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CASE REPORTS

CASE REPORT

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A Rare Metastasis of Prostate Cancer

İlkin Hamid-Zada, Bekir Demirtaş, Özgür Kazan, Özgür Efiloğlu, Asıf Yıldırım

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ABSTRACT

Prostate cancer is one of the most common cancers in men. Generally, prostate cancer metastases occur in lymph nodes and bones, but rare metastases, such as those in the kidneys, can be observed. There is no clear consensus regarding the diagnosis and treatment of renal metastases of prostate cancer. Our case report describes a 70-year-old male patient with a right renal mass detected on routine imaging due to elevated prostate-specific antigen levels 3 years after he was diagnosed with prostate cancer. For rare renal metastases, biopsy of the mass should be considered for diagnostic purposes.

Keywords: Prostate cancer, renal metastasis, prostate-specific antigen

INTRODUCTION

Nowadays, prostate cancer is one of the most common oncological diseases and is also the second most common cancer diagnosed in men [1]. We know that prostate cancer generally metastasizes to the lymph nodes and bones. Prostate cancer rarely metastasizes to some organs. The kidney, intracranial, ocular, and adrenal glands can be given as examples. Diagnosis and treatment for renal metastasis of prostate cancer remain controversial. We report a rare case of prostate adenocarcinoma metastasizing to the kidney.

CASE PRESENTATION

A 70-year-old male patient presented with right flank pain two months previously and lower urinary tract symptoms admitted to our hospital. He had adenocarcinoma group 5 [Gleason score 9 (4+5)] transrectal prostate biopsy results and a prostate-specific antigen (PSA) level of 100 ng/mL. After diagnosis of prostate cancer, androgen deprivation therapy and radiotherapy were started. There was no solid organ metastasis upon diagnosis. Biochemical recurrence occurs 2 years after the initial diagnosis. The patient was started on enzulatamide, and his PSA level began to decrease. The patient did not apply for hospitalization for 2 years after oncological treatment. During the screening tests, a 4 cm low echogenic lesion was detected on ultrasound at the ureteropelvic junction of the right kidney, and the PSA value was 135 ng/mL. For further investigation, magnetic resonance imaging (MRI) was taken. The MRI scan showed a contrast-enhanced mass in the right kidney (Figure 1), which indicated the possibility of transitional cell carcinoma. After MRI scan, the patient was prepared for surgery and evaluated the right ureter for ureterorenoscopy. First, the right distal and mid-ureter appearance was edematous and narrow. The operation time can be observed until the proximal ureter is examined and urine cytology. Urine cytology result was negative for urothelial cancer. Retrograde pyelography showed no apparent abnormality, such as malignancy or filling defect in the suspected area on MRI. After surgery, a tru-cut biopsy was performed from the mass. The pathological result indicated adenocarcinoma, which was considered to have originated from the prostate, according to the immunohistochemical stain (Figure 2). In immunohistochemistry, tumor tissue showed negative staining for cytokeratin 7, but NK3 homebox-1 and prostate-specific acid phosphatase-positive staining for PSA. The patient was referred to medical oncology.

DISCUSSION

Currently, prostate cancer is one of the most common causes of cancer deaths in men. Theoretically, prostate cancer cells can spread anywhere in the body. Prostate cancer metastases occur more commonly in the following areas: bones, lymph nodes, lungs, and liver. Rare locations of prostate cancer metastasis include adrenal glands, brain, breasts, eyes, salivary glands, spleen, pancreas, and kidneys.

Kidney metastases are more common in lung, colon, and breast cancers. Only few cases of prostate cancer have been

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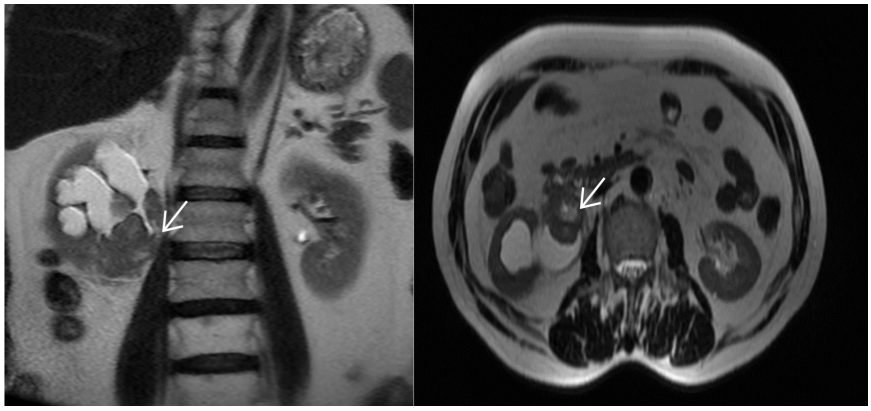

Figure 1. Coronal and axial MRI demonstrating right renal mass
MRI: Magnetic resonance imaging

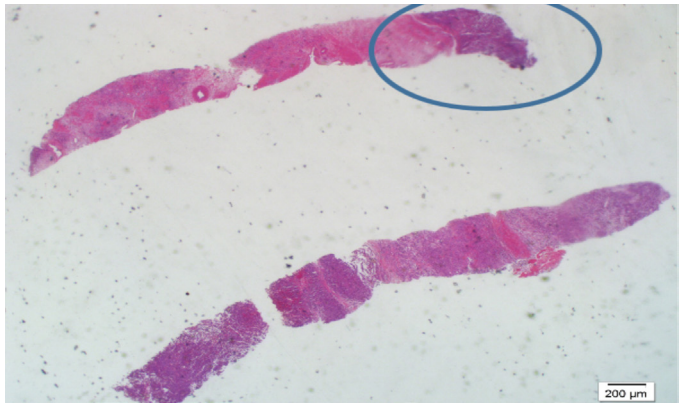

Figure 2. Histological section showing renal metastasis of prostatic adenocarcinoma

reported. The kidneys are the most vascular organs among the regions where prostate cancer metastasizes; the cause of this metastasis is thought to be the result of arterial embolization [2]. Sometimes, we can see tumor-to-tumor metastasis and called collison tumor [3]. A rare metastases such as renal oncocytoma metastasis or renal cell carcinoma of prostate cancer have been seen in the literature. It is important to note that renal cell carcinoma is the most common recipient tumor and it metastasizes from tumor to tumor [4]. Renal metastasis of prostate cancer was first reported by Kutcher et al. [5] in 1986. Additionally, Denti et al. [6] detected a mass lesion in the left kidney on imaging and performed biopsy of the lesion. Histopathological examination and immunostaining of the mass revealed prostate adenocarcinoma [6]. Ibinaiye et al. [7] described a second case diagnosed as antemortem by percutaneous fine needle aspiration in the literature. Sakata et al. [8] reported the incident detection of a kidney mass on computed tomography in a male patient. He received treatment for prostate cancer 2 years ago. Left nephrectomy was performed. The pathological finding of this case was renal metastasis of prostate adenocarcinoma [8]. In our case, it was revealed during routine follow-up. Fine needle biopsy helped in the diagnosis of atypical prostate cancer metastases. In the literature, survival rates are less than 2 years in patients with prostate cancer and kidney metastases [9]. Although our patient was diagnosed with prostate cancer metastasis, he has been alive for 6 months.

