile lesions of a large 6 cm × 6 cm × 5 cm, were visualized on the right anterior superior wall of the bladder and the initial pathological report showed gland cystitis but no characteristic tumor tissue was identified on the mucosal surface of the bladder (Fig. 2F-H).

Based on imaging results and the pathological findings, the patient finally underwent a laparoscopic partial cystectomy (in November 2018). Part of the bladder containing tumoral vascular tissues with a safe margin was sent for histopathological examination. The pathological diagnosis was given as ‘bladder angioma’ consisted of a mixture of cavernous lymphangioma and hemangioma components. The gross pathological examination revealed a well-circumscribed, bearing a vesicles-like, with a size of 7 cm × 5 cm × 4 cm and gray-brown cut surface. These anatomical features supported the diagnosis of hemangioma of the bladder (Fig. 2I-L). Postoperative urinary and pelvic ultrasonography showed that the bladder wall was smooth, no abnormal echoes were found in the lumen in three months follow-ups (Fig. 3). Hematuria was not noted on postoperative urinalysis.

Discussion

Most bladder tumors are epithelial and particularly urothelial, non-urothelial neoplasms occur very rarely in the bladder and usually present a diagnostic challenge. In the present study, to the best of our knowledge, UBH is mostly congenital malformation of capillaries and blood vessels, non-urothelial neoplasms are extremely rarely reported clinically, accounting for only 0.6% of all urinary bladder tumors[3–4].

Although it can occur in all age groups, the most often age group is under 30. In the review of literature most of the bladder hemangioma are solitary (66%), varying from few millimeters to 10 cm in diameter with a predilection for the dome, posterior wall, and trigone of the bladder and so it has increased the diagnostic challenge of intramural tumors of the bladder[5]. Multiple bladder hemangiomas occasionally coexist with cutaneous hemangioma, varicose veins, or are associated with one of two conditions: Sturge-Weber syndrome and Klippel-Trenaunay-Weber syndrome, predisposing to their development. For this reason, systemic evaluation in these patients is highly recommended[6–7].

UBH are mostly congenital benign tumor formations of angiogenesis. Nevertheless, several studies have confirmed increased risks of developing soft tissue tumors in relation to radiation therapy for cancer[8–9]. The predominant clinical symptom of UBH is painless recurrent, isolated gross macroscopic hematuria with or without irritative urinary symptoms and abdominal pain[10]. However,hypovolemic shock can be present in cases with massive hemorrhage. Hydroureteronephrosis can occur as a result of ureteric obstruction by the mass, and a hematoma can obscure the mass in the bladder when there is massive bleeding[11].

Here, we took a thorough English literature review focusing on UBH published up to January 2019 and identified overall 16 cases published from 2010 to 2019 were obtained after strict selection (Table 1)[5–6, 9, 12–22]. Included our two cases, they occurred in a wide range of ages from 2 to 85 years (mean 27.8), with median age 18 years, and the male to female ratio was 0.8 with no gender predominance. It was typical with respect to size with lesions ranging from 1.0 cm to 7.0 cm in diameter, although the characteristic of multiplicity was not usual. In our two cases, systemic evaluation of our patients was grossly normal, with no cutaneous hemangioma or palpable scrotal varicocele.

Table 1
Literature review of the reported cases of Clinico-pathologic Characteristics of hemangioma in the bladder

