Urology Case Reports 58 (2025) 102929

Contents lists available at ScienceDirect

Urology Case Reports

journal homepage: www.elsevier.com/locate/eucr

Oncology

Neurofibroma of bladder: A case report and literature review

Zhipeng Yan [a,b], Baoqun Xu [c], Maokun Sun [a,b], Heng Zhang [a,b], Xiaolu Sun [a,b], Lihua Li [a,b], Yulan Gao [a,b,**], Yunji Sun [a,b,*]

[a] Department of Urology, Shandong Provincial Third Hospital, Shandong University, Jinan, 250012, China
[b] Shandong Stone Disease Prevention and Treatment Center, Jinan, 250012, China
[c] Department of Pathology, Shandong Provincial Third Hospital, Shandong University, Jinan, 250012, China

ARTICLE INFO

Keywords:
Hematuria
Bladder tumor
Neurofibroma
Bladder resection
Transurethral resection of bladder tumors

ABSTRACT

To improve the understanding and treatment level of urogenital nerve fibroma by sharing the clinical manifestations, imaging features, and pathological characteristics of a case of urogenital nerve fibroma.The patient was a middle-aged male with initial symptoms of painless gross hematuria, bladder irritation, and pelvic mass. Imaging examination showed a bladder mass, and transurethral bladder tumor resection was performed to reduce the tumor. Pathology was confirmed to be bladder neurofibroma. After 6 months of surgery, follow-up examination showed a significant reduction in tumor volume and no recurrence. The successful diagnostic and therapeutic experience of this case can be referenced for clinical practice.

1. Introduction

Neurofibroma of the genitourinary system is very rare in clinical practice, and neurofibroma of the bladder is the most common organ.[1] Patients often experience clinical symptoms at a young age, with a much higher proportion of male patients than female patients. We report a case of primary neurofibroma of the bladder in a 36-year-old male whose clinical symptoms were clinical symptoms of painless gross hematuria, bladder irritation, and pelvic mass. Pelvic magnetic resonance imaging shows thickening of the right posterior wall of the bladder, with irregular soft tissue signal shadows protruding into the cavity. The prostate and bilateral seminal vesicles are also affected. Through cystoscopy and pathological biopsy, it was found to be consistent with neurofibroma of the bladder. Immunohistochemical examination further confirmed the diagnosis.

2. Case presentation

The patient, a 36-year-old male, presented to our hospital for 2 days due to painless gross hematuria accompanied by lower abdominal pain; The patient has a family history of neurofibroma (his grandmother and father); Physical examination: A cystic mass can be palpated in the bladder area of the lower abdomen, and multiple cystic masses can be palpated along the spine in the lower back (Fig. 1 A).Multiple coffee-latte spots and subcutaneous soft tissue masses are found on the skin of the whole body (Fig. 1B).Urinary tract ultrasound shows a solid cystic mass in the pelvic cavity. Further magnetic resonance imaging of the lumbosacral vertebrae and pelvic cavity revealed enlargement of the sacral canal and some sacral foramen, with a local cystic protrusion towards the pelvic cavity (Fig. 2A and B).Nodular shadows were observed in the subcutaneous fat layer of the lumbosacral region, with larger ones ranging from approximately 1.9cm–1.3cm. Thickening of the trigone and right posterior wall of the bladder, with irregular soft tissue signal shadows protruding into the cavity, with a maximum cross-section of approximately 4.6cm × 3.3cm(Fig. 2C). A cystic shadow can be seen between the posterior wall of the bladder and the sacrum, with a size of approximately 4.9cmX2.9cm. The prostate and bilateral seminal vesicles are enlarged with uneven signals(Fig. 2 D).

