

The impact of age, sex, comorbidities, and use of antithrombotics on the clinical course severity among patients surgically treated for urinary bladder tamponade

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Abstract

Objectives: To examine the relationship between clinical patient characteristics and the severity of the disease course in patients hospitalized due to urinary bladder tamponade. The severity was assessed based on hemoglobin (Hgb) levels upon admission, the requirement for red blood cell transfusion (RBCT), and length of hospital stay.

Materials and Methods: A retrospective analysis was conducted at a single center, involving 75 patients who were hospitalized due to urinary bladder tamponade.

Results: Bladder cancer (33.3%) and postoperative bleeding (28%) were the most common causes of bladder tamponade. Patient age exhibited a negative correlation with Hgb levels upon admission ($r = -0.539$, $P < 0.001$) and a positive correlation with the quantity of administered RBCT units ($r = 0.425$, $P < 0.001$) and the length of hospitalization ($r = 0.541$, $P < 0.001$). The number of comorbidities exhibited a negative correlation with Hgb levels upon admission ($r = -0.555$, $P < 0.001$) and a positive correlation with the quantity of administered RBCT units ($r = 0.522$, $P < 0.001$) and the length of hospitalization ($r = 0.543$, $P < 0.001$). Patients taking antithrombotic therapy (AT) had lower mean Hgb levels on admission (87.8 ± 13.5 g/L vs. 107.6 ± 18.7 g/L, $P < 0.001$), a higher mean number of administered RBCT units (2.8 ± 2.1 vs. 1.1 ± 1.3 , $P < 0.001$) and longer hospitalizations (4.6 ± 1.6 days vs. 3.1 ± 1.1 days, $P < 0.001$) compared to those not taking AT.

Conclusion: Older patients with multiple comorbidities, particularly those taking AT, should be expected to have a more severe clinical course of bladder tamponade. Therefore, special clinical attention is necessary for this vulnerable patient group.

Keywords: Bladder cancer, bleeding, elderly patients, hematuria, urinary bladder tamponade

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INTRODUCTION

Urinary bladder tamponade is an urgent urological condition characterized by the complete filling of the bladder with blood and blood clots. The primary causes

include bleeding tumors of the bladder or other parts of the urinary tract, prostatic bleeding associated with benign prostatic hyperplasia (BPH) or prostate cancer, irradiation cystitis, and postoperative bleeding following

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urinary tract surgery.^[1,2] The incidence of these underlying conditions and procedures is higher among elderly patients.^[3] It is worth noting that elderly patients often use oral antithrombotic therapy (AT), which can increase the risk of bleeding from these aforementioned sources.^[4] Severe anemia and hemorrhagic shock due to significant bleeding are the most dangerous complications of bladder tamponade.^[1] Therefore, immediate evaluation and treatment by a urologist are crucial for patients with bladder tamponade. Currently, research on bladder tamponade is scarce, with only a limited number of original studies offering comprehensive insights into multiple cases of this condition.^[5,6] However, none of these studies have specifically investigated the clinical course of the disease.

The aim of the present study was to examine the characteristics of patients presenting with bladder tamponade and requiring surgical intervention in our hospital, as well as to show the underlying causes of tamponade in our population. Furthermore, we sought to determine the impact of patient characteristics such as age, sex, comorbidity burden, and oral AT use on the clinical severity of disease.

MATERIALS AND METHODS

This study was a retrospective, cross-sectional, and single-center investigation, conducted after receiving approval from the Research Ethics Committee of our hospital. The study population consisted of 75 adult patients who underwent surgical treatment for urinary bladder tamponade at our hospital center between January 1, 2019 and June 1, 2021. Patients for whom conservative treatment methods were sufficient to control the bleeding and prevent clot formation were excluded from the study. Only the patients who underwent endoscopic transurethral surgery for bladder tamponade were included. Patients who died during hospitalization, as well as those with incomplete medical records, were also excluded.

Data were obtained from the electronic medical records of the hospital. The authors confirm that all original data reported in this study are available and accessible. Patient identities were anonymized using identification numbers to maintain confidentiality. The collected data included patient sex, age, history of smoking, chronic therapy, comorbidities, length of hospital stay, cause of tamponade based on intraoperative and histopathological findings, hemoglobin count (Hgb) at admission (prior to surgery and prior to transfusion), the requirement for red blood cell transfusion (RBCT), and the quantity of RBCT units administered. Medication data, particularly the use

of oral antithrombotic agents, were carefully examined, encompassing the use of antiplatelet and/or anticoagulant drugs. The severity of the clinical course of the disease was assessed based on patient's blood Hgb level at admission, the requirement for RBCT, the quantity of RBCT units administered, and the duration of hospitalization.