More careful screening should be performed in patients with high-risk prostate cancer and high serum PSA levels. Rare atypical site metastases occur in a small proportion of these patients. When a renal lesion is detected in patients diagnosed with prostate cancer, a metastatic lesion should be considered. Although prostate cancer metastasis to the kidney is rare, biopsy should be considered in such cases. Although the clarity of this situation is not known, routine metastatic screening is very important. In literature, there is no definitive treatment; more reports and studies with a higher level of evidence should be conducted to help us make decisions in this patient group.

Ethics

Informed Consent: The patient written informed consent was obtained.

Authorship Contributions

Surgical and Medical Practices: İ.H-Z., B.D., Ö.K., Ö.E., A.Y., Concept: İ.H-Z., B.D., Ö.K., Ö.E., A.Y., Design: İ.H-Z., B.D., Ö.K., Ö.E., A.Y., Data Collection or Processing: İ.H-Z., Analysis or Interpretation: İ.H-Z., B.D., Literature Search: İ.H-Z., B.D., Ö.K., Ö.E., A.Y., Writing: İ.H-Z.

Conflict of Interest: No conflict of interest was declared by the authors.

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REFERENCES

1. Horn AJ, Fritz BE, Lagrange CA, West WW, Lele SM. Clinically undiagnosed prostate carcinoma metastatic to renal oncocytoma. Case Rep Urol. 2012;2012:307813.
2. Khan F, Mahmalji W, Sriprasad S, Madaan S. Prostate cancer with metastases to the kidney: a rare manifestation of a common disease. BMJ Case Rep. 2013;2013:bcr2012008388.
3. Kurtul N, Resim S, Koçarslan S. Giant renal metastasis from prostate cancer mimicking renal cell carcinoma. Turk J Urol. 2018;44:367-9.
4. Sobrinho ULGP, Diniz ALL, Martins RGM, Da Silva DEA, De Souza TA, et al. Partial nephrectomy as treatment of an atypical metastasis from prostate cancer—a case report and review of literature. Open J Urol. 2018;8:8-16.
5. Kutcher R, Greenebaum E, Rosenblatt R, Moussouris HF. Prostatic carcinoma metastasis to the kidney: diagnosis by thin needle aspiration biopsy. Urol Radiol. 1986;8:98-100.
6. Denti F, Wisard M, Guillou L, Francke ML, Leisinger HJ. Renal metastasis from prostatic adenocarcinoma: a potential diagnostic pitfall. Urol Int. 1999;62:171-3.
7. Ibinaiye PO, Mbibu H, Shehu SM, David SO, Samaila MO. Renal metastasis from prostate adenocarcinoma: a potential diagnostic pitfall. Ann Afr Med. 2012;11:230-3.
8. Sakata R, Iwasaki A, Kobayashi M, Osaka K, Fujikawa A, et al. [Renal metastasis from prostatic adenocarcinoma : a case report]. Hinyokika Kiyo. 2011;57:683-7.
9. Vyas M, Menon S, Desai SB. Collision tumor of kidney: a case of renal cell carcinoma with metastases of prostatic adenocarcinoma. Indian J Med Paediatr Oncol. 2013;34:21-3.

CASE REPORT

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Bladder Metastasis from Clear Cell Renal Cell Carcinoma: A Case Report

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ABSTRACT

Kidney cancer is one of the most common urologic cancers. Generally, kidney cancer metastases occur in the liver, lungs, and bones, but we can see rare metastases such as those in the urinary bladder. Our case report describes a 60-year-old male patient with a left renal mass that was incidentally detected. After diagnosis of renal mass, left radical nephrectomy was performed. During one of these routine follow-up visits, he was admitted to our hospital with macroscopic hematuria. After transuretral resection of a suspicious lesion, the pathological results indicated metastatic carcinoma of the kidney.

Keywords: Clear cell, renal cell carcinoma, bladder metastasis

INTRODUCTION

Kidney cancer is one of the most common urologic cancers. Clear cell renal cell carcinoma (RCC) is the most frequent subtype and is characterized by the loss of chromosome 3p and mutation of the *Von Hippel-Lindau* gene at chromosome 3p25 [1]. Renal metastasis frequently spreads to the liver, lungs,bones, lymph nodes, adrenal glands, brain, pancreas, pleura, and thyroid glands. However, metastatic spread from RCC to the urinary bladder is rare. The urinary bladder is one of the least common sites of RCC metastasis, accounting for <2% of patients with advanced disease. We present the case report of a 59-year-old man with urinary bladder metastasis due to clear cell RCC.

CASE PRESENTATION

The patient was incidentally detected to have a renal mass measuring 6.8 cm × 4.9 cm × 4.2 cm on contrast-enhanced abdominal-pelvic computed tomography (CT) (Figure 1). The chest CT scan revealed an asymmetric density measuring 40x32 mm in the paratracheal area of the cervical region, as well as multiple lymphadenopathies (LAP) in the mediastinum, the largest of which measured 25 mm. Additionally, there were multiple bilateral lung nodules suspected to be pulmonary metastases, with the largest nodule measuring 15 mm in size and a 10 mm hypodense nodule located in the left lobe of the liver. Fluorodeoxyglucose-positron emission tomography was positive for metastasis in the left supraclavicular area, bilateral lungs, and mediastinum. Biopsy of LAP in the left lower cervical area confirmed metastasis of RCC. The patient underwent left laparoscopic radical nephrectomy. The pathological results were classified as clear cell RCC, pT3 Nx Mx L1 V1 R0, nuclear grade: FURHMAN III, Ki-67: 80%. After surgery, the patient consulted the medical oncology department because of metastasis. Medical oncology initiated treatment with pembrolizumab (a PDCD1 receptor inhibitor) and lenvatinib a tyrosine kinase inhibitor. The patient's postoperative course was uneventful, and they were scheduled for regular follow-up every 3 months. During one of these follow-up visits, the patient was admitted to our hospital because of hematuria. A suspicious area was detected on urinary tract ultrasound. Transurethral resection of a suspicious area in the bladder was performed, and the pathological results indicated involvement of metastatic carcinoma from the kidney. Immunohistochemical staining of the tissue showed that GATA3 and NKX 3.1 were negative, but Pax-8 was positive in the pathology material (Figure 2).