3. Treatment and outcome

The patient has persistent symptoms of hematuria and bladder irritation. After admission, the patient underwent transurethral cystoscopy and bladder tumor biopsy; During the operation, a bladder diverticulum was visible on the lateral wall of the bladder, and a solid mass with a wide base was observed on the right posterior wall of the bladder, measuring about 5cmX3cm in size. The surface showed mucosal redness, swelling, and easy bleeding; Clamp the tissue and send it for

* Corresponding author. Department of Urology, Shandong Provincial Third Hospital, Shandong University, Jinan, 250012, China.
** Corresponding author. Department of Urology, Shandong Provincial Third Hospital, Shandong University, Jinan, 250012, China.
E-mail addresses: wwllovegyl@163.com (Y. Gao), kennysunuser@163.com (Y. Sun).

https://doi.org/10.1016/j.eucr.2024.102929
Received 11 November 2024; Accepted 30 December 2024
Available online 31 December 2024

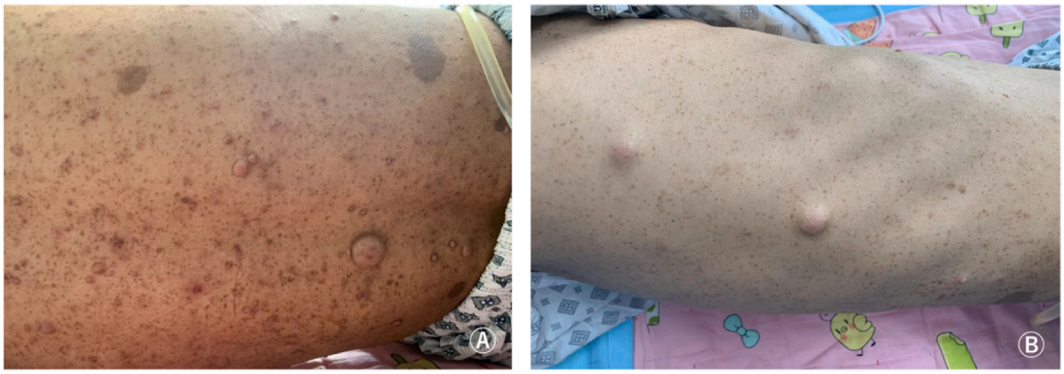

Fig. 1. Preoperative physical examination pictures.
A:Back physical examination picture; B:Abdominal physical examination picture.

