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CASE REPORT

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A case report of bilateral hydroureteronephrosis associated with systemic sclerosis

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Abstract This report describes a case of atrophic bladder and bilateral hydroureteronephrosis that occurred in a patient with systemic sclerosis (SSc). A 49-year-old woman who had a 12-year history of SSc was admitted to our hospital because of bilateral hydroureteronephrosis indicated by uroflowmetric and radiological studies. Histological examination of the patient's bladder after biopsy revealed fibrotic replacement of submucosa and infiltration of mononuclear cells, but no deposition of immunoglobulins and complement components were observed. Nephrostomy to relieve the urinary retention was required. There have been few reports regarding SSc complications in hydronephrosis. The association between hydronephrosis and the pathological disorder of SSc is discussed.

Key words Systemic sclerosis · Hydronephrosis · Atrophic bladder · Nephrostomy

Introduction

Systemic sclerosis (SSc) is a connective tissue disease characterized by fibrosis of the skin and visceral organs, including lungs, gastrointestinal tract, heart, and glomeruli in the kidneys. Renal parenchymal involvement, which causes rapid reduction of creatinine clearance, azotemia, and sudden onset of severe hypertension, is a documented life-threatening symptom of SSc. In contrast, the involement of SSc in the lower urinary tract is an uncommon manifestation. Although atrophic bladder has been reported as a chronic lower urinary tract disorder in patients with systemic lupus erythematosus (SLE),[1,2] there have been few reports on the involvement of the lower urinary tract in SSc. Bilateral hydronephrosis has rarely been mentioned, and only one investigator has reported hydronephrosis associated with SSc.[3]

Here we present a case of bilateral hydronephrosis with contracted bladder in a patient with SSc. We evaluated the lower urinary tracts disorder using radiological examinations, including intravenous pyelography (IVP), computed tomography (CT), and magnetic resonance imaging (MRI). We also performed immunohistological staining of the urinary bladder. Although immunohistological studies have frequently been performed in lupus cystitis cases,[1,2] atrophic bladder in patients with SSc has not been examined in detail. In this communication, we report the results of uroflowmetric, radiological, and immunohistological examinations of atrophic bladder observed in a patient with SSc and discuss the pathogenesis of hydronephrosis.

Case report

The patient was a 49-year-old Japanese woman who was diagnosed with SSc based on Raynaud's phenomenon, bilateral sclerodactylia, sausage-like swelling of the fingers, and the histological findings of a skin biopsy in 1987 at another hospital. She had been treated with 5 mg/day prednisolone since then. She had acute myocardial infarction caused by stenosis of the 7th segment of the coronary artery, and percutaneous transarterial coronary angioplasty was performed in March 1997. From 1998, she had felt polakisuria and decreased volume of urine, which were

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getting worse, and bilateral sclerodactylia had progressed gradually. In March 1999, she was admitted to the hospital with complaints of lower abdominal pain and complete urinary retention. Although an improvement of the bilateral hydronephrosis was observed within 24 h after insertion of a urinary catheter, she was referred to our university hospital on April 12, 1999, so that the disease activity of the SSc could be evaluated and the cause of the hydronephrosis examined.

On admission to our hospital, physical examination revealed bilateral sclerodactylia, and scleroderma on the face and forearm. Neither pitting scars on the fingers nor shortening of the sublingual ligament were present. Blood pressure was 128/70 mmHg, and funduscopic findings indicated no hypertensive retinopathy. A slight fine crackle was audible at the bilateral lower back. Bowel sound was normal, and no abnormalities were found in neurological examination. Laboratory findings revealed a normal blood cell count. The serum albumin value was slightly low at 3.8 mg/dl, and the triglyceride level was mildly elevated at 158 mg/dl. The serum creatinine level was 0.6 mg/dl, and renin activity was within normal limits. Urinalysis demonstrated 1+ proteinuria and 20 red blood cells and 10 white blood cells per high-power field. Although antinuclear antibodies were positive at a titer of 1:640, anti-Scl 70, anticentromere, anti-RNP, anti-DNA, anti-SS-A, and anti-SS-B antibodies were negative.

