MALT Lymphoma of the Urinary Bladder Shows a Dramatic Female Predominance, Uneven Geographic Distribution, and Possible Infectious Etiology

Kirill A Lyapichev1,2,*
Yana Ivashkevich1,2 *
Yaroslav Chernov1
Denis Chinenov1
Evgeniy Shpot2
Alexander A Bessonov3
Bouthaina S Dabaja4
Sergej Konoplev1

1Department of Hematopathology, The University of Texas MD Anderson Cancer Center, Houston, TX, 77030, USA;
2Institute for Urology and Reproductive Health, I.M. Sechenov First Moscow State Medical University, Moscow, Russia;
3Breast Cancer Department, NMRCC N. N. Petrov Research Institute of Oncology of the Ministry of Healthcare, St. Petersburg, Russia; *Radiation Oncology Department, The University of Texas MD Anderson Cancer Center, Houston, TX, USA

*These authors contributed equally to this work

Abstract: Extranodal marginal zone lymphoma of mucosa-associated lymphoid tissue (MALT lymphoma) of the urinary bladder is an extremely rare entity accounting for 0.2% of all malignant urinary bladder neoplasms, and the diagnosis could be challenging. We present here a patient with urinary bladder MALT lymphoma and review of all published case reports in the literature. We summarized the reported immunophenotype of the neoplasm, ancillary studies, therapy, and follow-up for all 59 patients in the table. The median patients’ age was 57 years-old (range, 17 to 88), with female predominance in 50 of 59 patients representing a 1:5.6 ratio. Geographical distribution of the reported patients was as follows: 22 from Asia, of which more than a half (16) originated from Japan; 28 from Europe, of which 19 reported from the United Kingdom, and 3 patients were reported from the United States (including our patient). Twenty-three (77%) of 30 patients, for whom their clinical presentation was recorded, had symptoms of cystitis; Escherichia coli was the most common pathogen. We concluded that a prominent female predominance, uneven geographic distribution of urinary bladder MALT lymphoma, and a success of antibacterial therapy in selected cases suggest the link between urinary tract infection and urinary bladder MALT lymphoma.

Keywords: MALT lymphoma, urinary bladder, cystitis, urinary tract infection

Introduction

Extranodal marginal zone lymphoma of mucosa-associated lymphoid tissue (MALT lymphoma) is a low-grade B cell lymphoma which accounts for 7–8% of all B cell lymphomas.1 The stomach is the most common organ involved by MALT lymphoma (about 35%), followed by other anatomical locations: eyes and ocular adnexa, skin, lungs, salivary glands, breasts, and thyroid.2

The first definitive report of MALT lymphoma in urinary bladder was published in 1990 by Kuhara and colleagues.3 MALT lymphoma of the urinary bladder is an extremely rare entity and accounts to less than 1% of all non-Hodgkin lymphomas and 0.2% of all malignant urinary bladder neoplasms.4 The majority of patients present with hematuria and/or dysuria. The differential diagnosis could be very broad and includes inflammatory lesions, bladder carcinoma, and infections.5
Some authors hypothesized that chronic antigenic stimulation and lymphoid hyperplasia caused by *Escherichia coli* or other bacterial infections might be a precursor of bladder MALT lymphomas. The positive experience in antibiotics treatment of MALT lymphoma of bladder might serve as an indirect support of this hypothesis.7–11

Herein, we report and discuss a case of primary bladder MALT lymphoma and summarize other cases reported in the literature.

**Case Presentation**

A 58-year-old Caucasian female with history of hypertension, asthma, rheumatoid arthritis, irritable bowel syndrome, colon polyps, depression, and menopausal syndrome presented to the clinic with nonspecific urinary symptoms: dysuria, nocturia, and urinary frequency. There were no B symptoms identified. The CT demonstrated multiple thickening on the anterior and posterior bladder walls (Figure 1A and B). Consequently, patient underwent a cystoscopy evaluation with transurethral resection of bladder tumor (TURBT), which revealed 2.5 x 2.5 cm mass on posterior bladder wall distally from the trigone. The mass did not have characteristic bladder cancer architecture. The patient signed the informed consent/authorization for participation in research which includes the permission to collect and use the information from medical records, imaging studies, medical photographs, pathology images, and study results for future research projects and publications. A copy of the signed consent is kept on file in the patient electronic records.