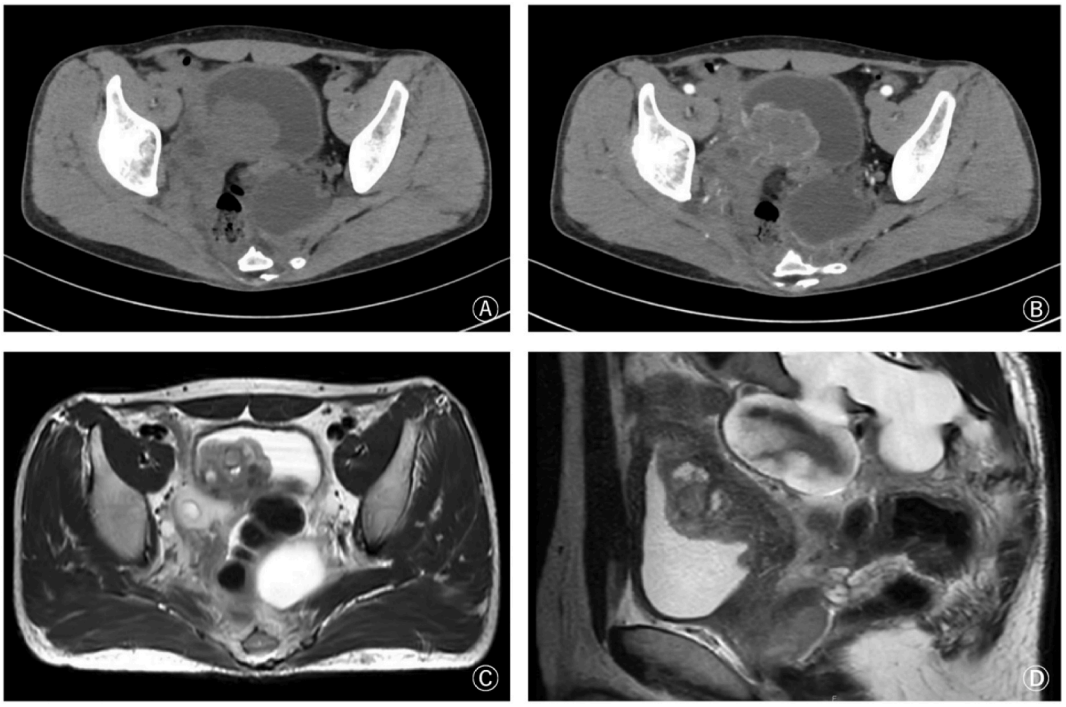

Fig. 2. Preoperative imaging examination.
A:Preoperative non-enhanced Bladder CT image; B:Preoperative enhanced CT; C:Coronal magnetic resonance imaging; D:Sagittal magnetic resonance imaging.

pathological examination. The pathological results indicate that there is spindle cell proliferation in the stroma (biopsy of bladder tumor), combined with immunohistochemical results, it is considered as neurofibroma.If necessary, NF gene testing can be performed to further clarify neurofibromatosis. Vimentin (+), SOX-10 (+), S100 (+), CK (−), EMA (−), CD21 (−), CD35 (−), CD117 (−), DOG-1 (−), CD34 (vascular+), Bcl-2 (weak+), CD31 (vascular+), CD68 (histiocyte+), Desmin (−), SMA (−), B-catenin (plasma+), Ki67 (3–5%+)(Fig. 3A–F).

After being diagnosed with neurofibroma of the bladder, considering the patient's younger age and medical needs, transurethral resection of the bladder tumor was performed on the patient; Postoperative pathology was still considered as bladder neurofibroma. After surgery, the patient's symptoms of hematuria and bladder irritation disappeared, and a follow-up urological enhanced CT scan at the 6th month after surgery showed a significant reduction in bladder tumor burden (Fig. 4A and B). Re-examination of cystoscopy 6 months after surgery showed that the tumor volume was significantly reduced, and the patient refused to undergo a second transurethral resection of the bladder tumor (Fig. 4C and D). The work has been reported in line with the SCARE criteria.

4. Discussion

Type I neurofibromatosis (NF1) is an autosomal inherited disease.[2] Mutations in the NFI gene can develop into neurofibroma.[3,4] Patients often experience symptoms in the early stages or even adolescence, and neurofibromatosis lesions can occur in the prostate, urethra, testes, spermatic cord, and ureter of the urinary system, but the bladder is the most common site.[5,6] As reported in this case, bladder neurofibroma typically originates from the pelvic cavity, bladder nerves, and prostate plexus.[7] Common clinical features include gross hematuria, difficulty urinating, recurrent urinary tract infections, bladder irritation symptoms, and pelvic masses. In isolated cases of bladder neurofibroma, differential diagnosis of leiomyosarcoma, ganglioneuroma, and paraganglioma should be considered.[8] In addition to clinical manifestations, imaging examinations can help evaluate lesions in the abdominal, pelvic, and spinal regions, especially in cases where neurofibromatosis is not yet clear in the initial patient.[9] Imaging examinations include