Ultrasonography and intravenous pyelography (IVP) showed bilateral hydronephrosis and engorgement of the bilateral urinary tracts, as shown in Fig. 1. An improvement of bilateral hydronephrosis due to catheterization was indicated by IVP. Cystometric analysis revealed a reduced compliance of bladder with no residual urine. The maximal volume of the bladder was estimated at less than 40 ml. Right vesicoureteral reflux was observed on voiding cystography. Cystoscopy showed edematous mucosa and scattered erosion of the bladder wall. A biopsy of the bladder was performed by transurethral resection, and its histological examination revealed fibrotic replacement of submucosal tissue and infiltration of mononuclear cells, as shown in Fig. 2. However, when immunohistological staining was performed using anti-IgG, anti-IgM, anti-IgA, and anti-C3 antibody, no deposition was detected in the specimen. Computed tomography (CT) did not detect an obstruction of the ureters by extrinsic involvement such as a classic retroperitoneal fibrosis. Magnetic resonance imaging (MRI) reconfirmed no organic region around the ureters by both horizontal and sagittal views. In addition, MRI also indicated thickening and unhomogeneous intensity of the bladder wall, as shown in Fig. 3. Based on these findings, a diagnosis of obstructive uropathy was made, which was

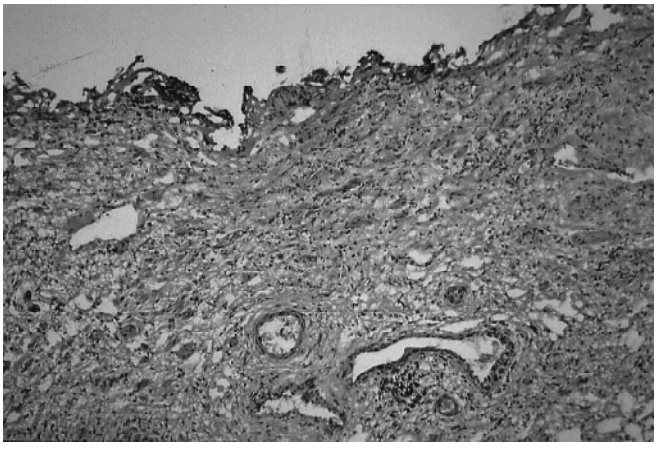

Fig. 2. Bladder biopsy (light microscopy) showing the fibrotic replacement of the submucosal region and infiltration of mononuclear cells (H & E, ×100)

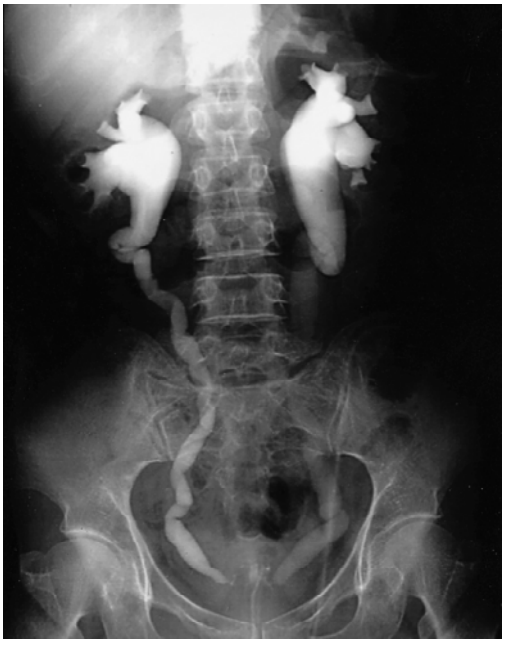

Fig. 1. IVP showing bilateral hydroureteronephrosis and marked stenosis of ureterovesical junctions

