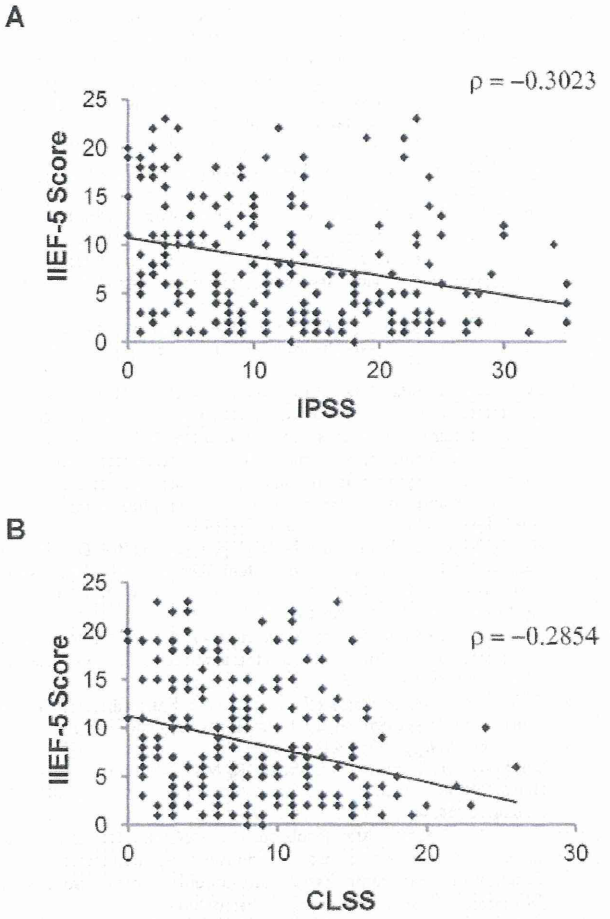

Figure 2. (A) Correlation of IPSS total score and IIEF-5 total score. (B) Correlation of CLSS total score and IIEF-5 total score. ρ: Spearman correlation coefficient.

correlated with the total IIEF-5 score (Figure 2A). The symptoms other than daytime frequency and incomplete emptying showed a significant relationship with the total IIEF-5 score (Table II). Likewise, the total CLSS scores significantly correlated with the total IIEF-5 score, with a Spearman rank correlation coefficient of −0.2854 ($p < 0.0001$, Figure 2B). The correlation between the individual symptoms of CLSS and the total IIEF-5 score is shown in Table II. The symptoms other than daytime frequency and incomplete emptying in the CLSS questionnaire showed significant relationship with the total IIEF-5 score. Interestingly, both bladder and urethral pain showed significant inverse correlation with the total IIEF-5 score ($p = 0.0168$ and 0.0051, respectively Table II). Furthermore, the multivariate analysis identified nocturia and urethral pain as independent factors for low IIEF-5 scores ($p = 0.00025$ and $p = 0.00547$,respectively, IIEF-5 total score = 11.68 − (1.884 × nocturia) − (1.676 × urethral pain), Table III)

Discussion

LUTS and sexual dysfunction are common in aging men. Recently, the association between LUTS and ED has been investigated in community-based studies [1–5,11–13]. Using the IPSS questionnaire as an assessment tool for LUTS, these studies showed a significant association between ED and LUTS including storage and voiding symptoms [1–5,11–13]. We have recently developed the CLSS questionnaire to assess core or important symptoms in various pathological conditions [8]. With questions on incontinence and pain, the CLSS questionnaire is more useful as an assessment tool of male LUTS than the IPSS questionnaire at the initial stage [9]. In the present study, using the IPSS and CLSS questionnaires, we tried to determine the relationship of LUTS scores with sexual function as measured by the IIEF-5 questionnaire.

The results confirmed the significant relationship between IPSS and ED. Among IPSS and CLSS symptoms other than daytime frequency and incomplete emptying showed significant correlation with the total IIEF-5 score. Importantly, both bladder and urethral pain showed significant inverse correlation with the total IIEF-5 score. In addition, nocturia and urethral pain were identified as independent factors for low IIEF-5 score by a multivariate regression analysis. These results indicate that evaluation of pain symptoms is indispensable for urological assessment in men with pelvic health problems.

Urogenital pain may be caused by various conditions. Chronic prostatitis is one of the most common conditions; about 40% of men with prostatitis experienced urethral or bladder pain in this study.

Table II. Correlation between CLSS, IPSS, and IIEF score ($n = 220$).