**Pathological Findings**

The histologic sections showed a dense lymphocytic proliferation beneath the urothelial surface of urinary bladder mucosa. Within the lymphoid proliferation, a monomorphic population of small lymphocytes having moderately abundant, pale staining cytoplasm was dominant. Regularly scattered, reactive lymphoid follicles were prominent within the mucosal lymphoid proliferation. The neoplastic lymphocytic proliferation had a perifollicular infiltration pattern.

Multiple immunohistochemical studies on biopsy material were performed and showed that neoplastic cells were positive for CD20, CD79a, BCL-2, and immunoglobulin kappa light chain (weak) confirming the clonality of the neoplastic cells; the neoplastic cells were negative for CD5, CD10, and immunoglobulin lambda light chain (Figure 2).

The diagnosis of MALT lymphoma of urinary bladder floor was established. No additional molecular studies were performed.

**Treatment/Follow-Up**

The patient received 4 cycles of Rituximab and achieved complete remission seen on the pelvic computed tomography (CT) (Figure 3). The patient showed no signs of disease with the last follow-up more than 10 years after original diagnosis.

**Literature Review**

The literature review was initiated starting with 1990 when Kuhara and colleagues reported what was eventually called “the first definitive report of a MALT lymphoma of the urinary bladder.”3,12 After a systemic search of the PubMed database for primary MALT lymphoma involving urinary bladder, the search identified 42 reports with a total of 58 patients.3,5–45 The available information about diagnostic immunohistochemistry, clinical manifestations, treatments, and outcomes of these cases along with a current case is summarized in Table 1.3,5–45 There was a strong female predominance with 50 of 59 patients being females with a male:females ratio of 1:5.6. The median patients’ age was 57 years-old (range, 17 to 88). A significant proportion of cases (22 total cases) was

![Figure 1 Axial CT images showing multiple abnormal nodular thickening on the anterior (A) and posterior (B) bladder walls.](https://example.com/figure1.png)
reported from in Asia, of which more than half (16)
originated from Japan.8,9,10,16,18,22–24,28,31,33,36,41,42,44,45
According to some of the available reports there more
publications in Japanese literature which we could not
find in PubMed.23,41 The cases reported from Asia showed
even a higher female predominance where only one of 22
patients was a male.18 United Kingdom was another loca-
tion with significant number of patients and accounted for
19 out of 28 European cases.8,12,17,20,21,25,40 Including our
patient, only 3 patients were reported in the USA.32,34 All
patients had some urinary symptoms at presentation which
led to the diagnosis. Hematuria was the most common
presenting symptom and was previously reported from
50.9% to 75%. Twenty three of 30 patients, for whom
the information regarding presence or absence of cystitis
was available, had cystitis; Escherichia coli was the most
common pathogen.31,38 Xu and colleagues found that most
patients, 76.5%, had a bladder solid mass on
presentation.38 None of patients demonstrated “B” group
symptoms such as weight loss, fever, or night sweats.

Only one case of MALT lymphoma with CD5 expres-
sion was reported.10 The clonality for heavy-chain IgH
gene rearrangement by PCR was studied in 10 cases and
was found to be clonally rearranged.6,8,16,24,28,29,39

Cytogenetic studies were reported in two cases.11,29
Krober and colleagues found that the first case was nega-
tive for t(14:18) and positive for trisomy3, while second
case showed translocation t(11:18)(q21;q21), trisomy 3,
and trisomy 18.29

Treatment approaches were variable including surgical
excision, antibiotics, chemotherapy, radiation, or com-
combined modality. Six patients were successfully treated

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**Figure 2** Bladder MALT lymphoma. The histologic sections show a dense, abnormal lymphocytic proliferation right beneath the urothelial surface of urinary bladder mucosa (A and B) the neoplastic cells are positive for CD20 (C) and CD79a (D).