DISCUSSION

RCC is one of the most common urological neoplasmses, accounting for approximately 5% of adult cancer cases in both sexes. Clear cell RCC is the most common subtype of RCC and

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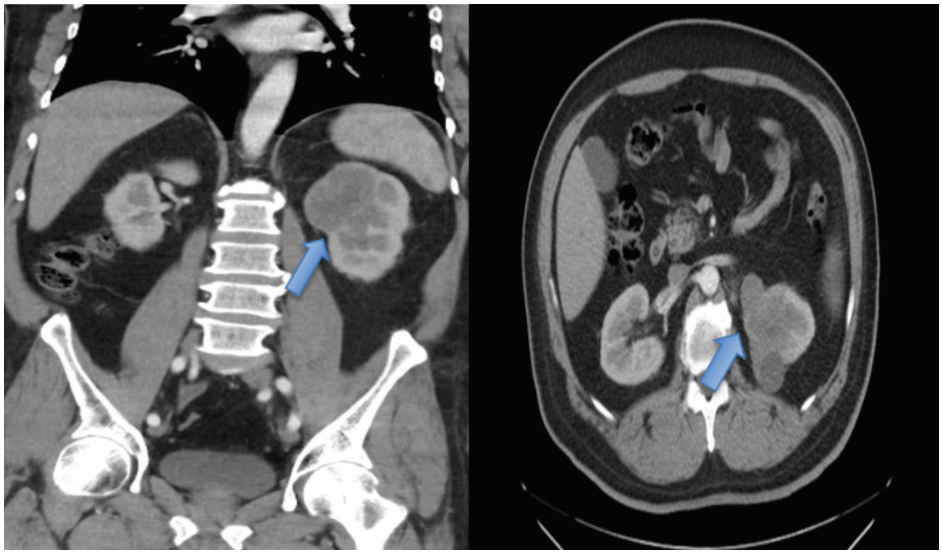

Figure 1. Coronal and axial CT demonstrating left renal mass
CT: Computed tomography

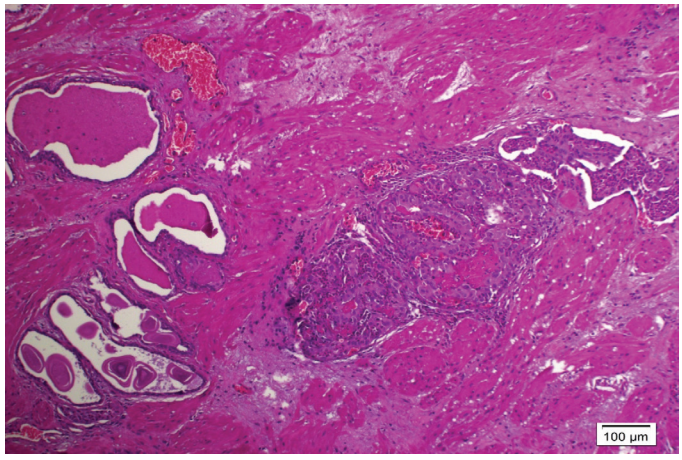

Figure 2. Histological section showing bladder metastasis from clear cell renal cell carcinoma

is associated with the highest risk of metastatic disease. RCC metastasis mostly occurs in the lungs, liver, lymph nodes, and bones. It is rare for RCC to metastasize to the urinary bladder, with less than 70 cases reported in the literature [2]. The first case of RCC metastasis to the bladder was reported by Hoffmain [3] in 1907. Advanced tumor stage is associated with poor prognosis and reduced survival rates [4]. The spread of RCC to the urinary bladder remains a topic of debate. Metastatic spread to the urinary bladder can occur via hematogenous, lymphatic, or urinary stream pathways. It is known that hematogenous pathways can cause systemic spread to the bladder. The spread of tumors through the lymphatic system can occur when there are connections between the lymphatic and vascular channels, allowing retrograde spread of the tumor. Another hypothesis-explaining the spread of renal tumors to the ureters and bladder is the dissemination of neoplastic cells through the urinary tract [5].

Metastases of RCC to the urinary bladder are typically classified into two types: synchronous and metachronous tumors, which present within 1 year and after 1 year of nephrectomy, and are associated with an unfavorable prognosis [6].

In the treatment of oligometastatic RCC, metastasectomy is generally preferred. In cases of solitary lung metastasis, metastasectomy can reduce the risk of death by twofold. Metastasis site is a crucial factor in determining survival rate. Patients with lung, bone, liver, and brain metastases exhibit significant differences in survival rates. A recent phase III study demonstrated that adjuvant pembrolizumab treatment following nephrectomy and metastasectomy improves disease-free survival in patients with oligometastatic RCC. Treatment guidelines for metastatic RCC in the urinary bladder are unclear because of its rarity [7].

The standard treatment for secondary lesions is typically total resection-based therapy (TUR-BT). In cases in which the bladder lesion is found to be pathologically muscle-invasive, radical cystectomy may be preferred. It is worth noting that the incidence of RCC metastasis to the urinary bladder is rare, ranging from 0.3% to 1.6%. According to Zachos et al. [1], the median time between diagnosis of renal cancer and bladder metastasis is 33 months.

Bladder cancer is typically associated with macroscopic hematuria, but it can also occur with isolated microscopic hematuria (urinalysis showing 3 red blood cells per high-power field). The presence of microscopic hematuria increases the risk

of bladder cancer by approximately 4%. Therefore, suspicious cases warrant further examination by cystoscopy. Routine examination for microscopic hematuria could facilitate early detection of RCC metastases to the bladder, thereby resulting in better outcomes. As such, radiological imaging, urine analysis, and serum biochemistry testing are recommended after RCC treatment [8].

Metastasis of RCC to the urinary bladder is a rare event. There are no definitive recommendations for treatment. After RCC diagnosis, careful monitoring for metastasis is necessary. If a mass is found in the urinary bladder, treatment options include TUR-BT and radical cystectomy. Additionally, urine analysis, cystoscopy, and CT Urography may be performed in suspicious cases.

Ethics

Informed Consent: The patient written informed consent was obtained.

Authorship Contributions

Surgical and Medical Practices: İ.H-Z., M.K., Ö.E., A.Y., Concept: İ.H-Z., M.K., Ö.E., A.Y., Design: İ.H-Z., M.K., Ö.E., A.Y., Literature Search: İ.H-Z., M.K., Writing: İ.H-Z., M.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Zachos I, Mitrakas L, Karasavvidou F, Karatzas A, Tzortzis V. Clear-cell renal cell carcinoma single urinary bladder metastasis: a case report and review of the literature. J Surg Case Rep. 2022;2022:rjac475.
2. Adhiguna MA, Pramod SV, Noegroho BS, Safriadi F, Hernowo BS. Case of metachronous clear cell bladder metastasis on low risk localized renal cell carcinoma patient. Int J Surg Case Rep. 2022;96:107158.
3. Hoffmain EH. Nvpernephrom-metastasen. Dtsch Aled Wschr 1907;33:303.
4. Arpita S, Manoj J, Kaushik S, Anish S. Metastasis of renal cell carcinoma to urinary bladder: A rare case report with review of literature. J Lab Physicians. 2017;9:322-4.
5. Matsumoto K, Hayakawa N, Nakamura S, Oya M. Bladder metastasis from renal cell carcinoma: retrospective analysis of 65 reported cases. Clin Exp Metastasis. 2015;32:135-41.
6. Zeng Q, Luo S, Chen L, Chen L, Chen J. Bladder metastasis from type 2 papillary renal cell carcinoma: a case report. Oncol Lett. 2023;25:270.
7. Smart A, Wynne M, Baraban E, Ged Y, Smith A. Metastasis to the bladder: a rare site of recurrence of renal cell carcinoma. Case Rep Urol. 2022;2022:4339270.
8. Elabbady A, Boudreau R, Mehrnoush V, Salem M, Fahmy A, et al. Rapid metachronous bladder metastasis of type 2 papillary renal cell carcinoma. Arch Clin Cases. 2023;10:93-6.