Statistical analysis

Statistical analyses were performed using the SPSS 25 Package for Windows (IBM, Armonk, NY, USA). The Chi-square test was employed to assess the differences in categorical variables between the respective groups of interest. For continuous variables, the Student's *t*-test for independent samples was used to compare the two groups of interest. Data are presented as mean \pm standard deviation. Bivariate correlation analysis was conducted using Pearson's correlation coefficient. Statistical significance (*P*) was reported at a two-tailed level for all analyses, and *P* < 0.05 was considered statistically significant.

RESULTS

The baseline characteristics of patients, including parameters of interest reflecting severity of bladder tamponade, are shown in Table 1.

The most common underlying cause of bladder tamponade in the study population was bladder cancer (33.3%), followed by postoperative bleeding (28%), BPH (18.7%), cystitis (13.3%), and prostate cancer (6.7%). Among

Table 1: The baseline characteristics of patients surgically treated for urinary bladder tamponade and disease course severity parameters in the whole studied population

Variable	n (%)
Baseline patient characteristics	75 (100)
Male	59 (78.7)
Female	16 (21.3)
Age (years), mean \pm SD	74.7 \pm 10.1
History of smoking	26 (34.7)
Number of comorbidities	2.2 (1.2)
Type of comorbidities	
Hypertension	62 (82.7)
Diabetes	22 (29.3)
Hyperlipidemia	21 (28)
Other cardiovascular diseases	19 (25.3)
Metastatic malignant diseases	18 (24)
Atrial fibrillation	10 (13.3)
Chronic renal failure	6 (8)
COPD	4 (5.3)
No comorbidities	6 (8)
Oral antithrombotic therapy use	23 (30.7)
Parameters reflecting disease severity (mean \pm SD)	
Hgb upon admission (g/L)	101.5 \pm 19.5
Patients requiring RBCT	48 \pm 64
RBCT units received	1.6 \pm 1.8
Hospitalization days	3.6 \pm 1.5

SD: Standard deviation, Hgb: Hemoglobin, RBCT: Red blood cell transfusion, COPD: Chronic obstructive pulmonary disease

patients with bladder cancer-related tamponade, all cases were attributed to urothelial carcinoma. In the subgroup of 21 patients with tamponade caused by postoperative bleeding, 81% had undergone elective transurethral resection of the bladder tumor, while the remaining 19% had undergone elective transurethral resection of the prostate. Ten patients experienced tamponade due to cystitis, with radiation being the primary cause in 70% of cases, followed by infection (20%) and chemotherapy (10%).

Parameters reflecting clinical course and severity of bladder tamponade were first compared with regards to the patient's sex. No statistically significant difference was found in mean blood Hgb values at admission, the proportion of patients who required a RBCT, the average number of administered units of RBCT, or the average length of hospitalization between men and women [Table 2].

The correlation between the patient's age and disease course severity parameters was examined. A significant negative correlation was found between age and blood Hgb values at admission. A positive correlation was found between age, the number of received units of RBCT, and the length of hospitalization [Table 3]. The mean age of patients who required a RBCT was significantly higher than among patients who did not require a RBCT (77.8 ± 9.6 years vs. 69.0 ± 8.7 years, $P < 0.001$).

Furthermore, the correlation between the number of comorbidities the patients had and disease course severity parameters was also analyzed. A negative correlation was found between the number of comorbidities and blood Hgb values at admission, while a positive correlation was found between the number of comorbidities, received units of RBCT and the length of hospitalization [Table 3]. The mean number of comorbidities in patients who required a RBCT was significantly higher than among patients who did not require a RBCT (2.71 ± 1.09 vs. 1.33 ± 1, $P < 0.001$).

Finally, the difference in disease course severity parameters between patients taking versus not taking oral AT as part of their chronic therapy was examined. The patients taking AT had statistically significantly lower mean Hgb values at admission ($P < 0.001$), as well as a higher mean number of received units of RBCT ($P < 0.001$), and longer hospitalization duration ($P < 0.001$), compared to those who were not taking any AT. Similarly, the proportion of patients who required a RBCT was significantly higher in the group of patients taking AT compared to the group of patients not taking such drugs [$P = 0.006$, Table 4].

Table 2: Comparison of blood hemoglobin count upon admission, the requirement for red blood cell transfusion, and length of hospital stay between men and women with urinary bladder tamponade

Variable	Mean±SD		P
	Male	Female	
Hgb upon admission (g/L)	102±19.4	99.6±20.4	0.666*
Patients requiring RBCT (%)	62.7	68.8	0.655'
RBCT units received	1.6±1.8	1.7±1.8	0.878*
Hospitalization days	3.6±1.5	3.4±1.3	0.542*

*Student's t-test for independent samples, 'Chi-square test. SD: Standard deviation, Hgb: Hemoglobin, RBCT: Red blood cell transfusion

Table 3: Correlation between the patient's age and number of comorbidities with disease course severity parameters (blood hemoglobin count upon admission, number of received units of red blood cell transfusion, and length of hospital stay)