	CLSS		IPSS	
	r	*p* value	*r*	*p* value
Daytime frequency	−0.0827	0.2215	−0.1217	0.0716
Nocturia	−0.2905	<0.0001	−0.3205	<0.0001
Urgency	−0.1628	0.0156	−0.1759	0.0089
Urgency incontinence	−0.201	0.0028	—	
Stress incontinence	−0.1752	0.0092	—	
Slow stream	−0.1655	0.014	−0.2115	0.0016
Straining	−0.2115	0.0016	−0.26	<0.0001
Interruption	—		−0.2055	0.0022
Incomplete emptying	−0.0962	0.1552	−0.1144	0.0965
Bladder pain	−0.1611	0.0168	—	
Urethral pain	−0.1882	0.0051	—	

r: Spearman's correlation coefficient. CLSS: Core lower urinary tract symptom score. IPSS: International prostate symptom score. IIEF: International index of erectile function. —: not addressed.

Table III. The result of multivariate regression model.

	p value
Daytime frequency	—
Nocturia	0.00025
Urgency	—
Urgency incontinence	—
Stress incontinence	0.07183
Slow stream	—
Straining	0.10179
Incomplete emptying	0.22512
Bladder pain	—
Urethral pain	0.00547

Concerning the relationship between pain and ED, testicular pain has been shown to impair sex drive and satisfaction, and perineal pain increased patients' sexual problems [14]. In another study, pelvic pain was associated with sexual anxiety, lack of interest in sex, and orgasm, and erectile difficulties [15]. These reports imply that urogenital pain could be a major cause of ED.

Despite the fact that accumulating evidence has identified LUTS as a risk factor for ED in aging men, the precise etiology between these two disorders remains to be clarified. Suggested mechanisms include a decrease of nitric oxide/nitric oxide synthase in the endothelium, increased Rho-kinase activity and calcium sensitivity, an adrenergic receptor imbalance, and autonomic hyperactivity [16,17]. Urogenital pain may induce the release of endorphins, which in turn act on mμ opiate receptors, strongly suppressing libido and sexual function. Opiates have been shown to decrease libido and sexual function by suppressing luteinizing hormone secretion and subsequently serum testosterone [18–20]. In these studies, blockade of mμ opiate receptors recovered sexual function [20]. Psychological effects of urogenital pain may interfere with sexual function [21]. Men with chronic prostatitis are known to experience depression that definitely impairs sexual function [22].

The limitations of our study include 1) an inadequate sample number, which might underestimate significance of certain symptoms, 2) the cross sectional nature of investigation, and 3) inclusion of Japanese men only. Longitudinal studies and/or studies using cohorts of different cultural or clinical background are warranted to confirm the results of this study.

In conclusion, urethral pain was identified as an independent factor for low IIEF-5 score. CLSS rather than IPSS would be a more appropriate tool for LUTS evaluation in men with pelvic health problem. Looking at LUTS symptoms would be mandatory in men with ED. In case with urethral pain, further examination might be considered.

***Declaration of Interest*:** The authors declared no conflict of interest.

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Original Article: Clinical Investigation

Management trends, angioembolization performance and multiorgan injury indicators of renal trauma from Japanese administrative claims database

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Abbreviations & Acronyms
AE = angioembolization
AIS = Abbreviated Injury Scale
CI = confidence interval
DPC = Diagnosis Procedure Combination
ICD-10 = International Classification of Diseases and Related Health Problems, Tenth Revision
Nx = nephrectomy
RR = rate ratio

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Objectives: To show the characteristics and therapeutic trends of renal trauma in Japan using a nationwide database.

Methods: All renal trauma cases from the Diagnosis Procedure Combination database during 6 months of each year from 2006 to 2008 were included in the analysis. The following variables were considered: demographics, ambulance use, comorbid trauma, interventions, mechanism of injury and the Abbreviated Injury Scale. Patients were divided into two groups by trauma range: limited to rib, abdomen and pelvis (group A) or more extended (including supradiaphragmatic regions or lower extremities; group B). Rib fracture impact was assessed as a predictor of comorbid organ trauma. The incidences of angioembolization failure and nephrectomy were also evaluated.

Results: A total of 1505 renal trauma cases (1014 and 491 in groups A and B, respectively) were identified. Comorbid trauma in the liver, spleen and lumbar/pelvic fractures were 7.4%, 5.6% and 5.1% in group A and 24.0%, 11.2% and 17.5% in group B, respectively. The rates of angioembolization (and its failure proportion), nephrectomy, transfusion and mortality were 7.9% (12.5%), 3.3%, 15.6% and 1.1% in group A, and 17.1% (11.9%), 2.6%, 28.3% and 8.1% in group B, respectively. Risks of coincident traumas in the liver, spleen and pelvic fracture were 2.23, 2.35 and 2.72 times higher if a rib fracture was observed. The incidences of renal trauma and nephrectomy (per 100 000 person-years) were estimated as 2.06 and 0.063, respectively.

Conclusions: Angioembolization failure is not rare, and nephrectomy is an important last resort. Patients with comorbid rib fracture should be explored for coincident traumas.

Key words: embolization, kidney, mortality, nephrectomy, trauma.