Ref/year	Case No.	Sex/ Age (y)	Clinical Manifestation	Site	Tumor Size	Pathologic examination	Treatment	Follow-up (mo)
Kato et al, 4/2000[12]	1	F/8	Gross hematuria, Klippel Trenaunay syndrome	the apex of the bladder	4 cm	NA	Nd:YAG Laser	NED(10)
Pratap et al, 8/2007[13]	2	M/5	gross hematuria accompanied by lower abdominal pain	the dome and the posterolateral bladder wall	5 cm	cavernous hemangiolymphangioma	Partial cystectomy	NED(8)
Tavora et al, 8/2008[5]	3	F/19	hematuria alone	not mentioned	1.1 cm	cavernous hemangioma	biopsy	LFU
	4	M/67	hematuria combined with pain	not mentioned	3.2 cm	capillary hemangioma	biopsy	NED(24)
	5	F/85	asymptomatic	not mentioned	2.4 cm	capillary hemangioma	biopsy	NED(4)
Antonio et al, 6/2010[14]	6	F/7	mild hematuria with clots	supratrigonal lateral and posterior bladder wall	numerous hemangiomas	NA	eletrocautery	NED(6)
Ashley et al, 10/2010[15]	7	F/3	gross Hematuria	posterior and left lateral bladder wall	4 cm	Cavernous hemangioma-lymphangioma	Cystoscopic illuminated partial cystectomy	NA
Takemoto et al, 10/2011[16]	8	M/4	gross hematuria	anterior wall, dome, and right lateral bladder wall	covered about 60% of the bladder	NA	Nd : YAG/ holmium : YAG laser	NED(24)
Mager et al, 10/2014[17]	9	M/46	disabling lower urinary tract symptoms	Prostate, the seminal vesicle, and the bladder neck	not mentioned	NA	interventional superselective coiling of the arterial feeder	NED(6)
Jibhkate et al,1/2015[18]	10	M/3	gross hematuria accompanied by lower abdominal pain	the dome of the bladder	7 cm	Cavernous hemangioma	Partial cystectomy	NED(12)
Kim et al, 7/2015[6]	11	M/4	intermittent and recurrent painless gross hematuria	the bladder dome and along the lateral aspects	1.3 cm	Cavernous hemangioma	coagulated with a Holmium laser	NA
Lahyani et al, 10/2015[19]	12	M/60	macroscopic haematuria	the dome of the bladder	not mentioned	Cavernous hemangioma	partial cystectomy and augmentation cystoplasty	NA
Lu et al, 2/2016[20]	13	M/46	asymptomatic	the right bladderwall	1.4 cm	intramural Anastomosing hemangioma	Partial cystectomy	NA

NED, no evidence of disease; NA, not available; Nd : YAG, neodymium: yttrium-aluminium-garnet; LFU, lost to follow-up.

Ref/year	Case No.	Sex/ Age (y)	Clinical Manifestation	Site	Tumor Size	Pathologic examination	Treatment	Follow-up (mo)
De et al, 7/2017[21]	14	M/2	persistent gross hematuria	the dome of the bladder	not mentioned	Cavernous hemangioma	Partial cystectomy	NA
Hu et al, 11/2018[9]	15	F/49	painless hematuria	the superior posterior wall	1 cm	cavernous hemangioma	transurethral tumor resection	NED(18)
Syu et al, 1/2019[22]	16	M/17	painless gross hematuria	the superior anterior wall	3.5 cm	cavernous hemangioma	en bloc resection of the urachus and bladder tumor with opened surgery	NED(24)
This report	17	F/44	painless gross hematuria	the superior anterior wal	5 cm	cavernous hemangioma	open radical cystectomy	NED(36)
	18	F/31	asymptomatic	the right anterior wall	6.9 cm	cavernous lymphangioma and hemangioma	laparoscopic partial cystectomy	NED(12)

NED, no evidence of disease; NA, not available; Nd : YAG, neodymium: yttrium-aluminium-garnet; LFU, lost to follow-up.

Clinically, imaging tests, such as ultrasonography, pelvic arteriography, computed tomography scan, and magnetic resonance imaging, are useful in defining the extent and location of a hemangioma[2]. The cystoscopic features of a bluish, sessile mass with gross hematuria are highly suggestive of hemangioma. The endoscopic differential diagnostic considerations for pigmented raised lesions include endometriosis, melanoma, and sarcoma. Accurate diagnosis requires confirmation by biopsy[23].