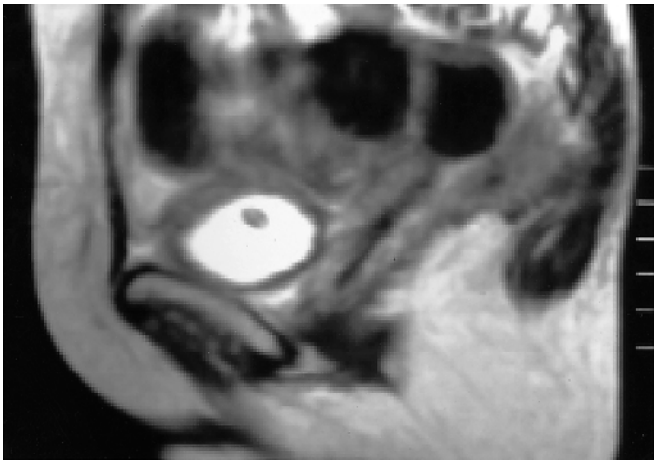

Fig. 3. MRI indicating the thickening and inhomogeneous intensity of the bladder wall. It also shows no organic regions around the ureters or bladder

thought to be an involvement of SSc in the urinary system, especially in the bladder.

After the patient's admission, although transient relief of the obstructive uropathy was obtained after urinary catheterization, a recurrence of hydronephrosis and pyelonephritis were observed. We considered that this was probably due to the coexistence of a ureterovesical obstruction in addition to vesicourethral stenosis. Because of the recurrence of uropathy as well as pyelonephritis, percutaneous nephrostomy was performed by urologists for urinary diversion. Since the operation, the hydronephrosis and pyelonephritis have not recurred.

Discussion

This report has described a patient with SSc complicated with obstructive uropathy, and especially the characteristic hydronephrosis which was indicated by IVP, cystography, cystoscopy, and MRI. We first showed that MRI is useful to detect a thickening bladder wall and any irregularity of the submucosal region, as well as to exclude the possibility of extrinsic tumors using both horizontal and sagittal views. In contrast to frequent fibrotic changes in the visceral organs such as the gastrointestinal tract, lungs, and skin, involvement in the lower urinary system is extremely rare with SSc. In this case, we initially thought that the main obstruction causing the hydronephrosis had occurred at the vesicourethral junction, because the hydronephrosis was controlled immediately after urethral catheterization. However, we observed a recurrence of bilateral hydronephrosis within a week despite the catheterization. The obstructive disorder was then thought to be not only in the vesicourethral junction, but also in the ureterovesical junctions. Only a few reports have documented the involvement of the urinary tract in patients with SSc. Rodnan[4] observed fibrous tissue changes in 15% of postmortem bladder specimens, but the relevance of clinical symptoms such as frequency of urination or urinary retention to fibrosis of the bladder was not discussed. Lazzeri et al.[5] first proposed the involvement of the bladder in nine SSc patients who complained of urological symptoms on the basis of both histological examinations of the bladder and functional studies including uroflowmetry and filling cystograms. They demonstrated that a contracted bladder was detected by uroflowmetry in four patients, and an accumulation of collagen fibers was found in three out of five patients. However, there were no patients who developed hydronephrosis as in our case.