**Figure 3** Axial CT image of depicting the bladder and showing no evidence of abnormal nodularity 3 months later.
| Case No. | Age (y.o.) | Sex | Immunohistochemistry                          | FISH and Molecular Study | Treatment                        | Follow-Up                                      | Cystitis (Present/Absent/N/A) | Urine Culture (a Bug/Negative/N/A) | Country of Origin | Year of Report | Reference |
|----------|------------|-----|-----------------------------------------------|--------------------------|----------------------------------|-----------------------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------|--------------|-----------|
| 1        | 56         | F   | Positive: CD20 (L26), CD79a (MB1) Negative: CD43 (MT1), CD45RO (UCHL1) Lambda light chain restricted | N/A                      | Total cystectomy                 | 9 months after surgery, negative for recurrence | Present                        | Enterococcus                  | Japan (Asia)                 | 1990           | Kuhara et al³ |
| 2        | 67         | F   | Positive: CD20 (L26)                          | N/A                      | Chemotherapy (CHOP)              | 24 months follow-up, negative for recurrence   | Present                        | N/A                          | UK (Europe)                  | 1993           | Pawade et al¹² |
| 3        | 74         | F   | Positive: CD20 (L26)                          | N/A                      | Radiotherapy                     | Dead (no follow-up)                           | Present                        | N/A                          | UK (Europe)                  | 1993           | Pawade et al¹² |
| 4        | 22         | F   | Positive: CD20 (L26)                          | N/A                      | Chemotherapy and radiotherapy    | 46 months follow-up, negative for recurrence   | N/A                            | N/A                          | UK (Europe)                  | 1993           | Pawade et al¹² |
| 5        | 83         | F   | Positive: CD20 (L26)                          | N/A                      | Radiotherapy                     | 20 months follow-up, negative for recurrence   | N/A                            | N/A                          | UK (Europe)                  | 1993           | Pawade et al¹² |
| 6        | 80         | M   | Positive: CD20 (L26)                          | N/A                      | Not treated                      | Died in 30 months after diagnosis of ischemic heart disease | Present                        | N/A                          | UK (Europe)                  | 1993           | Pawade et al¹² |
| 7        | 73         | F   | Positive: CD45 (LCA), CD20 (L26), MB2 Negative: CD79a (MB1), CD45RO (UCHL1) | N/A                      | Chemotherapy                     | Died in 8 months due to unrelated to lymphoma cause. No lymphoma recurrence in bladder. Lymphoma of the thyroid. | N/A                            | N/A                          | Spain (Europe)               | 1996           | Fernandez et al³ |
| Patient | Age | Gender | Positive Features | Treatment | Follow-up | Response | Location | Year | Authors |
|---------|-----|--------|-------------------|-----------|-----------|----------|----------|------|---------|
| 8       | 50  | F      | Positive: CD20 (L26), MB2 Kappa light chain restricted | N/A       | Chemotherapy | 60 months follow-up, negative for recurrence | N/A      | N/A  | Spain (Europe) 1996 | Fernandez et al |
| 9       | 75  | F      | Positive: CD20 (L26), MB2 | N/A       | Chemotherapy | 9 months follow-up, negative for recurrence | N/A      | N/A  | Spain (Europe) 1996 | Fernandez et al |
| 10      | 70  | F      | N/A               | N/A       | Chemotherapy and radiotherapy | 48 months follow-up, negative for recurrence | N/A      | N/A  | Chile (America) 1998 | Gallardo et al |
| 11      | 80  | F      | Positive: CD20 (L26), CD79a Negative: CD3, CD5, CD10, CD23, CD43 (MT1) | N/A       | Radiotherapy | 16 months follow-up, negative for recurrence | N/A      | N/A  | UK (Europe) 1998 | Yuille et al |
| 12      | 77  | F      | Positive: CD19, CD20, Negative: CD3, CD5, CD10, CD21, CD23, CD45RO Lambda light chain restriction | N/A       | Clonal heavy-chain IgH gene rearrangement (PCR) Transurethral resection (TUR) x 2 | 36 months follow-up after last TUR, negative for recurrence | Present  | N/A  | Japan (Asia) 1999 | Ando et al |