Since it is not commonly seen bladder hemangiomas in the genitourinary tract, it is important for pathologists and clinicians to carefully differentiate it from malignant non-urothelial neoplasms, as they have vital different prognostic features as well as therapeutic strategies[20]. Clinical and radiological examinations are not enough for an accurate diagnosis. Careful histopathological and immunohistochemical studies are required to establish the correct diagnosis. Histologically, bladder hemangiomas can be classified into cavernous, capillary, and arteriovenous types, and nearly 80% were cavernous type, while much less frequent are capillary or arteriovenous types[23]. Bladder hemangiomas are histologically similar to hemangiomas found at other sites and are composed of numerous proliferative capillaries mixed with thin-walled, dilated blood-filled vessels lined with flattened endothelium. The vessels are sometimes thickened by adventitial fibrosis. The histologic depth of a bladder hemangioma may be within the submucosa layer or even extend to the muscular layer or perivesical tissues[5]. Malignant vascular tumor, such as angiosarcoma, is highly aggressive potential with the characterizations of infiltrative growth, clear cytological atypia, high cellularity and poor prognosis. On the contrary, bladder hemangiomas are typically characterized by proliferated of vessel walls with distinct borders and spreading between the normal vasculature, and which lack distinct endothelial atypia or multilayering and with favorable prognosis[23]. The differential diagnosis of a polypoid bladder mass detected in children with painless gross hematuria includes not only hemangioma but also rhabdomyosarcoma, other vascular tumors, inflammatory pseudotumor, leiomyoma, neurofibromatosis, pheochromocytoma, transitional cell papilloma, transitional cell carcinoma, and pseudo tumoral cystitis[25–26].

The treatment options for UBH are varied for individuals with favorable follow-ups. The treatment of patients with a UBH is controversial, and the factors include the size, location and depth of penetration[22]. For small lesions and asymptomatic hemangiomas, surveillance is sufficient. The treatment is only necessary when the lesions threaten the organ function or the patient´s performance status, such as hematuria resulting in anemia, and suspicion of some malignant lesion. Optional treatment strategies include observation, transurethral resection, electrocoagulation, radiation, systemic steroid administration, injection of a sclerosing agent, interferon-a-2 therapy, YAG-laser therapy, and partial cystectomy or complete cystectomy[5, 12, 22]. Transurethral endoscopic surgery resection has become the gold standard for the treatment of small bladder cavernous hemangioma. The risk of uncontrollable bleeding is insignificant when the lesion is small (≤ 3 cm), and follow-ups show favorable outcomes[2, 18]. Biopsy and fulguration do not create significant bleeding and can adequately treat small lesions. Neodymium: yttrium aluminum garnet (Nd : YAG) laser irradiation has become another effective and less invasive treatment option, and it allows complete coagulation of the whole bladder Thickness[16].In cases of > 3 cm masses or multiple tumors or those that extend deep into the bladder, however, a transurethral biopsy or resection of bladder hemangioma is contraindicated because of the iceberg nature of this tumor and the significant possibility of excessive hemorrhage, open resection of the lesion or partial cystectomy are effective[5, 11]. Whereas, A partial cystectomy may reduce storage function, a partial cystectomy and bladder augmentation can preserve storage function, but this treatment may worsen voiding function[19].

Although UBH has a benign course, Postoperative follow-up is mandatory for detecting tumor recurrence or residual disease, such as ultrasonography, CT, and even flexible cystoscopy could be arranged to detect the recurrence[18–19].

Conclusion

In conclusion, UBH is a benign non-urothelial tumor that rarely occurred in pediatric and adolescent patients. And they are usually diagnosed and confirmed by histopathological examination due to the difficulty in definitive diagnosis by clinical and radiological examination. It is critical to distinguish UBH from malignant vascular tumors, since the required therapeutic approach, and the prognosis may differ substantially. In view of the limited number of reported cases, there is no 'gold standard' treatment for UBH. Treatment options are varied for individuals with favorable follow-ups. Although their prognosis usually is excellent, follow-up is mandatory to detect recurrence or residual disease.