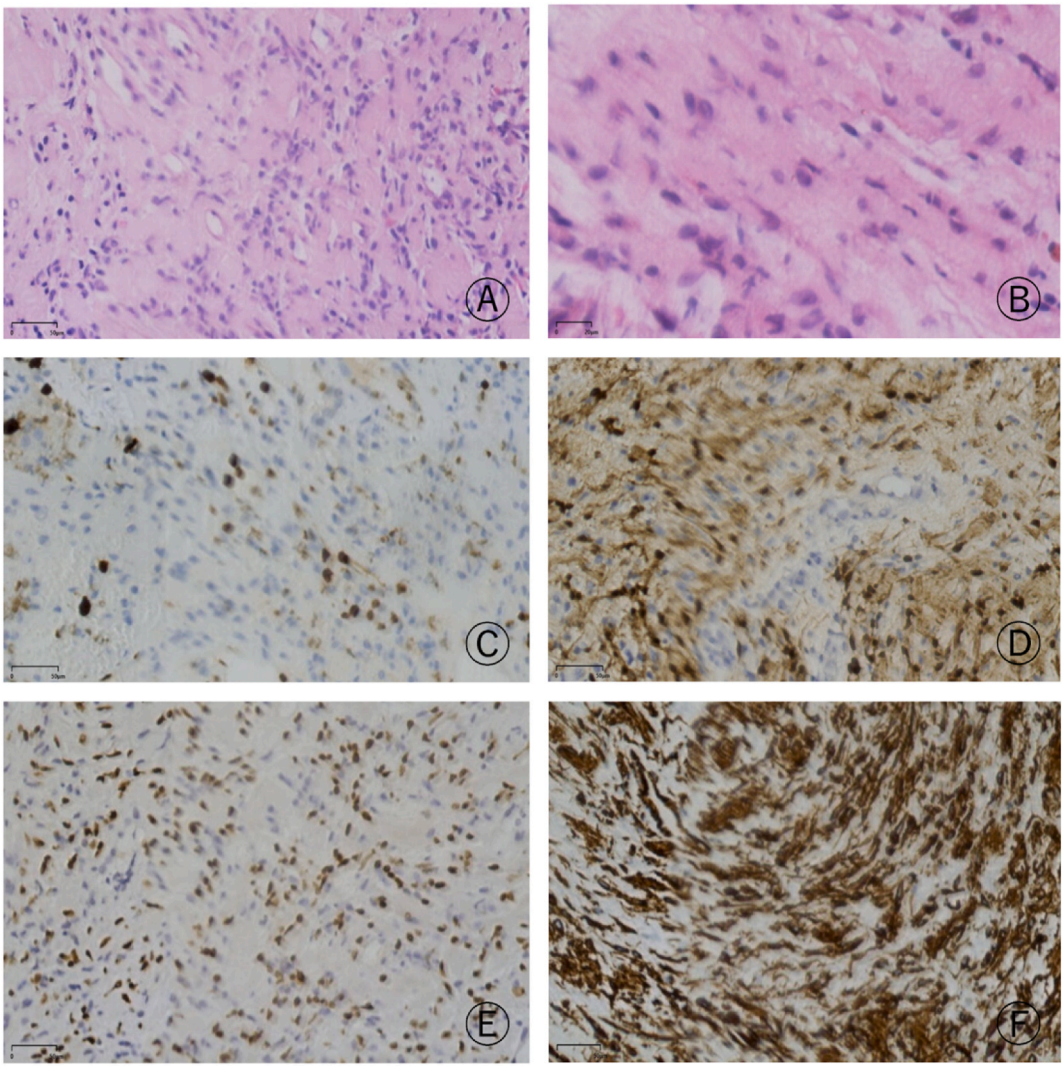

Fig. 3. Microscope Images (HE) and Pictures of immunohistochemical pathology results.
A:HE(X100); B:HE(X200); C:Ki67(+); D:S100(+); E:SOX-10(+); F:Vimentin(+).