| 13      | 27  | M      | N/A               | N/A       | Chemotherapy and radiotherapy | 18 months follow-up, negative for recurrence | N/A      | N/A  | Japan (Asia) 2000 | Kawakami et al |
| 14      | 75  | F      | N/A               | N/A       | Chemotherapy and radiotherapy | 36 months follow-up, negative for recurrence | N/A      | N/A  | France (Europe) 2000 | Tasu et al |
| 15      | 66  | F      | Positive: CD20     | N/A       | N/A       | 12 months follow-up, negative for recurrence | N/A      | N/A  | UK (Europe) 2000 | Bates et al |
| 16      | 79  | F      | Positive: CD20     | N/A       | N/A       | No follow-up | N/A      | N/A  | UK (Europe) 2000 | Bates et al |
| 17      | 59  | F      | Positive: CD20, CD43 | N/A       | N/A       | 36 months follow-up, positive for recurrence | N/A      | N/A  | UK (Europe) 2000 | Bates et al |
| Case No. | Age (y.o.) | Sex | Immunohistochemistry | FISH and Molecular Study | Treatment | Follow-Up | Cystitis (Present/Absent/N/A) | Urine Culture (a Bug/Negative/N/A) | Country of Origin | Year of Report | Reference |
|----------|------------|-----|----------------------|-------------------------|-----------|----------|-------------------------------|----------------------------------|-----------------|---------------|-----------|
| 18       | 64         | F   | Positive: CD20, CD45  | Clonal heavy-chain IgH gene rearrangement (PCR) | Radiotherapy | 156 months follow-up, negative for recurrence | Present | Staphylococci, Streptococci, *Escherichia coli*, Diphtheroid bacillus | Canada (America) | 2001 | Al-Maghrabi et al |
| 19       | 69         | F   | Positive: CD20, CD45  | Clonal heavy-chain IgH gene rearrangement (PCR) | Radiotherapy | 60 months follow-up, negative for recurrence | Present | *Escherichia coli* | Canada (America) | 2001 | Al-Maghrabi et al |
| 20       | 72         | F   | Positive: CD20, CD45  | Inconclusive results of heavy-chain IgH gene rearrangement (PCR) | Radiotherapy | 36 months follow-up, negative for recurrence | Present | *Escherichia coli* | Canada (America) | 2001 | Al-Maghrabi et al |
| 21       | 62         | M   | Positive: CD19, CD20, CD43 (focal) Negative: CD5, CD10, CD23, CD45RO Kappa light chain restriction | Clonal heavy-chain IgH gene rearrangement (PCR) | Radiotherapy | 24 months follow-up, negative for recurrence | Present | Staphylococcus aureus | Canada (America) | 2001 | Al-Maghrabi et al |
| 22       | 65         | F   | Positive: CD20, CD79  | N/A | Chemotherapy (CHOP) | 36 months follow-up, negative for recurrence | Present | Coliform Bacteria | UK (Europe) | 2001 | Wazait et al |
| 23       | 70         | F   | Positive: CD20, CD79  | N/A | Chemotherapy (Chlorambucil) | 60 months follow-up, negative for recurrence | N/A | N/A | UK (Europe) | 2001 | Wazait et al |
| 24       | 70         | F   | Positive: CD20 Negative: CD43 | N/A | Chemotherapy and radiotherapy | 48 months follow-up, negative for recurrence | N/A | N/A | Chile (America) | 2001 | Painemal Duarte et al |
|   |   |   | Positive: CD20, CD79a Negative: CD3, CD5, CD10, CD23, CD43, CD45RO, BCL6, cyclin D1 | N/A | Antibiotics (First paper to use HP eradication therapy which works; H. Pili test was positive) | 36 months follow-up, negative for recurrence | Absent | Negative | Netherlands (Europe) | 2002 | van den Bosch et al7 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 57 | M | Positive: CD20 Negative: CD3, CD5, CD10, CD23, CD43, cyclin D1 Ki-67 - low | Negative for t (14;18) Trisomy of Chromosome 3 | Antibiotics treatment against H. Pili (even H. Pili test was negative) | 36 months follow-up, negative for recurrence | N/A | N/A | Germany (Europe) | 2002 | Krober et al11 |
| 27 | 78 | F | Positive: CD20, CD79 | Clonal heavy-chain IgH gene rearrangement (PCR) | Antibiotics (trimethoprim, nitrofurantoin, and cephradine) | 19 months follow-up, negative for recurrence | Present | Escherichia coli | UK (Europe) | 2002 | Oscier et al8 |
| 28 | 82 | F | N/A | N/A | Chemotherapy (ChIVP) | Died, negative for recurrence | N/A | N/A | UK (Europe) | 2005 | Hughes et al21 |
| 29 | 81 | F | N/A | N/A | Diathermy | 12 months follow-up, negative for recurrence | N/A | N/A | UK (Europe) | 2005 | Hughes et al21 |
| 30 | 28 | M | N/A | N/A | Chemotherapy (ChIVP) | 120 months follow-up, negative for recurrence | N/A | N/A | UK (Europe) | 2005 | Hughes et al21 |