Abbreviations

IHC
immunohistochemistry; MSCTU:multi-slice spiral computed tomography urography; MRI:magnetic resonance imaging; CT:computed tomography; UBH:urinary bladder hemangioma.

Declarations

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Not applicable.

Authors'contributions

All of the authors participated in the collection of the clinical and pathological data and agreed with its content. Changxing Ke performed surgical procedures and assisted with the manuscript-review & editing. Jieshun Yang and Tiantian Ma evaluated the pathology of these cases. Cheng Deng and Guicheng Zhao conducted a literature search, Guicheng Zhao was major contributors in writing the manuscript. All authors read and approved of the final manuscript.

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Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Ethics approval and consent to participate

This study was a retrospective cohort analysis, and after receiving approval from the local ethics committee (Second Affifiliated Hospital of Kunming Medical University), informed consent was obtained from all patients. All methods in this study were performed in accordance with the relevant guidelines and regulations.

Consent for publication

Written informed consent was obtained from all patients.

Competing interests

The authors declare no conflict of interest.

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Figures

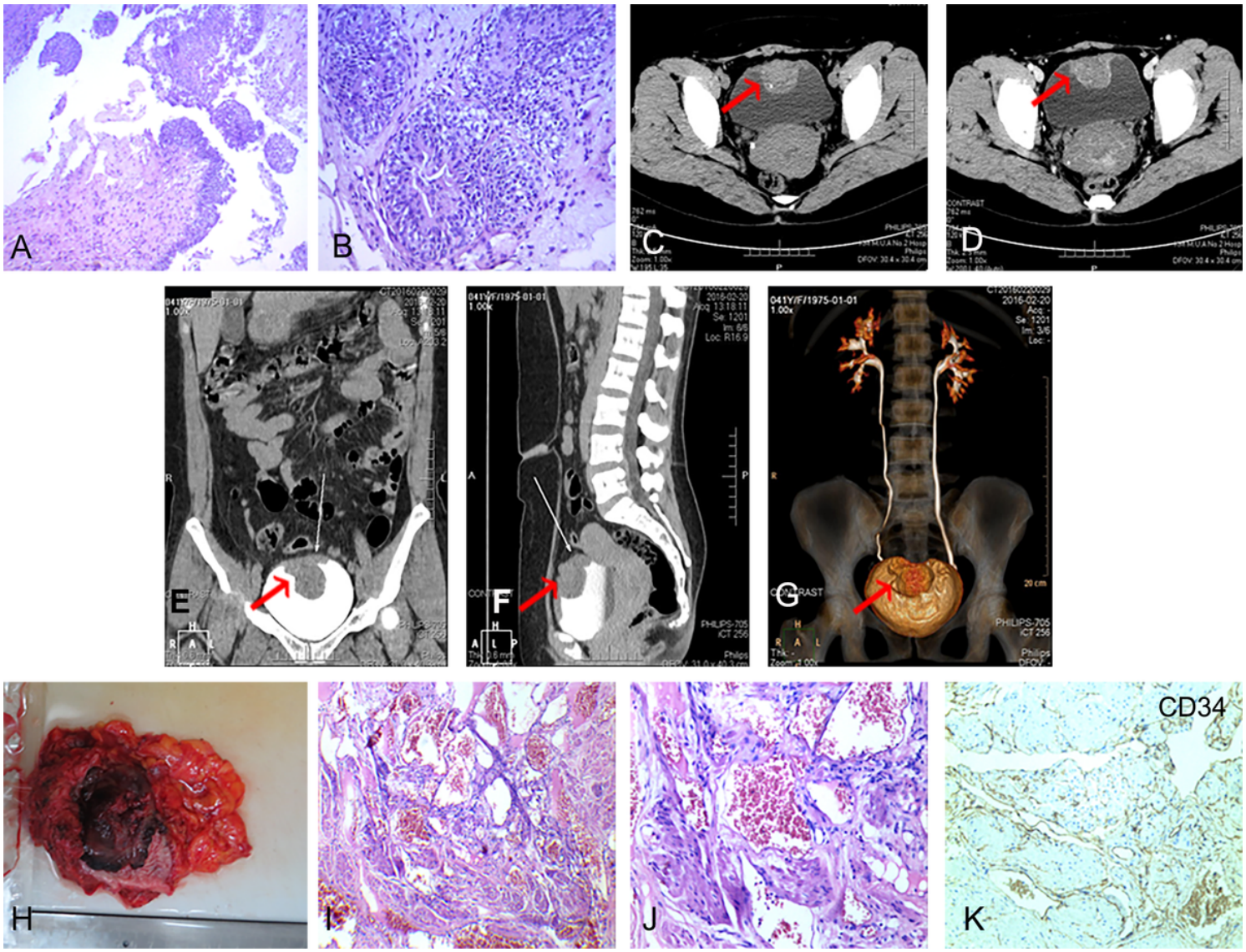

Figure 1

Cystoscopy and biopsy, MSCTU scanning, Histologic and immunohistochemical characteristics of case 1.(A-B) the initial pathological report of Cystoscopy and biopsy: Hematoxylin and eosin (H&E) staining showing Gland Cystitis, local urothelial hyperplasia with nipple formation, but no clear cancer cells were found (A: H&E 40×, B:H&E 100×). (C-G) Multi-slice spiral computed tomography urography (MSCTU) in urological system showed a 5.0cm× 3.1cm× 4.0 cm mass (red arrow) arising from the superior and anterior wall of the urinary bladder , with visible calcification and uneven enhancement.(H) Specimen of the en bloc resected tumor: Macroscopically, it was 10 cm x 7 cm x 4 cm partial cystectomy specimen, which on cut-section showed a large soft to firm hemorrhagic tumor mass measuring about 6.0 cm x 5.0 cm x 5.0 cm (Fig.2). (I-K) Histologic and immunohistochemical characteristics of the en bloc resected tumor: Hematoxylin and eosin (H&E) staining showing the urothelium of the bladder mucosa in the resected specimens and dilated thin-walled vessels in the detrusor muscle layer(I 40×), the lesion was formed by small irregular angiomatous spaces, lined by a simple layer of endothelial cells(J 100×)and endothelial cells were CD34-positive(K 100×).