Introduction

During the past two decades, non-operative management has become widely accepted as the preferable approach to renal trauma with advancing technology of transcatheter AE.[1–3] Although traumatic nephrectomy is becoming rare, it is still an effective last resort, and physicians should not hesitate to carry out nephrectomy if the need arises.

To reveal the characteristics of renal trauma involving multiple comorbid organ traumas and a therapeutic choice strategy is very useful for physicians' decision-making algorithms. To our knowledge, only one report from the USA has been published that describes the therapeutic trend and outcome of AE based on a nationwide cohort.[1] A risk assessment of traumatic nephrectomy is also informative for people who have only a single kidney or who face undergoing nephrectomy for urological malignancy.

The present study showed today's characteristics and therapeutic trends of renal trauma, and evaluated the incidence of traumatic nephrectomy in both the male and female general

population in Japan using the DPC database, a nationwide administrative database.

Methods

DPC database

The nature of the DPC database has been previously described.[4–6] In brief, this database collects inpatient administrative claims data in Japan that contain: (i) main diagnoses, comorbidities at admission and complications after admission accompanied by ICD-10 codes; (ii) surgical procedures accompanied by original Japanese K-codes; and (iii) discharge status. The numbers of patients in the database were 1.08-, 2.99- and 2.86 million in 2006, 2007 and 2008, respectively, and the number in 2008 represented approximately 40% of all acute care inpatient hospitalizations in Japan.

Sampling strategy

The database held the data between 1 July and 31 December 2006 to 2008 (6 months during each year), and we used it. The patients included in the present study were those who were diagnosed with "injury of kidney" (ICD-10 code; S37.0). Given the anonymous nature of the data collection process, informed consent was not required. Study approval was obtained from the Institutional Review Board of University of Occupational and Environmental Health, Fukuoka, Japan. The following information was extracted for each patient: sex, age, use of ambulance, comorbidities at admission, use of transfusion, mortality and therapeutic procedures related to renal trauma. AE failure was defined as requirement for subsequent therapy, which suggests a failure to control bleeding, urine leakage or other undefined problems. We also obtained the mechanism of injury (blunt or penetrating) and the Abbreviated Injury Scale (AIS, 1998) at the abdomen, both of which were voluntary items. AIS is a component of the Injury Severity Score, which is an anatomical scoring system developed for quick evaluation of multiple injuries and critical care. AIS is an ordinal scale ranging from 1 (minor injury) to 6 (non-survival injury).[7–9]

Descriptive and statistical analysis

The patients were divided into two groups according to the range of "severe trauma": in group A, "severe trauma" was restricted to the ribs, abdomen, and/or pelvis; in group B, "severe trauma" ranged from the supradiaphragmatic region to the lower extremities. "Severe trauma" was defined as corresponding to the ICD-10 code of bone fractures, organ injury, open wound, crushing injury and traumatic amputation of a body part (Appendix I). We then calculated the incidence of coincidence of abdominal and pelvic trauma with and without a comorbid rib fracture. Furthermore, among the cases with abdominal AIS scores of 3 (severe injury) or more, we compared the AE failure rate between level I trauma centers and lower-level centers. Finally, the incidences of renal trauma and traumatically imperative nephrectomy were calculated by a person-year method.

Univariate comparisons of each variable were carried our using the χ^2-test. The threshold for significance was $P < 0.05$. All P-values and 95% CI were calculated using PASW version 18.0 (SPSS, Chicago, IL, USA).

Results

Among the 8.42 million inpatients in the study population, 1505 with renal trauma were identified. Table 1 shows the comorbidities, therapeutic procedures and clinical characteristics of renal trauma patients. Males accounted for 72%, and the median age was 41 years (range 0–96 years). Patients in group B required longer hospital stays, more frequently injured other organs, and had higher transfusion rates and mortality than did patients in group A. Overall, renal trauma patients had another trauma in an abdominal organ at the rate of 15.8% in group A and 37.5% in group B ($P < 0.001$). AE was more frequently required in group B (7.9% in group A and 17.8% in group B, $P < 0.001$), and no significant differences were observed in their failure rates (12.5% and 11.9%, respectively; $P = 0.907$) or nephrectomy rates (3.3% and 2.6%, respectively; $P = 0.521$). Considering only ambulance users ($n = 792$), the overall rates of AE, nephrectomy and mortality increased to 17.6%, 4.4% and 5.5%, respectively. Information about mechanisms of renal trauma was available from 320 patients. Blunt and penetrating injuries were assigned to 304 (95%) and 16 (5%) patients, respectively.

In Table 2, we considered a rib fracture to be a predictor of coincident organ injury. If a rib fracture was present, risks of coincident traumas of the liver and spleen, and fractures of lumbar and pelvic bones were observed 2.23 (95% CI, 1.72–2.89), 2.34 (1.64–3.33), 2.45 (1.75–3.42) and 2.74 (1.85–4.05) times higher, respectively.