| 31 | 76 | F | N/A | N/A | Radiotherapy | 24 months follow-up, negative for recurrence | N/A | N/A | UK (Europe) | 2005 | Hughes et al21 |
| 32 | 77 | M | N/A | N/A | Chemotherapy (ChID) | 48 months follow-up, negative for recurrence | N/A | N/A | UK (Europe) | 2005 | Hughes et al21 |
| 33 | 66 | F | N/A | N/A | Radiotherapy | Died, negative for recurrence | Present | N/A | UK (Europe) | 2005 | Hughes et al21 |
| Case No. | Age (y.o.) | Sex | Immunohistochemistry | FISH and Molecular Study | Treatment | Follow-Up | Cystitis (Present/Absent/N/A) | Urine Culture (a Bug/Negative/N/A) | Country of Origin | Year of Report | Reference |
|----------|------------|-----|-----------------------|--------------------------|-----------|----------|-----------------------------|-------------------------------|----------------|--------------|-----------|
| 34       | 85         | F   | N/A                   | N/A                      | Radiotherapy | Negative for recurrence | N/A | N/A | Japan (Asia) | 2005       | Takahara et al\(^{22}\) |
| 35       | 84         | F   | N/A                   | N/A                      | Chemotherapy (R-CHOP) | N/A | N/A | Japan (Asia) | 2006       | Kakuta et al\(^{11}\) |
| 36       | 84         | F   | N/A                   | N/A                      | Radiotherapy | 14 months follow-up, negative for recurrence | Present | Escherichia coli | Japan (Asia) | 2007       | Hatano et al\(^{13}\) |
| 37       | 64         | F   | Positive: CD20, BCL2 Negative: CD5, CD10, cyclin D1 Ki-67 - low | Clonal heavy-chain IgH gene rearrangement (PCR) | Transurethral resection (TUR) and radiotherapy | 19 months later recurred in stomach | Absent | Negative | Japan (Asia) | 2007       | Ueno et al\(^{14}\) |
| 38       | 69         | F   | Positive: CD20, CD79a Negative: CD5, CD10 | N/A | Antibiotics | 25 months follow-up, negative for recurrence | Present | N/A | Japan (Asia) | 2008       | Fujimura et al\(^{9}\) |
| 39       | 64         | F   | N/A                   | N/A                      | Radiotherapy | 14 months follow-up, negative for recurrence | Present | Escherichia coli | Japan (Asia) | 2008       | Terasaki et al\(^{12}\) |
| 40       | 31         | F   | Ki-67 ~ 20–25%        | N/A                      | Chemotherapy (CHOP) | N/A | N/A | UK (Europe) | 2010       | Sen et al\(^{15}\) |
| 41       | 88         | F   | Positive: CD5, CD20, CD79a, CD45, BCL2, p53 Negative: CD10, CD15, CD23, CD30, CD34, CD43, CD56, cyclin D1, TdT Lambda light chain restriction Ki-67 ~ 50% | N/A | Antibiotics | 5 months follow-up, negative for recurrence | N/A | N/A | Japan (Asia) | 2011       | Terada et al\(^{10}\) |
| Case | Age | Gender | Positive | Negative | Treatment | Recurrence | Follow-Up | Outcome | Country | Year | Reference |
|------|-----|--------|----------|----------|-----------|------------|-----------|---------|---------|-------|-----------|
| 42   | 65  | F      | CD20, BCL2 | CD3, CD5, CD10, CD21, CD23, CD15, CD30 Ki-67 ~ 5–10% | N/A | Chemotherapy (R-CHOP) | Recur 12 months after treatment; died of septicemic shock secondary to a bladder abscess | Absent | N/A | Malaysia (Asia) | 2011 | Maninderpal et al 16 |
| 43   | 17  | F      | CD20, BCL2, CD45 Ki-67 ~ 25% | N/A | Transurethral resection (TUR) and chemotherapy | 24 months follow-up, negative for recurrence | N/A | N/A | Poland (Europe) | 2011 | Szopinski et al 17 |
| 44   | 68  | F      | CD20, CD79a, Kappa light chain restriction | Clonal heavy-chain IgH gene rearrangement (PCR) | Chemotherapy (rituximab) | Negative for recurrence | Absent | N/A | Japan (Asia) | 2012 | Morita et al 18 |
| 45   | 72  | F      | N/A | N/A | Chemotherapy (rituximab) and radiotherapy | N/A | Present | N/A | Japan (Asia) | 2013 | Mizumo et al 19 |
| 46   | 71  | F      | CD20, CD3 | N/A | Transurethral resection (TUR) | N/A | Present | N/A | Japan (Asia) | 2013 | Takahashi et al 20 |
| 47   | 48  | M      | CD20, BCL2, CD5, CD23, CD43, cyclin D1 Ki-67 ~ 5% Kappa light chain restriction | N/A | Chemotherapy (R-CHOP), radiotherapy, antibiotics | N/A | Present | Escherichia coli | Croatia (Europe) | 2013 | Bacaj et al 21 |
| 48   | 72  | F      | CD20, CD79a, BCL2, IgD | Clonal heavy-chain IgH gene rearrangement (PCR); FISH - t(11;18)(q21;q21); Trisomy of Chromosome 3 and 18 | Antibiotics (ciprofloxacin for 6 weeks) | 6 months follow-up, negative for recurrence | Present | Escherichia coli | Italy (Europe) | 2013 | Lucioni et al 22 |