abdominal enhanced CT, MRI, cystoscopy, and biopsy pathology. Enhanced CT can evaluate the depth and metastasis of bladder neurofibroma invasion, but the CT manifestations of bladder wall ganglioneuroma or other tumors may be similar.[10,11] In this case, contrast-enhanced CT of the urinary system showed diffuse thickening of the bladder wall, irregular soft tissue mass shadow on the right posterior wall of the bladder, with lobulated edges and no significant enhancement. Enhanced CT with unclear enhancement cannot be used to completely clarify bladder neurofibroma, but it can be used to distinguish the possibility of malignancy or metastasis of the tumor.[12] In our case, imaging examinations did not detect the possibility of malignant tumor metastasis. So further pathological examination is needed. In terms of histopathology, the histological manifestations of neurofibroma may be similar to low-grade malignant schwannoma, leiomyosarcoma, and rhabdomyosarcoma. Bladder neurofibroma usually presents with proliferation of spindle shaped cells in the stroma. Neurofibroma cells are composed of medium-sized spindle shaped cells with slender nuclei, and spindle shaped cells are mostly S-100 protein positive in immunostaining.[8] The unique clinical manifestations, imaging, and immunohistochemical features of neurofibroma of the bladder can usually provide a clear diagnosis.[13] Due to the benign nature of bladder neurofibroma and its good prognosis, asymptomatic patients can choose to undergo regular follow-up monitoring[14] or medication treatment. Studies have shown that regular use of selumetinib can lead to the reduction of neurofibroma and prevent the development of related complications.[15] For patients who continue to experience bladder irritation symptoms, anticholinergic drugs can be used for treatment. If the disease progresses during conservative treatment, such as obstructive urination symptoms or persistent hematuria due to lesion occupancy, surgical intervention becomes the preferred treatment method for symptomatic patients. Transurethral bladder tumor resection or partial cystectomy is suitable for patients without upper urinary tract obstruction.[16] If ureteral obstruction and hydronephrosis occur, ureteral orifice replantation can be considered as a surgical option. At the same time, rapid frozen histological examination of the distal ureter is required during surgery to avoid residual affected tissue.[14]

5. Conclusion

The unique clinical manifestations, imaging, and immunohistochemical features of bladder neurofibroma can usually be clearly diagnosed. As bladder neurofibroma is a benign tumor with a good prognosis, regular follow-up monitoring can be chosen for asymptomatic patients. If patients experience obstructive urination symptoms or persistent hematuria due to the occupying space of the lesion, surgical intervention becomes the preferred treatment method for symptomatic