Figure 1 shows therapeutic trends for renal trauma. A total of 46 nephrectomies were carried out, and their previous procedures were one AE ($n = 10$), two AE ($n = 1$), open repair ($n = 1$) and no treatment ($n = 34$). Interval dates between previous intervention and nephrectomy were 0 ($n = 9$), 1 ($n = 2$) and 7 ($n = 1$) days. Among 230 patients who underwent AE, 177 (76.9%) underwent the first intervention on the hospitalization day, and 37 (16.0%) underwent the first intervention the next day. Two patients underwent arteriovenous fistula constructions for hemapheresis.

AIS was obtained from 52 patients who underwent AE, and 47 were assigned an AIS of 3 or more. Among these 47 patients, AE failure occurred in two of 40 (5.0%) in level I trauma centers, and in two of seven (28.5%) in lower-level hospitals ($P = 0.046$).

To estimate the incidence of renal trauma, we first calculated the presumable cohort population in the present study.

Table 1 Characteristics of patients with renal trauma

Trauma range	Rib, Abdomen and pelvis (group A)	More extended (group B)
Total	1014	491
Median age, years (range)	41 (2–96)	42 (0–96)
Median length of stay, days (IQR)	11 (7–18)	19 (11–35)
Male (%)	719 (70.9)	366 (74.5)
Ambulance use (%)	397 (39.2)	395 (80.4)
Trauma (%)		
Rib fracture†	109 (10.7)	265 (54.0)
Overall abdominal organs	160 (15.8)	184 (37.5)
Liver	75 (7.4)	118 (24.0)
Spleen	57 (5.6)	55 (11.2)
Pancreas	14 (1.4)	6 (1.2)
Stomach or bowel	11 (1.1)	10 (2.0)
Abdominal vessel	4 (0.4)	15 (3.1)
Pelvic organs	16 (1.6)	14 (2.9)
Lumbar or pelvic fracture	52 (5.1)	86 (17.5)
Transfusion (%)	158 (15.6)	139 (28.3)
Mortality (%)	11 (1.1)	40 (8.1)
Intervention (%)		
AE	80 (7.9)	84 (17.1)
AE failure‡	10 (12.5)	10 (11.9)
Open repair	16 (1.6)	7 (1.4)
Nephrectomy	33 (3.3)	13 (2.6)

†Rib fractures included intrathoracic severe traumas. (S223–5, S25.x–28.x.) ‡AE failure was defined as a requirement of subsequent therapy. The proportion was expressed as a percentage of total AE.

Table 2 Risk rate ratios of other organ trauma with versus without rib fracture

	Rib fracture		RR (95%CI)
	No	Yes	
Total	1131	374	
Liver (%)	111 (9.8)	82 (21.9)	2.23 (1.72–2.89)
Spleen (%)	63 (5.6)	49 (13.1)	2.34 (1.64–3.33)
Lumber fracture (%)	68 (6.0)	55 (14.7)	2.45 (1.75–3.42)
Pelvic fracture (%)	49 (4.3)	44 (11.8)	2.74 (1.85–4.05)
Other abdominal or pelvic trauma (%)	86 (7.6)	41 (11.0)	1.45 (1.01–2.06)

We utilized the DPC database to collect inpatient data for 6 months of each year, and coverage rates (pi) were 27.4%, 44.2%, and 42.7% of all acute hospitalizations in 2006, 2007, and 2008, respectively. According to National Census data[10] the general population in Japan (Ni) is was 127.7, 127.7, and 127.6 million in 2006, 2007, and 2008, respectively. Therefore, a presumable general population cohort ($\Sigma[Ni \times pi/2]$) was 72.9 million person-years. The incidences of renal trauma and traumatic nephrectomy (per 100 000 person-years) were then estimated as 2.06 (95% CI, 1.95–2.16) and 0.063 (0.044–0.081), respectively.

Discussion

We showed today's characteristics and therapeutic trends of renal trauma using a large population based database. First, we found that rib fracture was associated with higher occurrences of coincident liver and spleen trauma (rate ratios of 2.23 and 2.35, respectively). Higher risk for spleen than liver trauma is a rationale in the consideration of a longer distance between the right kidney and the ribs, than between the left kidney and the ribs. This tendency mirrors published reports by Shweiki *et al.* who examined 476 cases and showed that