(Continued)
| Case No. | Age (y.o.) | Sex | Immunohistochemistry | FISH and Molecular Study | Treatment | Follow-Up | Cystitis (Present/Absent/N/A) | Urine Culture (a Bug/Negative/N/A) | Country of Origin | Year of Report | Reference |
|---------|------------|-----|-----------------------|--------------------------|-----------|-----------|-------------------------------|----------------------------------|-----------------|--------------|-----------|
| 49      | 63         | F   | Positive: CD20, BCL2 Negative: CD3, CD5, CD10, cyclin D1 Ki-67 ~ 20% Lambda light chain restriction | Clonal heavy-chain IgH gene rearrangement (PCR) | Radiotherapy | 11 months follow-up, negative for recurrence | Absent | Negative | Taiwan (Asia) | 2014 | Chen et al[19] |
| 50      | 54         | M   | Positive: CD20 Negative: CD3, CD10, BCL6, cyclin D1 | N/A | Radiotherapy | 36 months follow-up, negative for recurrence | Absent | Negative | USA (America) | 2014 | Haddad-Lacle et al[12] |
| 51      | 78         | F   | Positive: CD20, CD79a, BCL2 Negative: CD3, CD10, CD23, cyclin D1 Ki-67 ~ 20% Kappa light chain restriction | N/A | Chemotherapy (rituximab) | N/A | Present | Escherichia coli | Japan (Asia) | 2014 | Matsuda et al[13] |
| 52      | 76         | F   | Positive: CD20, BCL2 Negative: CD3, CD10 | N/A | Radiotherapy | 3 months follow-up, negative for recurrence | N/A | N/A | Taiwan (Asia) | 2015 | Hsu et al[15] |
| 53      | 65         | F   | Positive: CD20, PAX5 Negative: CD5, CD10 | N/A | A transurethral resection of the bladder tumor (TURBT) and radiotherapy | 3 months follow-up, negative for recurrence | N/A | N/A | USA (America) | 2015 | Vempati et al[34] |
| 54      | 53         | F   | Positive: CD20, CD45 Negative: CD3, CD5, CD10, BCL2 | N/A | Chemotherapy (R-CHOP) | 9 months follow-up, negative for recurrence | Present | Negative | India (Asia) | 2016 | Jitani et al[5] |
| 55      | 72         | F   | N/A | N/A | Transurethral resection of bladder tumors (TURBT) | 13 months follow-up, negative for recurrence | N/A | N/A | Japan (Asia) | 2018 | Ozawa et al[35] |
with antibiotics.\textsuperscript{7,9,11,29} Eight patients had some surgical procedures with or without consequent radiotherapy and/or chemotherapy.\textsuperscript{3,16,24,27,31,34,38,45} Hughes and colleagues reported one patient who was successfully treated by diathermy.\textsuperscript{21} Majority of the patients (24) were treated with chemotherapy either alone (16) or in combination with radiation (8) (Table 1). Three cases did not have any information about therapeutic approach.\textsuperscript{17} Overall the outcome of the treatment was good with median follow-up time of 64.5 months (from 3 to 156 months).