CASE REPORT

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Importance of Artificial Intelligence-based Radiography in the Examination and Treatment of Patients with Subacromial Impingement Syndrome

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ABSTRACT

According to various estimates, shoulder pain covers 7-26% of all diseases faced by the global population. In addition, according to studies by Scandinavian scientists, up to 18% of the population's loss of working capacity and paid sick leave are caused by shoulder pain. According to experts, the number of these diseases is already approaching epidemic levels in Sweden, Finland, Japan, and the United States. Insurance payments for diseases caused by shoulder pain are second only to vertebrogenic pain. Subacromial impingement syndrome is the main cause of this pain. Diagnosis includes a complex of clinical and instrumental research methods. A reliable diagnosis of the presence of subacromial impingement syndrome, as well as the type, nature, and severity of subacromial muscle compression, is achieved using modern methods for visualizing the internal structures of the shoulder. It should be noted that radiography and ultrasound are important among them. To determine the model performance of artificial intelligence in detecting rotator cuff pathology using different imaging modalities and to compare its capability with that of physicians in clinical scenarios. Neck-shoulder syndrome is one of the most frequent causes of disability in the population, accounting for 18% of disability sheets. The treatment of pathologies attracts physicians of various specialties: orthopedic traumatologists, neurosurgeons, anesthesiologists, resuscitators, surgeons, neurologists, therapists, physiotherapists, and physical therapy physicians.

Keywords: Radiodiagnosis, impingement syndrome, shoulder joint, subacromial fibrosis, rotator cuff, etiopathogenetic factors, anatomical structure of the shoulder joint, radiography with artificial intelligence

INTRODUCTION

X-ray examination and treatment of subacromial impingement syndrome are among the most common radiological diagnostic procedures. Manufacturers of diagnostic software based on artificial intelligence (AI) technology are actively developing products to describe research data. Today, remote descriptions of X-ray studies are actively used in radiology diagnostics. With this organization of the diagnostic process, the doctor receives an image for description with a time delay and does not have direct contact with the X-ray technician conducting the study. Therefore, the quality of the examination directly depends on the qualifications of the X-ray technician.

X-ray imaging can be subject to errors, largely due to human factors, that make image interpretation and description difficult for both the radiologist and the AI software, which is worsened under high workload conditions.

Subacromial impingement is the most common type of shoulder impingement and occurs secondary to attrition between the coracoacromial arch and the underlying supraspinatus tendon or subacromial bursa, leading to tendinopathy and bursitis,, respectively.

CASE PRESENTATION

The prevalence of neck and shoulder pain among adults is 4%-7% and increases to 15%-20% at the age of 60-70 years [1]. The number of newly diagnosed cases per year per 1000 is 4-6 at the age of 40-45 years and 8-10 at the age of 50-65 years, with a predominance in women [2].

The structure of the shoulder joint is characterized by anatomical and functional complexity, which makes it a target for the development of various pathological changes under the influence of a number of factors leading to disruption of the stability and strength of articular structures. Damage

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to the rotator cuff can be caused by both external causes (reduction of the subacromial space, increase in the volume of the coraco-acromial arch, instability, overload of the shoulder joint) and internal (changes in vascularization, pathology of the microstructure of collagen fibers, tendon degeneration, etc.) [3].

Pain in the shoulder joint is one of the most common causes of disability in the population, accounting for 18% of sick leave certificates. Their growth is approaching an epidemic in Sweden, Finland, Japan, and the USA, and insurance claims for shoulder pain rank second to vertebrogenic pain.

Modern equipment for X-ray, magnetic resonance imaging, and computed tomography studies has high reproducibility and accuracy. However, these techniques can sometimes give false-positive results regarding changes in the structure of tissues, which can affect a specialist's diagnosis. In this case, the aim of experimental studies is to minimize diagnostic errors, increase accuracy, and make the interpretation of results more accessible.

1) Radiography and sonography make it possible to describe both direct and indirect symptoms of impingement syndrome.

2) The complete information regarding impingement syndrome is provided by a comprehensive X-ray and ultrasonographic study.

In an epidemiological multicenter study of >12,000 workers in 18 countries, generalized pain in the cervical spine and shoulder was reported by 40.7% of participants and by 35.1% in the past year by 35.1%. Frozen shoulder syndrome is characterized by pain and limited mobility in the shoulder joint. Risk factors for frozen shoulder include:

1- Elderly age,

2- Injuries or surgical interventions in the shoulder joint,

3- Diabetes,

4- Cardiovascular diseases,

5- Cerebrovascular diseases,

6- Endocrine pathology,

7- Professions (carpenters, joiners, painters, plasterers, builders, installers, teachers),

8- Sports (volleyball, handball, water polo, tennis, boxing and martial arts),

9- Degenerative-dystrophic diseases of the cervical spine [2].

X-ray of the shoulder joint is considered the simplest and most informative research method, and it allows us to identify the primary signs of impingement syndrome.

At an early stage of pathology, the sensitivity of this technique is low, but signs of pathology can be detected as the process progresses. These changes manifest themselves as signs of rotator cuff ossifying tendinitis, narrowing of the subacromial space, degeneration of the acromioclavicular joint, local osteoporosis, etc. It has been proven that a narrowing of the acromioclavicular interval of less than 6-7 mm clinically corresponds to dislocation of the biceps brachii tendon in the presence of all layers.

The complexity of the anatomical structure of the shoulder joint, together with the multifactorial nature of subacromial impingement syndrome, has contributed to the emergence of research in the field of studying the structure of shoulder joint structures and new methods for diagnosing injuries. There is no unified diagnostic algorithm for examining patients with complaints of shoulder joint pain to verify rotator cuff impingement syndrome, which would facilitate the detection of early signs and eliminate additional expensive diagnostic methods.

DISCUSSION

In the framework of the study, we observed direct and indirect radiographic symptoms of subacromial impingement syndrome in 14 patients. We observed the following direct radiographic signs:

- Narrowing of the subacromial space to less than 7 mm;

- Signs of clavicular-acromial arthrosis (narrowing of the joint space, thickening and unevenness of closed plates, extraneous bone growths);

The indirect radiographic signs are as follows:

- Large bubble osteoporosis of the humerus;

- Thickening of the cortical layer and increased intensity of large bubbles at the attachment site of the supraspinatus tendon.

Our study revealed once again that radiographic examination can identify both direct and indirect symptoms of subacromial impingement syndrome.

Thus, considerable experience has been accumulated in the use of AI to diagnose various diseases. The quality of X-ray examination is an important parameter, which is often given the little time in diagnostic practice. Quality violations can lead to a decrease in the diagnostic value of images, underdiagnosis, and overdiagnosis, as well as malfunctions in diagnostic software based on AI technology. In this study, we demonstrate the effectiveness of transfer learning in classifying radiological images and identifying various quality defects [4].

We have created a Web tool that allows you to analyze diagnostic study data sets. All models integrated into this tool have high diagnostic accuracy metrics of more than 95%, which allows them to be used in clinical practice. Active use of the developed tool and its components will optimize the assessment of the quality of radiological studies for diagnostic and research purposes. Subsequently, the use of this tool can be scaled up for diagnostic studies of other modalities and anatomical areas.

Ethics

Informed Consent: Not necessary.

Financial Disclosure: The author declared that this study received no financial support.