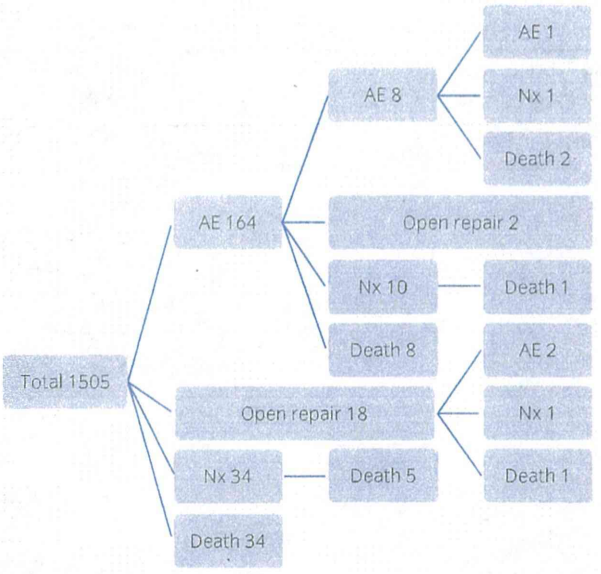

Fig. 1 Repeated procedures undergone by patients with renal trauma.

the odds ratios of liver and spleen trauma in the presence of any low rib fracture were 2.11 and 2.42, respectively.[11]

We also clarified today's therapeutic trend. Overall, 89% of all cases underwent no intervention. In general, conservative management for renal trauma is widely used today, and it is reported that most grade I and II, and stable parenchymal grade III and IV injuries were managed without any interventions.[2,12]

In contrast, nephrectomy was carried out in 3.1% of all patients with renal trauma and 6.7% of patients initially undergoing AE. This shows that timely nephrectomy remains an important last resort despite the fact that AE has advanced. Nephrectomy rates vary widely among countries. For example, Dobrowolski *et al.* reported that the rate of 73% in Poland was much higher than that of 11.3% in the USA.[13] He stated that this difference might be affected by hospital access, availability of computed tomography with contrast medium, and other social factors, such as traffic accident frequency and gun regulation. Kuan *et al.*[7] reviewed 8465 cases of renal trauma in the National Trauma Data Bank of the USA between 1994 and 2003, and mentioned that the nephrectomy rate and mortality were 7.3% and 11.3%, respectively, which were higher than the present study, and that blunt mechanisms represented 81.4% of cases, which was lower than the present. Besides racial variants and differences in database backgrounds, we infer that social factors play an important role in this discrepancy. In developed countries, traffic accidents could account for many renal traumas besides falls.[3] Traffic accident fatalities per 100 000 population are 11.01 and 3.85 in the USA[14] and Japan,[15] respectively. Guns are strictly regulated in Japan, and in the present study, only one case had trauma related to gunshot.

The AE performance difference is also interesting. From the USA, Hotaling *et al.* showed that among grade IV and V renal trauma cases, level I trauma centers achieved a significantly higher diagnostic angiography success rate than those of other hospitals.[1] In the present study, we attempted a similar analysis by using the AIS score as a severity indicator; however, few cases involved the AIS, especially those in the lower-level emergency hospitals. Although level I trauma centers barely achieved a favorable result ($P = 0.046$), further data accumulation is required.

Incidences of renal trauma and traumatic nephrectomy in Japan were 2.06 and 0.063 per 100 000 person-years, respectively. This is useful information, especially for people who have only a single kidney or who face selecting either nephrectomy or renal-sparing surgery for urological malignancy. Although the associated life expectancy is >20 years, physicians could explain the traumatic nephrectomy risk as <0.002%. Of course, however, renal failure derived from chronic kidney disease is a separate issue. After the nephrectomies, arteriovenous fistula for hemapheresis were required in two patients (0.13% overall and 0.25% in ambulance users). Another report from the USA[7] stated that dialysis was required in 0.46% of cases (perhaps including transit dialysis), which is unlikely to make much of a difference to the present study.

There were several limitations in the present study. Because the definition of trauma is completely subjective to the doctor's judgment, and comorbidity/complication lists were limited to up to four diagnoses, an underestimation of comorbidities or complications could have occurred. Especially in life-threatening cases, diagnoses with less critical priority might be unlikely to be reported. Furthermore, the present study focused on inpatient cases only, and consequently there might be a sample bias toward patients who are more seriously ill. Furthermore, because critically traumatized patients are likely to be transported to large hospitals, and because there is a bias toward large hospitals in the DPC database,[16,17] the calculation could be an overestimation. Finally, several important clinical parameters, such as causes of trauma, renal trauma grading and laboratory or imaging test results, were not recorded in the database. Despite these limitations, using the nationwide database enabled us to show today's therapeutic trends of renal trauma based on real-world data.

We showed that angioembolization failure is not rare and that nephrectomy is still an effective last resort. Patients with a comorbid rib fracture should be carefully examined for coincident organ trauma.

Conflict of interest

None declared.