The pathogeneses of atrophic bladder and bilateral hydronephrosis remain unclear, but organic changes in the bladder due to marked fibrosis and autonomic dysfunction have been postulated. Fibrotic changes in the bladder wall, especially in the transmural region, impair both ureterovesical and vesicourethral junctions which function as valves. In addition, fibrotic replacement of the muscle results in a reduction of the compliance of the bladder and subsequent loss of contraction power, which is restricted by the prestretched length of the muscle fiber. Furthermore, an elevation of intravesical pressure induced by the reduction of compliance disturbs the urinary flow from ureters to bladder. However, it has been reported that a fibrotic bladder wall was observed in more than 10% of patients with SSc,[4] but only two cases developed into hydronephrosis in SSc patients with fibrosis of the urinary bladder.[3,6] Therefore, the distribution of fibrosis in bladder seems to be important in the development of hydronephrosis. Regarding the present case, all the bladder wall was markedly thickened, as shown in MRI. Therefore, it is likely that the diffuse fibrosis effect on both the ureterovesical and vesicourethral junctions would develop into bilateral hydronephrosis. Dessein et al.[7] assessed the prevalence of autonomic dysfunction commonly observed in multiple organs in patients with SSc. They observed that insufficient blood flow into the autonomic nerve system, especially to the 2nd to 4th sacral nerve roots which control urinary excretion, might cause dysautonomia and dysfunction of the sphincter muscles. In another paper,[5] the results of an intravesical capsaicin test showed that the integrity of the reflex arc of micturition was maintained, but that the efferent motor response was impaired. Regarding dysfunction of the esophagus, peristaltic defects have also been demonstrated in the absence of fibrosis or muscular atrophy, suggesting a primary neurogenic disorder which may ultimately lead to secondary muscle atrophy.[8] We speculated that the atrophic bladder and bilateral hydronephrosis observed in our patient might result from both fibrotic changes in the bladder wall and impaired neurological regulation.

SLE is known to complicate cystitis, designated lupus cystitis, which often results in atrophic bladder as observed in SSc. Lupus cystitis is characterized by a reduction in urinary bladder volume, and is sometimes complicated by gastrointestinal and central nervous symptoms.[1,2] The involvement of the autoimmune mechanism in lupus cystitis has been recognized, and the deposition of IgG, IgA, and IgM in the bladder has been reported.[9] Although tissue deposits of Ig and complement components have been demonstrated in cortical arteries and arterioles rather than in the glomeruli in sclerodermal kidney,[10,11] no reports have referred to the immunological relevance to atrophic bladder associated with SSc. When we first examined immunohistological staining of an atrophic bladder in a patient with SSc, IgG, IgA, IgM, and complement components were not detected in the specimen. We therefore suggest that the pathogenesis of bladder dysfunction in SLE could be different from that in SSc. In addition, there has been no investigation of an the association between specific antibodies, including antitopoisomerase-I antibody, and involvement of the urinary bladder in SSc.

The repeated pyelonephritis in the current case might be due to right vesicoureteral reflux observed by voiding cystogram. It is well known that such stricture and reflux are often observed in the esophagus in patients with SSc. An impaired esophagus leads to dysphasia, especially for solids, and reflux of the gastric contents into the distal esophagus with peptic esophagitis. However, Minervini et al.[12] demon-

strated that urinary symptoms and urodynamic features were correlated neither with the severity of vesical fibrosis nor with visceral involvement, and gastrointestinal fibrosis seems to be closely associated with impairment in bladder. As reported in previous papers and this paper, 12 patients with atrophic bladder showed gastrointestinal involvement with complaints such as dysphagia, nausea, diarrhea, and narrowing of the oral aperture.

We found a characteristic bilateral hydronephrosis in a patient with SSc, and demonstrated a decreased bladder volume and fibrotic changes in the cystic muscle and bladder wall using IVP, cystography, cystoscopy, and MRI. This is the first report showing MRI views of an atrophic bladder in SSc. We believe that MRI is useful for the detection of a thickening bladder wall and an irregularity in the submucosal region, as well as exclusion of an extrinsic mass by both horizontal and sagittal views. Furthermore, Ig deposition was not detected in the bladder of this patient who had SSc. This is the first immunohistological investigation of a bladder with SSc, and the results suggest a different pathogenesis of cystitis in SSc from that in SLE. Lower urinary tract involvement has not been fully investigated by uroflowmetric and radiological examinations in patients with SSc. Therefore, subclinical lower urinary dysfunction due to fibrosis and dysautonomia might be common in SSc. We suggest the need for uroflowmetric and radiological examinations in order to detect any lower urinary involvement in SSc patients with urological symptoms.

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