REFERENCES

1. Yarikov A, Lobanov I, Perlmutter O, Fraerman A, Tarasov I. Neck-shoulder syndrome: modern interdisciplinary aspects of diagnosis and treatment. Bulletin of Science and Practice. 2022;8:320-40.
2. Zhan H, Teng F, Liu Z, Yi Z, He J, et al. Artificial Intelligence aids detection of rotator cuff pathology: a systematic review. Arthroscopy. 2024;40:567-78.
3. Andronikov EA, Diomidova VN, Nikolaev NS, Drandrov RN, Gogulina NV. Informative value of radiological methods for diagnosing subacromial impingement syndrome. Acta Medica Eurasica. 2023;101-13.
4. Ho CY, Sole G, Munn J. The effectiveness of manual therapy in the management of musculoskeletal disorders of the shoulder: a systematic review. Man Ther. 2009;14:463-74.

CASE REPORT

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Relapsing Polychondritis and Artiritis in a Patient with Ulcerative Colitis: A Case Report

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ABSTRACT

A 31-year-old male presented with a history of vitiligo and extensive ulcerative colitis who developed relapsing polychondritis (RPC) manifesting as bilateral auricular chondritis, nasal chondritis, and polyarthritis. Despite the initial antibiotic treatment, the patient's symptoms persisted and worsened, necessitating the initiation of prednisolone therapy, which led to complete resolution of the chondritis and arthritis symptoms within 2 weeks. This case underscores the importance of considering RPC in patients with inflammatory bowel disease presenting with unexplained inflammatory symptoms involving cartilaginous structures.

Keywords: Inflammatory bowel disease, arthritis, auricular chondritis, nasal chondritis

INTRODUCTION

Inflammatory bowel diseases (IBD), including Ulcerative Colitis and Crohn's disease, are chronic inflammatory conditions of the gastrointestinal system with an autoimmune etiology. These diseases are often associated with extraintestinal manifestations, including arthritis, chondritis, and other autoinflammatory pathologies [1]. Arthritis is one of the most common extraintestinal manifestations of IBD, affecting both peripheral and axial joints. The coexistence of IBD with these autoinflammatory conditions suggests a shared pathophysiological mechanism, likely involving the dysregulation of the immune system [1]. Early recognition and appropriate management of these extraintestinal manifestations are crucial for improving patient outcomes and quality of life. In this article, we present a rare case of an uncommon extraintestinal manifestation.

CASE PRESENTATION

A 31-year-old man with known vitiligo and extensive ulcerative colitis (UC) was admitted with bloody mucus containing diarrhea 6-8 times per day and erythema in the left auricle (Figure 1A). The patient had been followed up for UC for 3 years and was receiving oral and local mesalamine therapy at the time of presentation. Antibiotics were started because they were thought to be of infectious origin. The complaints of the patient did not regress; redness in the right auricle and nose saddle, signs of arthritis in the bilateral ankle joint (Figure 1B), and edema in the lower extremities progressed during the next 20 days. According to the Rachmilevitz endoscopic activity index, the score was 10, indicating severe disease.

Laboratory tests revealed anemia (hemoglobin: 10.7 mg/dL), thrombocytosis (550 x109/L), and elevated acute-phase reactants (C-reactive protein: 27 mg/L, erythrocyte sedimentation rate: 34 mm/hr). No serological positivity associated with arthritis was detected in the serological tests sent. The patient's history did not include any autoimmune diseases other than vitiligo. No findings suggesting vasculitis or Behçet's disease was found in the examinations performed. Physical examination due to edema in the lower extremities revealed no pitting edema, and the lower extremity pulses were palpable. Doppler ultrasound of the lower extremities revealed no evidence of venous or arterial thrombosis. It was determined that the patient met 3 of the following McAdam et al. [2] criteria: bilateral auricular chondritis, non-erosive seronegative polyarthritis, nasal chondritis. In the foreground, relapsing polychondritis (RPC)

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This case was presented as a poster presentation at the 39th National Gastroenterology Week.

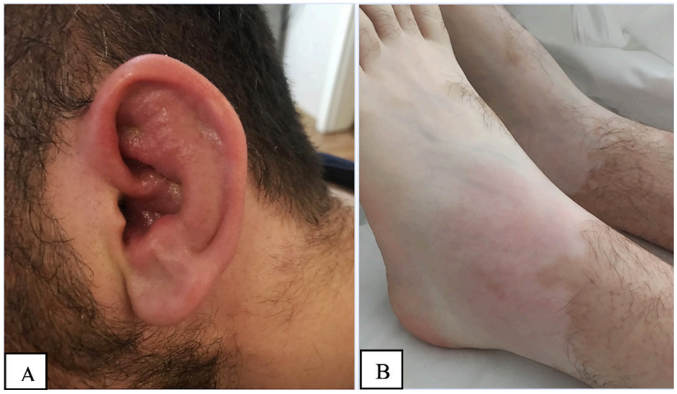

Figure 1. A redness in the right auricle (A) and signs of arthritis in the bilateral ankle joint (B)

was considered, and prednisolone treatment at 40 mg was started in patients who also had active UC. In the second week of treatment, the symptoms of chondritis and arthritis were completely resolved.

DISCUSSION

Chondritis, particularly in the form of RPC, is a rare but significant complication involving recurrent inflammation of cartilaginous structures, such as the ears, nose, and respiratory tract. RPC is an immune-mediated condition characterized by repeated episodes of inflammation and cartilage deterioration. Damage to the cartilage can produce collagen shards, which can result in the production of circulating immune complexes and induce RP. This condition is a rare disease with a frequency of approximately 4.5 per million [3]. RPC is diagnosed based on the McAdam et al. [2] criteria, which require the presence of three or more of the following features: (1) recurrent chondritis of both auricles, (2) non-erosive inflammatory polyarthritis, (3) chondritis of the nasal cartilage, (4) ocular inflammation, including conjunctivitis, keratitis, scleritis, or uveitis, (5) respiratory tract chondritis involving the laryngeal or tracheal cartilage, and (6) audiovestibular damage, such as hearing loss, vertigo, or tinnitus. Auricular involvement is the most common feature, but other organs may be included, like costal cartilage, airways, eyes, nose, heart, vascular system, and joints, may also be involved. Gastrointestinal findings are infrequent, and there have been sporadic reports of coexisting IBD [4]. The primary treatment for RPC is corticosteroid therapy with prednisolone to decrease the severity, frequency, and duration of relapse. Other medications reported to control symptoms include dapsone, methotrexate, azathioprine, and immunosuppressive drugs, and biological agents may be required for severe forms [5]. We have been following a rare case of RPC and UK coexistence in remission for 24 months after steroid and anti-tumor necrosis factor therapy.

This case underscores the importance of considering RPC in patients with IBD who present with unexplained inflammatory symptoms involving cartilaginous structures. Early recognition and treatment are crucial for preventing complications and improving patient outcomes.

Ethics

Informed Consent: Obtained.