Variable	Age (years)		Number of comorbidities	
	r*	P	r*	P
Hgb upon admission (g/L)	-0.539	<0.001	-0.555	<0.001
RBCT units received	0.425	<0.001	0.522	<0.001
Hospitalization days	0.541	<0.001	0.543	<0.001

*Pearson's correlation coefficient. Hgb: Hemoglobin, RBCT: Red blood cell transfusion

Table 4: Comparison of blood hemoglobin count upon admission, the requirement for red blood cell transfusion, and length of hospital stay between patients taking antithrombotic therapy and those not taking such drugs

Variable	Antithrombotic therapy use (mean±SD)		P
	Yes	No	
Hgb upon admission (g/L)	87.8±13.5	107.6±18.7	<0.001*
Patients requiring RBCT (%)	87	53.9	0.006'
RBCT units received	2.8±2.1	1.1±1.3	<0.001*
Hospitalization days	4.6±1.6	3.1±1.1	<0.001*

*Student's t-test for independent samples, 'Chi-square test. Hgb: Hemoglobin, RBCT: Red blood cell transfusion, SD: Standard deviation

DISCUSSION

Modern society is witnessing a significant demographic shift toward an aging population.^[7] Numerous studies have established an association between older age, multiple comorbidities, and poorer clinical outcomes in patients undergoing surgical treatment.^[8-10] To our knowledge, our study represents the first attempt to examine the association between baseline patient characteristics and the severity of disease course in surgically treated patients with urinary bladder tamponade. The findings from our research highlight that advanced age, higher comorbidity burden, and the use of AT are linked to lower blood Hgb levels upon admission, a higher likelihood of requiring RBCT, and extended hospital stays. It is well-documented in the literature that prolonged hospitalization is a risk factor for various unfavorable outcomes, such as nosocomial infections, thromboembolic events, and cognitive

decline.^[11-13] In addition, blood transfusion is not devoid of risks, as it can give rise to acute or delayed complications and contribute to increased morbidity and mortality.^[14] Hence, the identification of advanced age, a higher burden of comorbidities, and the utilization of AT as potential risk factors associated with longer hospital stays and an increased need for RBC transfusion among patients with bladder tamponade holds considerable significance for everyday urological clinical practice. Urologists encounter elderly patients with multiple comorbidities on a daily basis. When these patients present with hematuria, it is imperative to approach them with heightened caution and initiate early evaluation and treatment, particularly if they are using AT. This population may be inherently vulnerable and prone to a more severe disease course, leading to an increased risk of overall poorer health outcomes.

Previous research on bladder tamponade has primarily focused on individual case reports, highlighting unusual underlying causes or novel clot evacuation methods.^[15-17] Despite the importance of this condition in urological practice, there have been only a few recent studies that have descriptively presented cumulative results of multiple bladder tamponade cases, the underlying causes of tamponade, and the characteristics of treated patients. Studies conducted by Oida and Kawase, Miyamae *et al.* have reported collective results of urinary bladder tamponade cases in the Japanese population.^[5,6] The most common underlying causes of tamponade were bladder tumor, iatrogenic bleeding, prostatic bleeding, and cystitis. These cases predominantly involved elderly men, who commonly presented with multiple comorbidities. Almost half of the patients took AT as part of their chronic therapy. These patient characteristics align with our own findings. In our population, the leading causes of tamponade were bladder cancer, postoperative bleeding (following transurethral resection of bladder cancer or enlarged prostate), and BPH. The incidence of these pathological conditions and surgeries tends to increase with age, particularly in men.^[3] Consequently, bladder tamponade primarily affects older male patients, with an average age of 74.67 years in our study and a male predominance of 78.7%. As individuals age, the prevalence of comorbidities also rises.^[7] Thus, the majority of patients in our population presented with multiple associated conditions. Among these, cardiovascular diseases were the most common, with patients often being prescribed AT. Therefore, 30.7% of our subjects were taking antithrombotic agents as part of their chronic therapy, medications that can increase the risk of bleeding from potential pathological sources and heighten the likelihood of tamponade.^[4]

We specifically included patients who underwent endoscopic surgery, excluding those for whom conservative methods were sufficient to control bleeding and clot formation. This approach was chosen due to the inherent risk of bleeding associated with surgery itself. Consequently, a combined analysis of surgically and conservatively treated patients would have yielded a heterogeneous group, hindering objective interpretation of the results.

The limitations of our study stem from the small sample size due to the rarity of bladder tamponade compared to gross hematuria, as well as the relatively smaller size of our hospital in comparison to larger city centers.

Our findings contribute to the limited literature on urinary bladder tamponade by not only providing a descriptive analysis of bladder tamponade cases but also exploring the influence of clinical characteristics on the disease course severity, which has not been previously investigated. In light of the limited prior research and knowledge available, there is a clear need for further investigation, particularly on larger samples, to gain a deeper understanding of the underlying mechanisms of bladder tamponade.

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Conflicts of interest

There are no conflicts of interest.

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