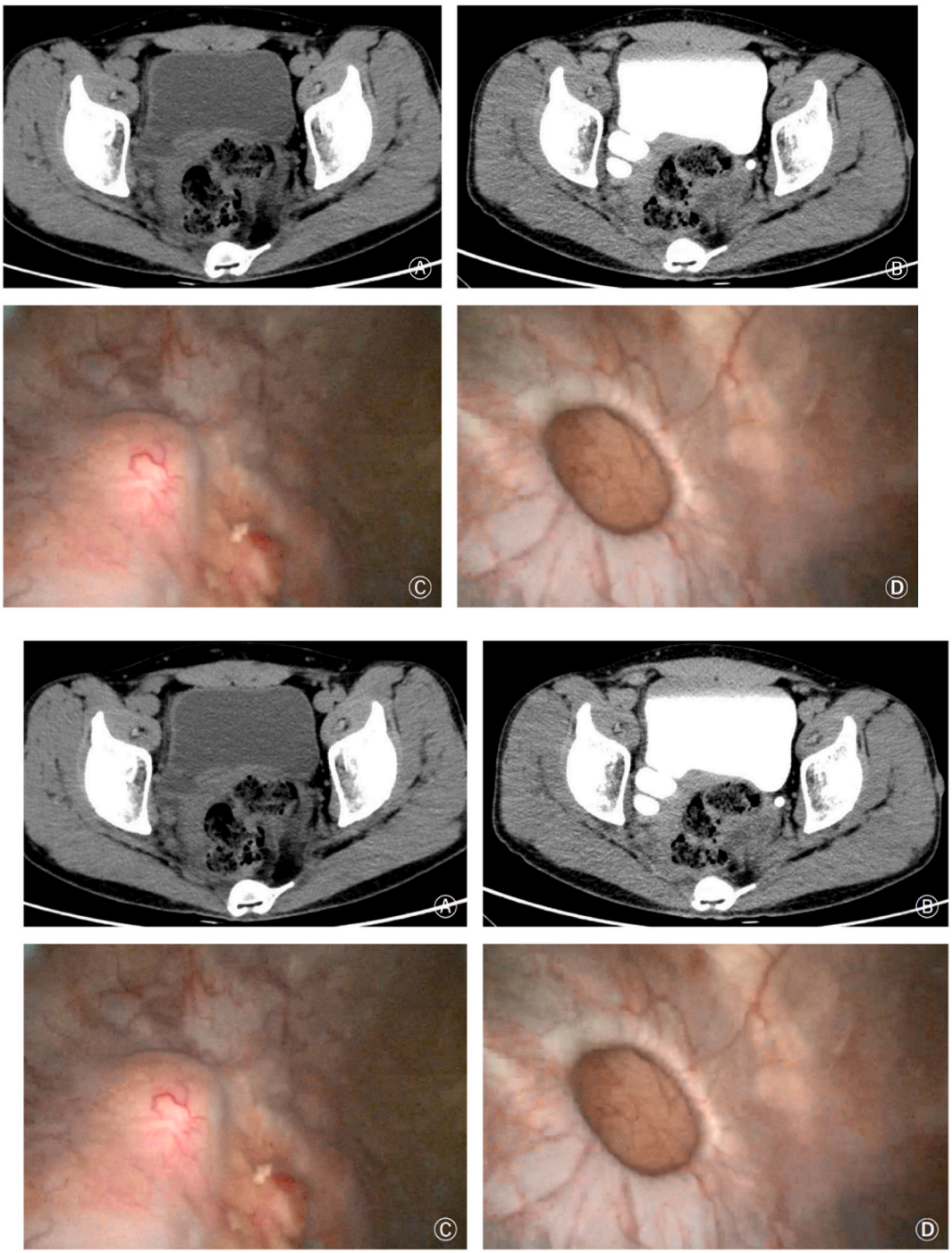

Fig. 4. Postoperative imaging examination and Cystoscopy images (before and after surgery).
A:Postoperative non-enhanced Bladder CT image; B:Postoperative enhanced CT; C and D:Postoperative Cytocopy images.

patients, while transurethral bladder tumor resection or partial cystectomy is suitable for patients without upper urinary tract obstruction.

CRediT authorship contribution statement

Zhipeng Yan: Writing – original draft. **Baoqun Xu:** Data curation. **Maokun Sun:** Data curation, Investigation. **Heng Zhang:** Data curation. **Xiaolu Sun:** Data curation. **Lihua Li:** Data curation, Investigation. **Yulan Gao:** Formal analysis, Investigation, Supervision. **Yunji Sun:** Writing – review & editing, Supervision, Validation.

Patient consent for publication

Signed informed consent was obtained from the patient for publication of this case report and any accompanying images.

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

The study is approved by the Ethical Committee of Shandong Provincial Third Hospital.

Funding

Not applicable.

Declaration of competing interest

The authors declare that they have no competing interests.

Acknowledgements

Not applicable.