Authorship Contributions

Surgical and Medical Practices: D.T.G., B.K., B.Ö., M.A.K., Y.Ö.Ö., Concept: D.T.G., M.A.K., Y.Ö.Ö., Design: D.T.G., M.A.K., Y.Ö.Ö., Data Collection or Processing: D.T.G., Analysis or Interpretation: D.T.G., Literature Search: D.T.G., B.K., B.Ö., M.A.K., Y.Ö.Ö., Writing: D.T.G., B.K., M.A.K., Y.Ö.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

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References

1. Garber A, Regueiro M. Extraintestinal manifestations of IBD: epidemiology, etiopathogenesis, and management. Curr Gastroenterol Rep. 2019;21:31.
2. McAdam LP, O'Hanlan MA, Bluestone R, Pearson CM. Relapsing polychondritis: A prospective study of 23 patients and a review of the literature. Medicine (Baltimore). 1976;55:193-215.
3. Mathew SD, Battafarano DF, Morris MJ. Relapsing polychondritis in the Department of Defense population and review of the literature. Semin Arthritis Rheum. 2012;42:70-83.
4. Karmacharya P, Pathak R, Shrestha P, Alweis R. Red hearing: swollen ear in a patient with ulcerative colitis. J Community Hosp Intern Med Respect. 2014;4.
5. Puéchal X, Terrier B, Mouthon L, Costedoat-Chalumeau N, Guillevin L et al. Relapsing polychondritis. Joint Bone Spine. 2014;81:118-24.

CASE REPORT

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Endoscopic Treatment of Early-stage Large Gastric Cancer and Closure with Hand-suturing Technique

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ABSTRACT

Gastric cancer is one of the leading causes of cancer-related mortality worldwide. Endoscopic submucosal dissection (ESD), when indicated based on tumor size, stage, and histological characteristics, is a highly successful curative, minimally invasive, non-surgical endoscopic treatment option. However, the risk of adverse events is higher compared to traditional methods. Here, we present a case of ESD in an early-stage gastric carcinoma and endoscopic closure using a new hand-suturing system.

Keywords: ESD, suturing, gastric cancer, bleeding, metaplasia, endoscopy, dysplasia

INTRODUCTION

Gastric cancer is a leading cause of cancer-related mortality worldwide [1]. Early diagnosis and treatment interventions improve prognosis and mitigate adverse outcomes [2,3]. Endoscopic submucosal dissection (ESD), when indicated based on tumor size, stage, and histological characteristics, is a highly successful curative, minimally invasive, non-surgical endoscopic treatment option [4]. However, the risk of adverse events, such as early or delayed perforation and bleeding, is higher with traditional methods like endoscopic mucosal resection and polypectomy [5]. Here, we present a case of ESD in an early-stage gastric carcinoma (EGC) and endoscopic closure using a new hand-suturing system.

CASE PRESENTATION

A 77-year-old male patient presented with gas, bloating, and nausea that had persisted for the past month, which were alleviated with medical treatment and diet. His medical history included ischemic heart disease, for which aspirin and clopidogrel were administered. Upper endoscopic examination revealed irregular areas with unclear borders in the greater curvature and posterior wall of the corpus-antrum junction, with widespread intestinal metaplasia throughout the stomach. Chromoendoscopy with indigo carmine after acetic acid washing revealed a flat, irregular area approximately 7 cm in diameter without ulcers (Figures 1, 2). Biopsies reveal intramucosal well-differentiated adenocarcinoma with high-grade dysplasia. Endoscopic ultrasound showed an intact muscularis propria and submucosal layer with no regional lymph nodes. Positron emission tomography did not show distant metastasis or lymph node involvement. Considering the patient's comorbid conditions and written consent, ESD was performed under general anesthesia. A 155x105 mm en-bloc resection specimen was obtained. There was no muscular damage in the resection

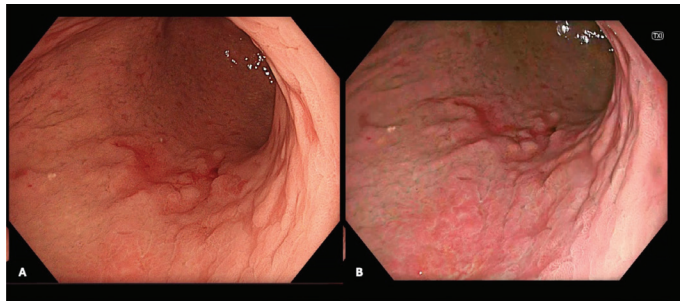

Figure 1. (A) Appearance of early gastric cancer with white light imaging. (B) Appearance of early gastric cancer with texture and color enhancement imaging

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area (Figure 3). Prophylactic coagulation was applied to visible vascular areas. Due to the patient's age and the necessity for anticoagulant and antiplatelet therapy, the resection area was closed using an endoscopic needle holder (Olympus, Sutuart, FG 260, Tokyo, Japan) with absorbable barbed suture (V-Loc 180, 3-0, Medtronic Ltd, Dublin, Ireland) (Figures 4, 5). Anticoagulant therapy was resumed 12 hours post-procedure per cardiology's recommendation, and the patient was discharged on postoperative day 2. Histopathological examination confirmed intramucosal carcinoma with high-grade dysplasia, approximately 10 cm in diameter (Figure 6). The vertical and horizontal margins were negative. No lymphovascular involvement was observed. Six months later, endoscopic follow-up revealed a linear scar without residual or recurrent lesions or metachronous lesions.

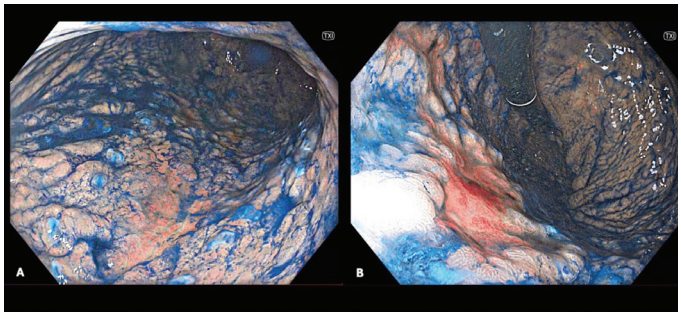

Figure 2. (A) Chromoendoscopic appearance of early gastric cancer. (B) Chromoendoscopic appearance of early gastric cancer

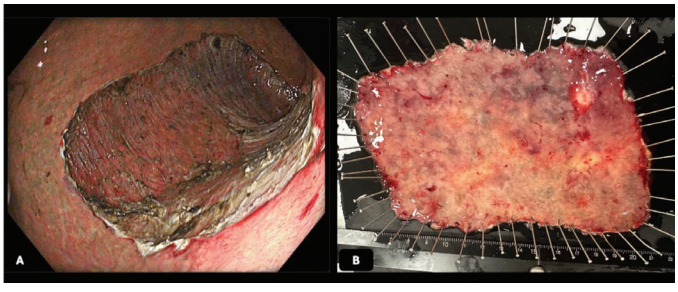

Figure 3. (A) Appearance of the resection area after endoscopic submucosal dissection. (B) En-bloc resection specimen appearance (155x105 mm)

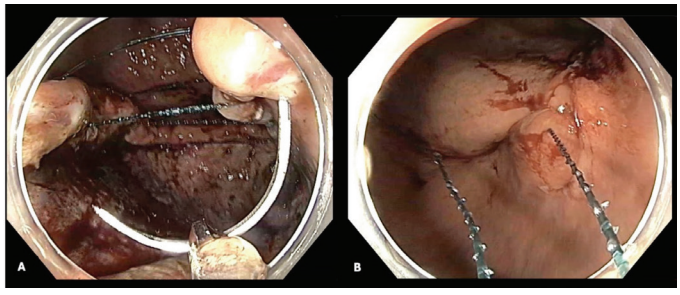

Figure 4. (A) Closure of the resection area using a V-Loc with needle holder. (B) Closure of the resection area using a V-Loc with needle holder

DISCUSSION

In the treatment of EGC, ESD has been a highly successful curative, non-surgical treatment option not only in East Asia but also increasingly in Western countries [6]. However, compared with traditional methods, there is a higher risk of adverse events, such as early and late bleeding and perforation. These risks increase with factors such as age, sex, lesion size, resection area, location, comorbid conditions like cirrhosis and renal failure, and anticoagulant-antiplatelet therapy [7-9]. In this case, the resection area was successfully closed using a new suturing system. After the procedure, clopidogrel and aspirin were immediately resumed, and no early or late bleeding occurred during follow-up.