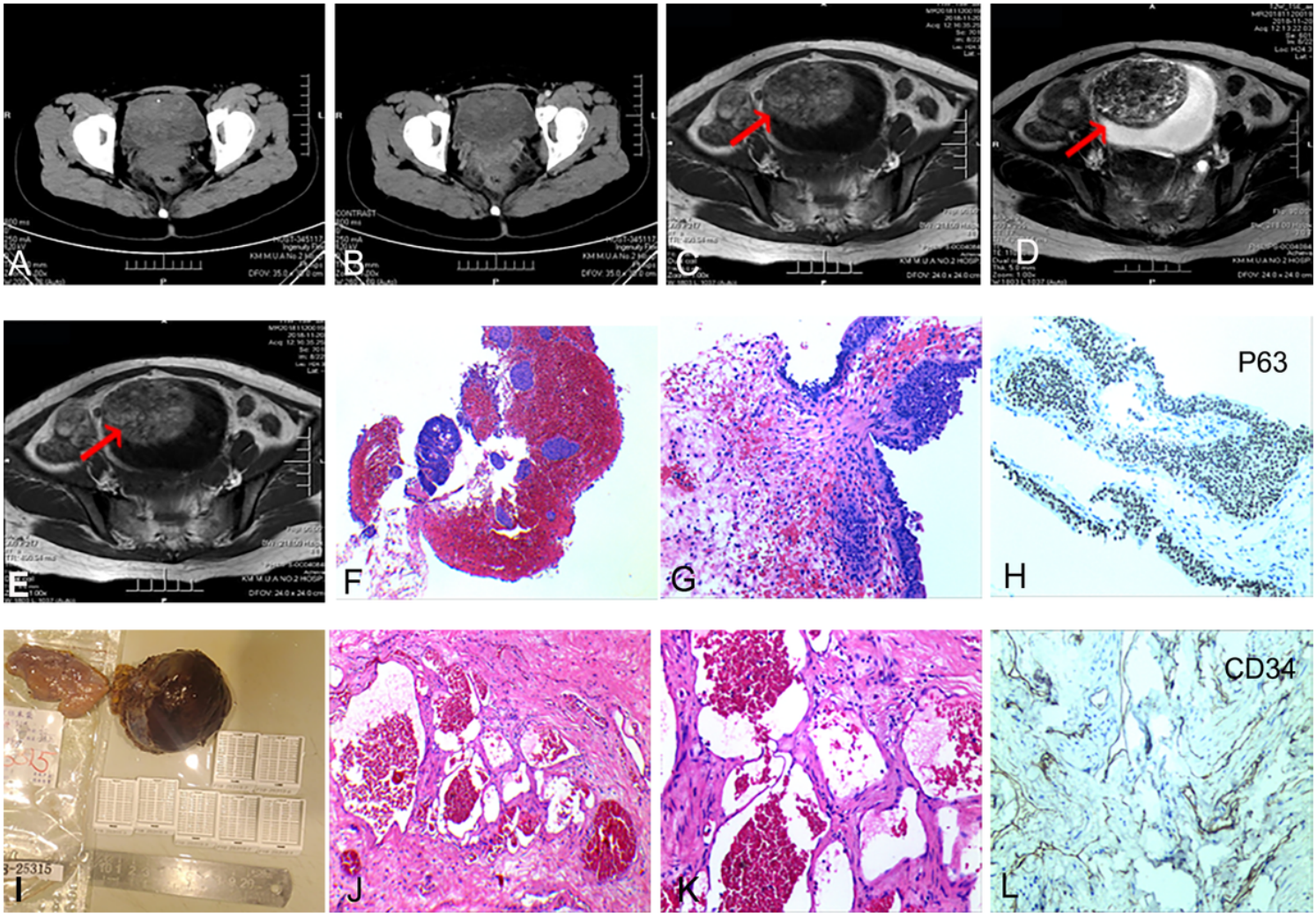

Figure 2

CT scanning, MRI scanning, Cystoscopy and biopsy, and pathological analysis of case 2. (A-B)preoperative CT scan image shows that bladder wall was thickened, patchy soft tissue density shadow and punctate calcification could be seen in the cavity(A) and uneven enhancement(B).(C-E) preoperative Pelvic MRI images. The tumor was a large 6.2 cm x 6.9 cm x 5.2 cm sharply defined lesion on the right anterior and upper wall of the bladder, which exhibited intermediate signal intensity on T1-weighted images(C), heterogeneous signal intensity with a predominance of hyperintensity on T2-weighted images and marked enhancement of the lesion(D), and that DWI showed a slightly higher signal, ADC showed a slightly lower signal, and the enhancement was slightly enhanced(E). (F-H) Cystoscopy and biopsy. The initial pathological report of H&E staining showed Gland Cystitis which showing a single-layer flat endothelium with no nuclear atypia(F 40×, G 100×) and endothelial cells were P63-positive(H 100×).(I) Specimen of the resected tumor: The gross pathological examination revealed a well-circumscribed, bearing a vesicles-like, with a size of 7cm×5cm×4cm and gray-brown cut surface. (J-L) Histologic and immunohistochemical characteristics after partial cystectomy: Hematoxylin and eosin (H&E) staining showing the structure of the tissue is predominantly composed of large and dilated vessels which are engorged with blood and covered with a thin wall(J 40×), the large and dilated vessels which are engorged with blood and covered with a thin wall with no clear atypia of the endothelial cells(K 100×), and endothelial cells were CD34-positive(L 100×).