References

1. Benazzouz MH, Hajjad T, Essatara Y, et al. Bladder involvement in Von Recklinghausen's disease. *Pan Afr Med J*. 2014;17:294. https://doi.org/10.11604/pamj.2014.17.294.4152. Published 2014 Apr 18.
[2. Brosseau JP, Liao CP, Wang Y, et al. NF1 heterozygosity fosters de novo tumorigenesis but impairs malignant transformation. *Nat Commun*. 2018;9(1):5014. https://doi.org/10.1038/s41467-018-07452-y. Published 2018 Nov 27.
[3. Ţarcă E, Cojocaru E, Trandafir LM, et al. Ganglioneuroma of the bladder in association with neurofibromatosis type 1. *Diagnostics (Basel)*. 2022;12(12):3126. https://doi.org/10.3390/diagnostics12123126. Published 2022 Dec 12.
[4. Mo J, Anastasaki C, Chen Z, et al. Humanized neurofibroma model from induced pluripotent stem cells delineates tumor pathogenesis and developmental origins. *J Clin Invest*. 2021;131(1), e139807. https://doi.org/10.1172/JCI139807.
[5. Salvitti M, Celestino F, Gerocarni Nappo S, Caione P. Diffuse ganglioneuromatosis and plexiform neurofibroma of the urinary bladder: an uncommon cause of severe urological disease in an infant. *J Pediatr Urol*. 2013;9(3):e131–e133. https://doi.org/10.1016/j.jpurol.2013.01.006.
[6. Ameur A, Touiti D, Jira H, el Alami M, Ouahbi Y, Abbar M. Aspects urogénitaux et néphrologiques de la maladie de Von Recklinghausen. A propos de deux observations et d'une revue de la littérature [Urinary and nephrologic aspects of Von Recklinghausen disease. Two case reports and review of the literature]. *Ann Urol (Paris)*. 2003;37(4):150–154. https://doi.org/10.1016/s0003-4401(03)00047-0.
[7. Nakazawa S, Yoneda S, Takezawa K, et al. [Plexiform neurofibroma of the bladder associated with neurofibromatosis type 1: a case report]. *Hinyokika Kiyo*. 2012 Apr;58(4):215–218. Japanese. PMID: 22684263.
[8. Wang W, Montgomery E, Epstein JI. Benign nerve sheath tumors on urinary bladder biopsy. *Am J Surg Pathol*. 2008;32(6):907–912. https://doi.org/10.1097/PAS.0b013e31815b0c9a.
[9. Shonnard KM, Jelinek JS, Benedikt RA, Kransdorf MJ. CT and MR of neurofibromatosis of the bladder. *J Comput Assist Tomogr*. 1992;16(3):433–438. https://doi.org/10.1097/00004728-199205000-00017.
[10. El Ounani F, Dafiri R. Imagerie de la neurofibromatose vésicale [Imaging features of neurofibromatosis involving the urinary bladder]. *J Radiol*. 2010;91(5 Pt 1):567–569. https://doi.org/10.1016/s0221-0363(10)70089-5.
[11. Levine E, Huntrakoon M, Wetzel LH. Malignant nerve-sheath neoplasms in neurofibromatosis: distinction from benign tumors by using imaging techniques. *AJR Am J Roentgenol*. 1987;149(5):1059–1064. https://doi.org/10.2214/ajr.149.5.1059.
[12. Wang W, Montgomery E, Epstein JI. Benign nerve sheath tumors on urinary bladder biopsy. *Am J Surg Pathol*. 2008;32(6):907–912. https://doi.org/10.1097/PAS.0b013e31815b0c9a.
[13. Cheng L, Scheithauer BW, Leibovich BC, Ramnani DM, Cheville JC, Bostwick DG. Neurofibroma of the urinary bladder. *Cancer*. 1999 Aug 1;86(3):505–513. PMID: 10430260.
[14. Ure I, Gürocak S, Gönül II, Sözen S, Deniz N. Neurofibromatosis type 1 with bladder involvement. *Case Rep Urol*. 2013;2013, 145076. https://doi.org/10.1155/2013/145076. Epub 2013 Jul 28. PMID: 23984171; PMCID: PMC3745892.
[15. Gross AM, Glassberg B, Wolters PL, et al. Selumetinib in children with neurofibromatosis type 1 and asymptomatic inoperable plexiform neurofibroma at risk for developing tumor-related morbidity. *Neuro Oncol*. 2022;24(11):1978–1988. https://doi.org/10.1093/neuonc/noac109.
[16. Umakanthan S, Naik R, Bukelo MM, Rai S, Prabhu L. Primary bladder neurofibroma: a rare case with clinical implications and diagnostic challenges. *J Clin Diagn Res*. 2015;9(9):ED05–ED6. https://doi.org/10.7860/JCDR/2015/14015.6447.