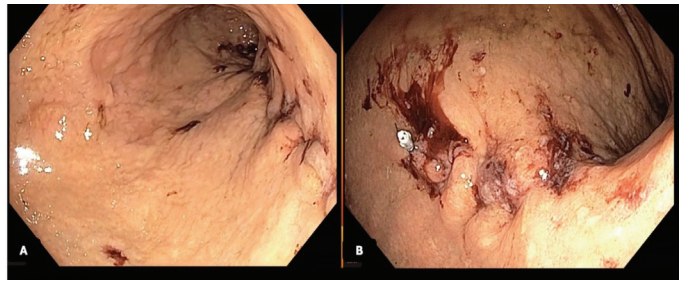

Figure 5. (A) Appearance of the resection area closed with hand suturing. (B) Appearance of the resection area closed with hand suturing

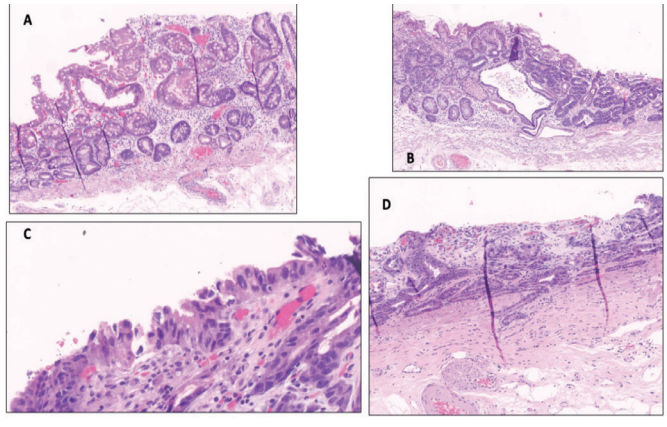

Figure 6. (A) Intestinal metaplasia, (B) high-grade dysplasia, (C) high-grade dysplasia/intramucosal carcinoma, (D) muscularis mucosa invasion

One issue following extensive resection is the development of strictures due to healing. The risk of strictures increases with the size of the resection area, presence of fibrosis, inflammation, neovascularization, and fibroblast activity [10-12]. Endoscopic suturing has been reported to result in less neovascularization and fibroblast activity [13]. In our case, despite the large resection area, no symptomatic or endoscopic strictures were observed during follow-up.

In patients with EGC and comorbidities requiring anticoagulant and antiplatelet therapy, ESD can be successfully performed regardless of lesion size at experienced centers. We believe that new endoscopic suturing systems will play a significant role in preventing late post-procedure adverse events.

Ethics

Informed Consent: Obtained.

Authorship Contributions

Surgical and Medical Practices: F.A., S.Ö., Data Collection or Processing: F.A., S.Ö., O.Ç.T., Analysis or Interpretation: F.A., O.Ç.T., Literature Search: F.A., Writing: F.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74:229-63.
2. Al-Haddad MA, Elhanafi SE, Forbes N, Thosani NC, Draganov PV, et al. American Society for Gastrointestinal Endoscopy guideline on endoscopic submucosal dissection for the management of early esophageal and gastric cancers: methodology and review of evidence. Gastrointest Endosc. 2023;98:285-305.e38.
3. Yao K, Uedo N, Kamada T, Hirasawa T, Nagahama T, et al. Guidelines for endoscopic diagnosis of early gastric cancer. Dig Endosc. 2020;32:663-98.
4. Hatta W, Gotoda T, Oyama T, Kawata N, Takahashi A, Yet al. A Scoring system to stratify curability after endoscopic submucosal dissection for early gastric cancer: "eCura system". Am J Gastroenterol. 2017;112:874-81. Erratum in: Am J Gastroenterol. 2019;114:1925-6.
5. Facciorusso A, Antonino M, Di Maso M, Muscatiello N. Endoscopic submucosal dissection vs endoscopic mucosal resection for early gastric cancer: a meta-analysis. World J Gastrointest Endosc. 2014;6:555-63.
6. ASGE standards of practice committee; Forbes N, Elhanafi SE, Al-Haddad MA, Thosani NC, et al. American Society for Gastrointestinal Endoscopy guideline on endoscopic submucosal dissection for the management of early esophageal and gastric cancers: summary and recommendations. Gastrointest Endosc. 2023;98:271-84.
7. Hashimoto M, Hatta W, Tsuji Y, Yoshio T, Yabuuchi Y, et al. Rebleeding in patients with delayed bleeding after endoscopic submucosal dissection for early gastric cancer. Dig Endosc. 2021;33:1120-30.
8. Miura Y, Tsuji Y, Yoshio T, Hatta W, Yabuuchi Y, et al. Association between perioperative management of antiplatelet agents and risk of post-endoscopic submucosal dissection bleeding in early gastric cancer: analysis of a nationwide multicenter study. Gastrointest Endosc. 2023;97:889-97.
9. Tanoue K, Fukunaga S, Nagami Y, Sakai T, Maruyama H, et al. Long-term outcome of endoscopic submucosal dissection for early gastric cancer in patients with severe comorbidities: a comparative propensity score analysis. Gastric Cancer. 2019;22:558-66.
10. Iizuka H, Kakizaki S, Sohara N, Onozato Y, Ishihara H, et al. Stricture after endoscopic submucosal dissection for early gastric cancers and adenomas. Dig Endosc. 2010;22:282-8.
11. Kim GH, Jee SR, Jang JY, Shin SK, Choi KD, et al. Stricture occurring after endoscopic submucosal dissection for esophageal and gastric tumors. Clin Endosc. 2014;47:516-22.
12. Yang F, Hu Y, Shi Z, Liu M, Hu K, et al. The occurrence and development mechanisms of esophageal stricture: state of the art review. J Transl Med. 2024;22:123.
13. Akimoto T, Goto O, Sasaki M, Mizutani M, Tsutsumi K, et al. Endoscopic hand suturing for mucosal defect closure after gastric endoscopic submucosal dissection may reduce the risk of postoperative bleeding in patients receiving antithrombotic therapy. Dig Endosc. 2022;34:123-32.