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Appendix I

ICD-10 definition of "severe trauma"

Region	
Supradiaphragm (including upper extremities)	S02.x, S04–9.x, S11.x, S12.x, S14.x, S15.x, S17–9.x, S21.x, S22.0–5, S22.5, S22.8, S22.9, S24–9.x, S41.x, S42.x, S47–9.x, S51.x, S52.x, S57-9.x, S61.x, S62.x, S67–9.x
Overall abdominal organs	S36.x
Liver	S36.1
Spleen	S36.3
Pancreas	S36.2
Stomach or bowel	S36.4–7
Abdominal vessel	S35.0–3, S35.5, S35.7–9
Pelvic organs	S37.1–9, S38.x, S39.x
Lumbar fracture	S32.0, S32.7, S32.8
Pelvic fracture	S32.1, S32.3–5, S32.7. S32.8
Low extremities	S71.x, S72.x, S77–9.x, S81.x, S82.x, S87–9.x, S91.x, S92.x, S97–9.x
Multiple or unspecified regions	T01.x, T02.x, T04–6.x, T09.1, T09.2–6, T09.8, T09.9, T11.0–6.x, T11.8, T11.9, T13.0–6, T13.8–4.9

BJUI
BJU INTERNATIONAL

Assessment of lower urinary tract symptoms in men by international prostate symptom score and core lower urinary tract symptom score

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Study Type – Therapy (symptom prevalence)
Level of Evidence 2a

What's known on the subject? and What does the study add?
The International Prostate Symptom Score (IPSS) has been most commonly used for the symptom assessment of men with lower urinary tract symptoms (LUTS). However, LUTS in men are so variable that they may not be fully captured by the IPSS questionnaire alone. This study has demonstrated that the Core Lower Urinary Tract Symptom Score (CLSS) questionnaire, which addresses 10 important symptoms, is an appropriate initial assessment tool for LUTS in men with various diseases/conditions.

OBJECTIVE

- International Prostate Symptom Score (IPSS) has been commonly used to assess lower urinary tract symptoms (LUTS). We have recently developed Core Lower Urinary Tract Symptom Score (CLSS). *The aim of this study is to compare IPSS and CLSS for assessing LUTS in men.*

PATIENTS AND METHODS

- Consecutive *515* men fulfilled IPSS and CLSS questionnaires.
- IPSS QOL Index was used as the QOL surrogate.
- The clinical diagnoses were BPH ($n = 116$), BPH with OAB wet ($n = 80$), prostate cancer ($n = 128$), prostatitis ($n = 68$), underactive bladder ($n = 8$), others ($n = 72$), and controls (e.g., occult blood) ($n = 42$).
- Simple statistics and predictability of poor QOL (QOL Index 4 or greater) were examined.

RESULTS

- All symptom scores were significantly increased in symptomatic men compared with controls. Scores of corresponding symptoms of two questionnaires were significantly correlated ($r = 0.58$–0.85, all $P < 0.0001$).
- A multivariate regression model to predict poor QOL indicated *nine* symptoms (daytime frequency, nocturia, urgency, urgency incontinence, *slow stream*, straining, incomplete emptying, bladder pain and urethral pain) as independent factors.
- The hazard ratios for bladder pain (*2.2*) and urgency incontinence (*2.0*) were among the highest.
- All the nine symptoms are addressed in CLSS, while three symptoms (urgency incontinence, bladder, and urethral pain) are dismissed in IPSS.

CONCLUSION

- CLSS questionnaire is more comprehensive than IPSS questionnaire for symptom assessment of men with various diseases/conditions, although both questionnaires can capture LUTS with possible negative impact on QOL.

KEYWORDS

LUTS, assessment, CLSS, IPSS, BPH

INTRODUCTION

Assessment of LUTS is highly important in the diagnosis and treatment of lower urinary tract dysfunction. The IPSS would be most commonly used as the assessment tool for men with BPH, overactive bladder (OAB), and after radical prostatectomy and prostatic radiotherapy [1–5]. However, LUTS associated with these conditions are so variable that they may not be fully captured by the IPSS questionnaire alone. For example, men with BPH or prostate cancer undergoing radiotherapy often have LUTS such as urgency, urgency incontinence and lower abdominal pain [5] although none of these symptoms are addressed by the IPSS questionnaire [1]. For this reason, a more comprehensive assessment tool is needed for the precise appraisal of LUTS in men. The International Consultation on Incontinence Questionnaire for Male LUTS (ICIQ-MLUTS) is designed to assess a variety of LUTS in men in a non-disease-specific

Age (year)	67.7 ± 11.1*
Serum PSA (ng/mL) (n = 397)	5.9 ± 16.9*
Prostate volume (mL) (n = 319)	31.5 ± 21.8*
Uroflowmetry (n = 178)	
Voiding volume (mL)	222 ± 148.4*
Peak flow rate (mL/s)	15.1 ± 24.3*
Residual volume (mL)	66.7 ± 136.1*
Diagnostic group	
BPH	116
BPH with OAB	80
Prostate cancer	128
T2N0M0	85
T3N0M0	27
M1	16
After radical prostatectomy	43
Androgen deprivation therapy	76
After radiotherapy	4
Others	9
Prostatitis	68
Type I	12
Type II	10
Type III	8
Type IV	38
Underactive bladder	8
Others	72
Control	42

TABLE 1
Characteristics of the study subjects (N = 515)

**Means ± SD. PSA, prostate-specific antigen; BPH, benign prostatic hyperplasia; OAB, overactive bladder.*

manner [6]. Unfortunately, this questionnaire is practically too extensive and does not address pain symptoms; a simpler and more appropriate questionnaire is desirable for the clinical practice.