It is important to acknowledge the limitations of our review. It is possible that some reports did not specify the urinary bladder as an involvement site, so we cannot exclude the possibility of missing a significant number of cases. This is a retrospective study, and patients have not been studied and treated uniformly; therefore, it is impossible to draw a definitive conclusion regarding the pathogenesis of MALT lymphoma of the urinary bladder.

The patient we report has a history of rheumatoid arthritis (RA). The relationship between RA and MALT lymphoma in this patient remains unclear. An increased risk of malignant lymphoma has been reported in patients with RA;\textsuperscript{46,47} however, patients with RA usually develop diffuse large B-cell lymphoma.\textsuperscript{48} While MALT lymphoma is common in patients suffering from primary Sjogren syndrome,\textsuperscript{49} MALT lymphoma in patients with RA are exceedingly rare; we identified only 11 single case reports in the literature.\textsuperscript{50-60}

\textbf{Conclusion}

In summary, MALT lymphoma of the urinary bladder is a rare low-grade extranodal B-cell lymphoma which predominantly affects elderly women of Asian origin. The disease often presents with nonspecific symptoms and is strongly associated with cystitis.\textsuperscript{14,34} The prognosis is generally excellent. Tissue biopsy with immunohistochemistry is crucial to reach the final diagnosis. A prominent female predominance, uneven geographic distribution of the cases, dramatic prevalence of cystitis among affected patients, and a success of antibacterial therapy in selected cases suggest the role of urinary tract infection, particularly \textit{E. coli}, in the pathogenesis of urinary bladder MALT lymphoma.

\textbf{Ethics Approval and Informed Consent}

The patient reported in the manuscript signed the informed consent/authorization for participation in research (MD Anderson Cancer Center protocol LAB01-473) which
includes the permission to use data collected in future research projects including presented case details and images used in this manuscript. A copy of the signed consent is kept on file in the patient electronic records.

Disclosure

The authors declare no conflicts of interest for this work and that there are no conflicts of interest regarding the publication of this article.

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