CASE REPORT

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Uncommon Presentation of Stromal Tumor Causing Small Bowel Obstruction: A Case Report

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ABSTRACT

This case report describes a rare presentation of gastrointestinal stromal tumor (GIST) causing mechanical small bowel obstruction in a 30-year-old female patient with a history of hepatitis B. Initial misdiagnosis as gastritis led to delayed recognition of the underlying pathology. Emergency laparoscopic intervention revealed mixed epithelioid and spindle cell GIST with high risk features, prompting segmental small bowel resection. Histopathological examination confirmed a PDGFRA mutation, loss of c-kit and DOG 1 expression, and a high mitotic rate, categorizing the tumor as high risk. This case highlights the importance of considering GIST in the differential diagnosis of abdominal symptoms and emphasizes the need for timely intervention to prevent complications.

Keywords: Gastrointestinal stromal tumor, small bowel obstruction, hepatitis B, laparoscopy, histopathology, imatinib

INTRODUCTION

Gastrointestinal stromal tumors (GISTs) are uncommon mesenchymal tumors that can arise anywhere along the gastrointestinal tract [1]. We present a case of GIST causing small bowel obstruction that was initially misdiagnosed as gastritis, highlighting the challenges in recognizing this rare presentation.

CASE PRESENTATION

A 30-year-old female patient with a history of hepatitis B presented with severe upper abdominal pain and vomiting. Initial diagnosis of gastritis was made at a local clinic, overlooking the underlying GIST. Emergency laparoscopy revealed mechanical small-bowel obstruction due to ileocecal invagination. Segmental resection of the small bowel, including the tumor, was performed, followed by reconstruction using an ileoileostomy.

Histopathological Examination

The resected specimen exhibited mixed epithelioid and spindle cell GIST with PDGFRA mutation, loss of c-kit and DOG 1 expression, and a high mitotic rate. Tumor extensions reached the mesenterial incision, and were classified as high-risk lesions (Category 5 Miettinen and Lasota). The TNM classification was pT2, pNx, L0 V0 Pn0, and the histopathological grading indicated a high mitotic rate.

DISCUSSION

This case highlights the challenges of GIST diagnosis, particularly when presenting with atypical symptoms and in the presence of coexisting medical conditions [2]. The necessity for prompt recognition and intervention is underscored by the high-risk tumor features, emphasizing the importance of considering GIST in the differential diagnosis of abdominal complaints [3].

GISTs can uncommonly present with small bowel obstruction [4], and a high index of suspicion is crucial for timely diagnosis and management [5]. This case emphasizes the significance of thorough clinical evaluation, appropriate imaging studies (Figure 1a-c), and histopathological examination in establishing an accurate diagnosis and guiding further therapeutic interventions. The patient's case was discussed at a tumor conference, and a comprehensive follow-up plan, including abdominal computed tomography examinations and adjuvant therapy with imatinib [6], was recommended.

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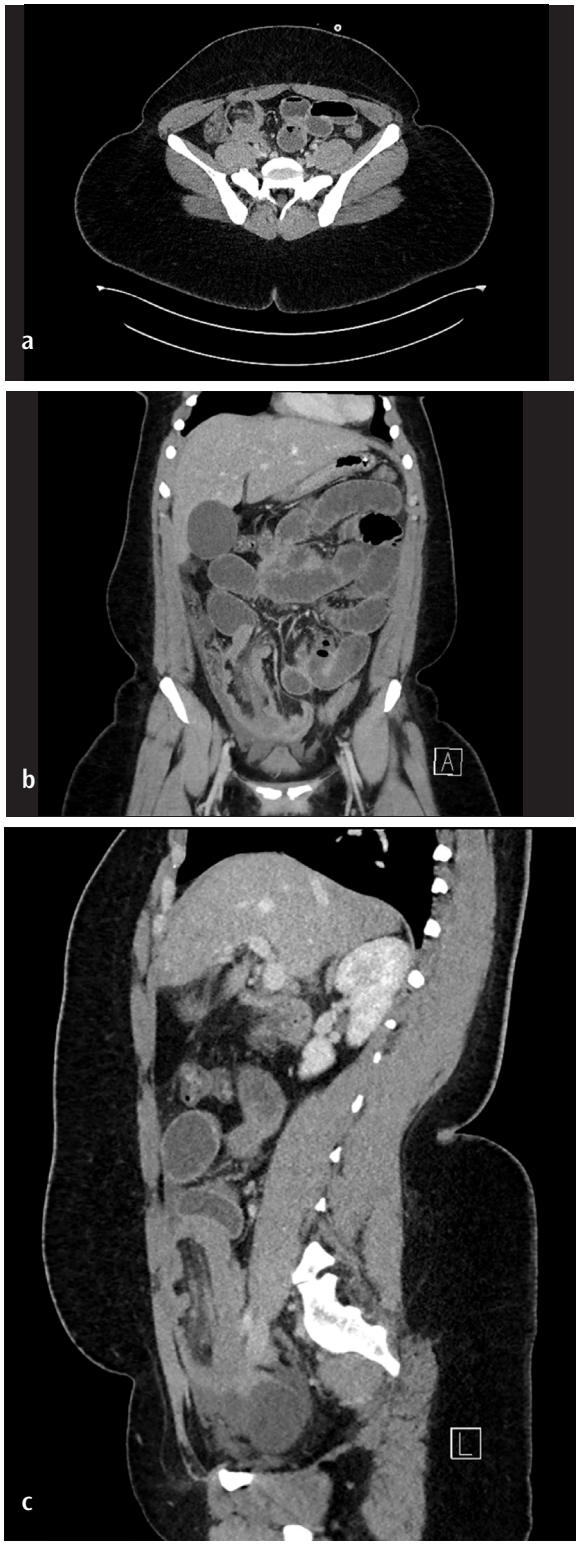

Figure 1. CT images of the case. (a) Axial plane, (b) coronal plane, (c) sagittal plane

Ethics

Informed Consent: Obtained.

Authorship Contributions

Surgical and Medical Practices: Z.A., R.K., S.S., Concept: S.S., Design: R.K., S.S., Data Collection or Processing: R.K., Analysis or Interpretation: Z.A., R.K., Literature Search: Z.A., R.K., Writing: Z.A., R.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Rammohan A, Sathyanesan J, Rajendran K, Pitchaimuthu A, Perumal SK, et al. A gist of gastrointestinal stromal tumors: a review. World J Gastrointest Oncol. 2013;5:102-12.
2. Vassos N, Agaimy A, Hohenberger W, Croner RS. Coexistence of gastrointestinal stromal tumours (GIST) and malignant neoplasms of different origin: prognostic implications. Int J Surg. 2014;12:371-7.
3. Joensuu H. Risk stratification of patients diagnosed with gastrointestinal stromal tumor. Hum Pathol. 2008;39:1411-9.
4. Yoshizawa JI, Shimizu T, Ikehara T, Fukushima K, Nakayama A. Gastrointestinal stromal tumor of the small bowel complicated by torsion: a case report. Int J Surg Case Rep. 2022;100:107761.
5. El-Menyar A, Mekkodathil A, Al-Thani H. Diagnosis and management of gastrointestinal stromal tumors: An up-to-date literature review. J Cancer Res Ther. 2017;13:889-900.
6. Joensuu H, Eriksson M, Sundby Hall K, Reichardt A, Hermes B, et al. Survival outcomes associated with 3 years vs 1 year of adjuvant imatinib for patients with high-risk gastrointestinal stromal tumors: an analysis of a randomized clinical trial after 10-year follow-up. JAMA Oncol. 2020;6:1241-6.