Recently we have developed the Core LUTS Score (CLSS) questionnaire for core or important symptoms in various pathological conditions [7]. The CLSS questionnaire addresses 10 important symptoms selected from 25 symptoms defined by the ICS standardization committee (Table 2). These 10 symptoms were chosen as the most influential three symptoms by more than one-quarter of patients of nine common conditions/diseases [7]. This characterizes the CLSS questionnaire as an overall or non-disease-specific symptom assessment tool with possible multiple dimensions. The CLSS questionnaire has been confirmed for validity and reliability in male and female subjects [7]. In addition, the CLSS questionnaire can be user-friendly for patients because of the simplicity of its question wording and response scale. Here, we compared the IPSS questionnaire and the CLSS questionnaire for the assessment of LUTS in men.

PATIENTS AND METHODS

The study was approved by our institutional ethical committee. In all, 515 consecutive treatment-naive men who visited our hospital, a tertiary referral institution, for urological conditions between April 2009 and April 2010, were enrolled (Table 1). The subjects, aged from 14 to 91 years (mean 67.7 ± 11.1 years), were divided into disease groups by routine urological examinations: BPH (n = 116), BPH with OAB (n = 80), prostate cancer (n = 128), prostatitis (type I: n = 12, II: n = 10, III: n = 8, IV: n = 38), underactive bladder (n = 8), and others (n = 72). Men from the control group (n = 42) were subjectively free of LUTS and comprised occult blood (n = 35), retroperitoneal fibrosis (n = 4) and non-functioning adrenal tumour (n = 3). Patients with BPH with urgency incontinence were regarded as BPH with OAB. Men with high serum levels of PSA underwent a prostate biopsy to exclude cancer and questionnaire data from before the biopsy were used for analysis.

The subjects were asked to response to two self-administered questionnaires for IPSS and CLSS on the same occasion.

The IPSS questionnaire comprises seven questions on LUTS (incomplete emptying, frequency, intermittency, urgency, weak stream, straining and nocturia) and an additional question to yield quality of life (QoL) index, which was scored from 0 (delighted) to 6 (terrible) and used as the QoL surrogate in this study. The CLSS questionnaire addresses 10 symptoms: daytime frequency, nocturia, urgency, urgency incontinence, stress incontinence, slow stream, straining, incomplete emptying, bladder pain and urethral pain [7]. Voiding frequency was scored as follows: 0 (fewer than seven times), 1 (8–9 times), 2 (10–14 times), 3 (15 times or more) for the day time, and 0 (never), 1 (once), 2 (two or three times), and 3 (four or more times) for the night time. Other symptoms were scored according to the frequency of episode (0–3) (Table 2). These symptoms were chosen from 25 types of LUTS as the most influential three symptoms using 1000 symptomatic individuals. The CLSS questionnaire further inquires into the single symptom (the single core symptom or the chief complaint) that the patients considered to have the most significant impact on daily life.

Difference in the symptom scores by clinical characteristics was analysed using the Wilcoxon rank sum test or chi-squared test. Correlations between the scores were evaluated by Spearman rank correlation coefficients. A multivariate regression model was used to identify symptoms predicting the poor QoL (QOL index score 4 or more). We used STATVIEW 5.0 software (SAS Institute, Cary, NC, USA) and regarded $P < 0.05$ as statistically significant.

RESULTS

Men with any diseases/conditions had significantly higher scores than the controls for all the symptoms examined ($P < 0.05$). For example, positive (score ≥1) rates in patients with BPH and patients with prostate cancer were significantly higher than in controls for all symptoms of CLSS (Fig. 1; top panel). Urgency incontinence, stress incontinence, bladder pain and urethral pain, which are not addressed in the IPSS questionnaire, also had higher positive rates in BPH and prostate cancer. Notably, 23% of men with BPH (27/116),

16% of men with BPH with OAB (13/80), and 15% of men with prostate cancer (19/128) experienced bladder/urethral pain to some extent.

The correlation between the corresponding symptoms of IPSS and CLSS is shown in Table 2. Spearman rank correlation coefficients (r) were 0.58 to 0.85 for all IPSS symptoms (all, $P < 0.001$) excepting interruption, which is not included in the CLSS. The total score of CLSS was significantly related to the total of IPSS (0.81; $P < 0.001$).