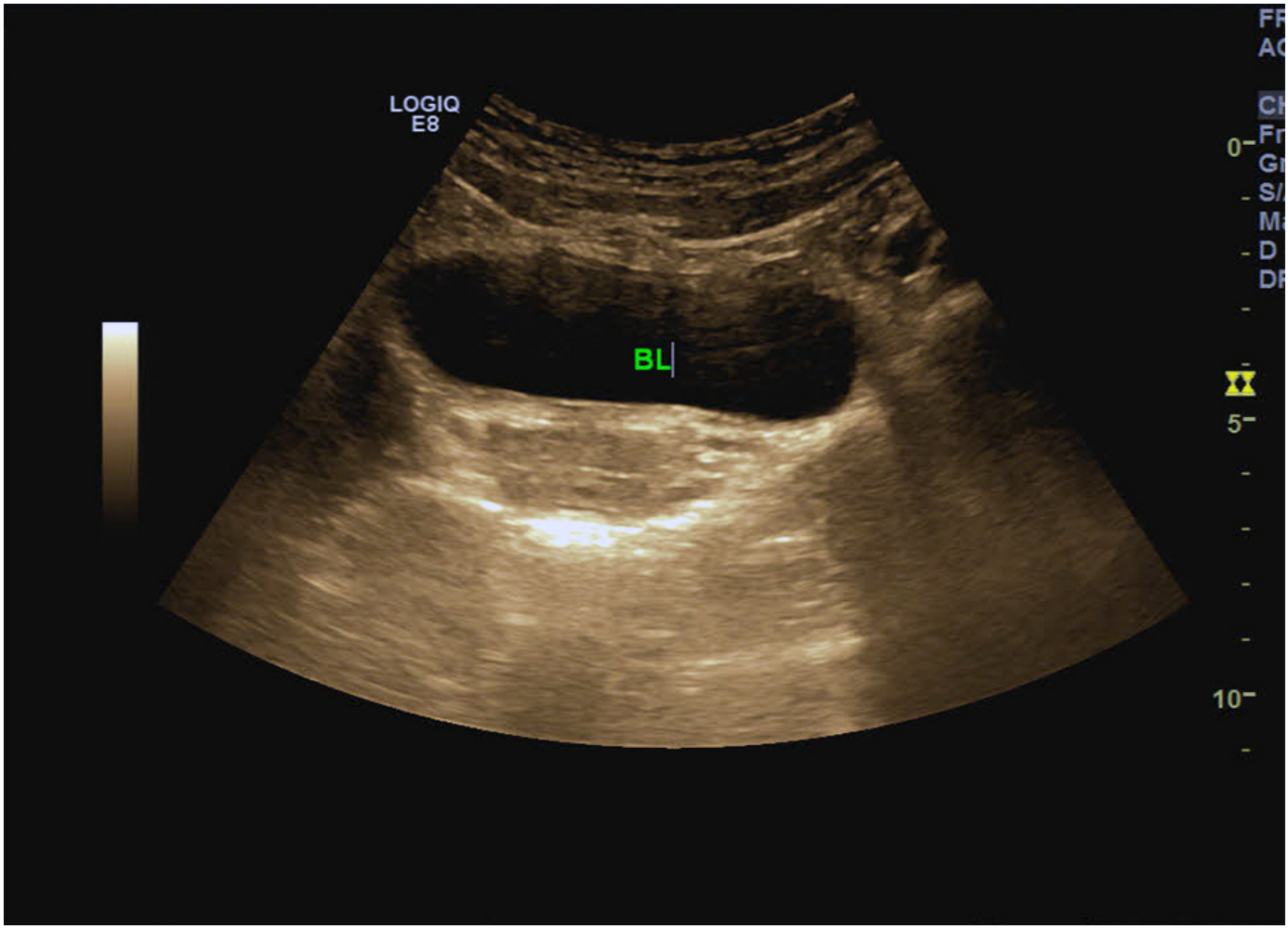

Figure 3

Postoperative urinary and pelvic ultrasonography image within three months of case 2.