The single core symptom, the most influential symptom, was incomplete emptying (25.2%) in BPH followed by nocturia (20.9%), slow stream (15.6%) and urgency (9.6%), and was nocturia (23.7%), followed by urgency incontinence (22.5%) and urgency (20%), in BPH with OAB (Fig. 1; bottom panel). Men with prostate cancer complained of urgency (17.1%) most often, followed by urgency incontinence (10.9%), nocturia (10.6%), slow stream (10.1%) and stress incontinence (5.4%).

The QoL Index was significantly higher in all disease groups than in controls ($P < 0.001$). The poor QoL, which was defined as QoL Index of 4 (mostly dissatisfied) and over, had no significant relationship with clinical parameters, such as age, prostate volume, serum PSA levels, voiding volume and residual urine (data not shown) except for peak flow rate; peak flow rate under the median (11.9 mL/s) was correlated with poor QoL (hazard ratio; 2.0, $P = 0.04$).

By contrast the poor QoL significantly correlated with all symptom scores of two questionnaires ($P < 0.001$) (Table 3). The multivariate analysis identified nine symptoms as the independent factor to predict poor QoL; that is, daytime frequency, nocturia, urgency, urgency incontinence, slow stream, straining, incomplete emptying, bladder pain and urethral pain (Table 3). The hazard ratio was highest for bladder pain (2.2) followed by urgency incontinence (2.0). All nine symptoms are addressed in CLSS. The IPSS questionnaire, however, dismisses urgency incontinence, bladder pain and urethral pain. Interruption, which is embraced in the IPSS questionnaire alone, was not an independent factor.

Parameter	Spearman's correlation coefficient
Daytime frequency	0.58*
Nocturia	0.85*
Urgency	0.61*
Urgency incontinence†	–
Stress incontinence†	–
Slow stream	0.72*
Straining	0.67*
Interruption‡	–
Incomplete emptying	0.79*
Bladder pain†	–
Urethral pain†	–
Total score	0.81*

*CLSS, Core lower urinary tract symptom score; IPSS, International Prostate symptom score. *Spearman's correlation coefficient with CLSS: $P < 0.001$ for all correlations. †Not addressed in IPSS. ‡Not addressed in CLSS.*

TABLE 2
Correlation between CLSS and IPSS of corresponding symptom scores (N = 515)

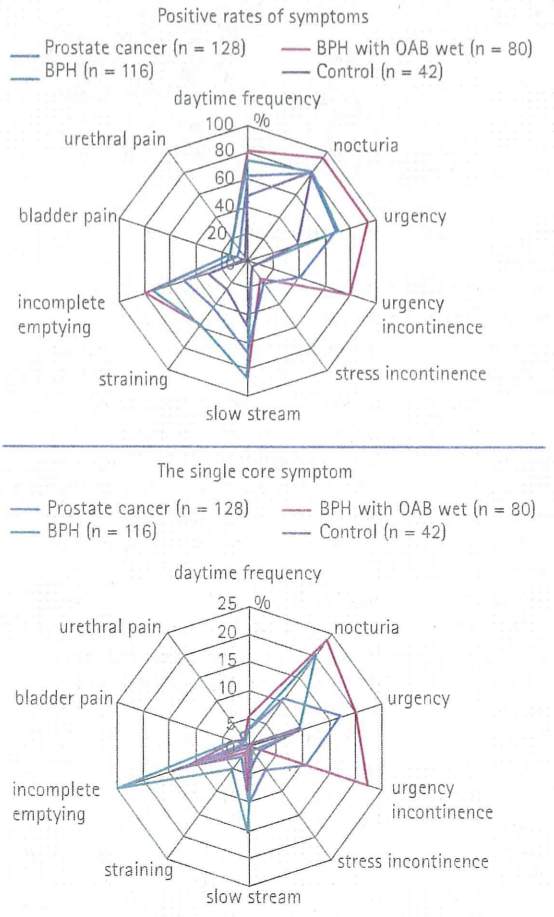

FIG. 1.
Positive rates of symptoms (top) and the single core symptom (bottom) in men with benign prostate hyperplasia (BPH) and prostate cancer. Top panel: positive (score ≥ 1) rates were significantly higher in men with BPH and prostate cancer than controls for all the symptoms addressed by the Core LUTS Score (CLSS). Urgency incontinence, stress incontinence, bladder pain, and urethral pain, which are not included in the International Prostate Symptom Score (IPSS) questionnaire, also showed higher positive rates. Lower panel: the single core symptom, the most influential symptom, was incomplete emptying (25.2%) in BPH, nocturia (23.7%) in BPH with overactive bladder (OAB) and urgency (17.1%) in prostate cancer.

DISCUSSION

Assessment of LUTS is indispensable for physicians to make the accurate diagnosis, treatment selection and efficacy evaluation in lower urinary tract disorders. For men complaining of LUTS the IPSS questionnaire has often been used as the symptom