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Prevalence of frailty syndrome in urological patients undergoing major elective surgical procedure due to malignancy

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Introduction The group of elderly urological patients is growing. A majority of urological operations is performed in this group. The current model of preoperative assessment is developed to be effective in younger groups of patients but not in the elderly. Frailty syndrome has been confirmed to be an effective risk stratification tool in many surgical settings. It can be diagnosed using a variety of screening tools, but the only objective tool is comprehensive geriatric assessment (CGA). However it is time consuming, difficult and to our best knowledge, has not been attempted in Polish urological patients.

Material and methods We assessed the prevalence of frailty in elderly urological patients undergoing surgery due to malignancy using CGA and screening tests. A total of 68 patients over 65 years of age qualified to elective major urological surgery underwent the preoperative assessment including use of traditional tools (medical history, physical examination, ASA score), CGA and frailty-screening tests. The 30-day postoperative complications rate using the Clavien-Dindo scale was also evaluated.

Results The mean age of patients was 71 years. The most common procedures were radical prostatectomy (47.1%), radical nephrectomy (36.6%) and radical cystectomy (11.8%). The prevalence of frailty was 39.7% using CGA and 4.4–10.3% using screening tests. The complication rate was significantly higher in frail individuals when using CGA.

Conclusions Frailty is common in urological elderly patients. The CGA is a time-consuming but reliable tool to diagnose frailty syndrome and predict complications. Screening tests can be useful for selecting patients who should undergo CGA but their predictive value is low.

Key Words: urology ‹› surgery ‹› elderly ‹› geriatric assessment

INTRODUCTION

The population of elderly patients is constantly growing. They form a heterogeneous group with diminished biological reserves [1]. More than 50% of patients undergoing urological surgery due to malignancy are over 65 years of age [2]. Currently, there is no widely accepted system designed to qualify elderly patients for surgical treatment. First impression and assessment of health status based on doctor`s experience is the most common method of life expectancy estimation [3]. This routine preoperative assessment of older patients does not provide the full data needed to choose optimal management because the tools traditionally used in preoperative setting such as medical history

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taking, physical examination, American Society of Anaesthesiology (ASA), Eastern Cooperative Oncology Group scale (ECOG) and laboratory tests are based on already diagnosed conditions and are designed to be accurate in younger patients. Some elderly patients present with frailty syndrome, as understood to be a state of low resistance to external stressors. It may result in an increased risk of adverse outcomes of surgical treatment, including urological procedures [3, 4, 5].

Recently, frailty syndrome became a point of growing interest for surgically oriented clinicians including urologists, mainly as a complications risk stratification tool, but also as a red flag suggesting a need of performing more detailed geriatric assessment pointing to a specifically designed intervention [6]. The prevalence of frailty syndrome in urological patients is not strictly defined and varies according to the methods used in recently published studies.

The comprehensive geriatric assessment (CGA) remains the only objective tool to diagnose frailty syndrome [1], however in available literature, the screening tests for frailty were predominantly used. Thus the main purpose of this study was to estimate the prevalence of frailty syndrome among elderly urological patients undergoing an elective surgery due to malignancy using screening tests and CGA.

MATERIAL AND METHODS

We performed a detailed preoperative assessment of 68 consecutive patients over 65 years of age, qualified to one of the major elective urological surgeries (radical cystectomy, radical prostatectomy, radical nephrectomy, nephron-sparing surgery or nephroureterectomy) due to malignancy in one large oncology-oriented urological ward. The Ethics Committee approved this study and informed consent was obtained from all patients. All patients agreed to participate in this study. Patients were evaluated with traditional tools – medical history taking, physical examination, laboratory tests (blood count, coagulation profile, hepatic and renal profile, electrolytes, urinalysis), medical imaging (chest X-ray, computed tomography/magnetic resonance imaging) ASA, ECOG, and CCI (Charlson Comorbidity Index) scores. ASA score was assessed by experienced anesthesiologists in an outpatient setting. ECOG was assessed with use of medical history and observation. CCI was assessed on the basis of careful study of medical documentation and was adjusted based on the age of the patient.

The presence of frailty syndrome was assessed after admission to the urological ward, between 1 p.m. and 4 p.m. the day before the planned surgery in a separate, large room by a doctor well trained in geriatric assessment and an experienced urological surgeon. Patients were assessed by observation (urological surgeon), a variety of validated screening tests [Geriatric 8 (G8), Vulnerable Elders 13 (VES-13), Fried frailty screening test] developed for quick and easy detection of frailty and a reference method – the Comprehensive Geriatric Assessment (CGA), which was administered by a doctor trained in CGA. Patients were also asked for self-assessment of their health status using a numeric scale where 1 was the worst and 10 was the best. The CGA included validated tools such as: Activities of Daily Living (ADL) [7], Instrumental Activities of Daily Living (IADL) [8], the Blessed Orientation-Memory-Concentration (BOMC) Test [9], the Clock Drawing Test (CDT) [10], the Folstein Mini-Mental State Examination (MMSE) [11], the Charlson Comorbidity Scale (CCS) [12], the Geriatric Depression Scale (GDS) [13], the Timed Up and Go (TUG) [14], the mini nutritional assessment (MNA) [15], and the assessment of polypharmacy as a number of medications taken daily. The complete geriatric assessment took 45–70 minutes and consisted of questions, mental tasks, physical exercise, measurements and detailed medical history analysis which are included in the above-mentioned CGA tools which allow to investigate the different CGA domains: medical, functional, cognitive, psychological, socioeconomic, and environmental conditions. The data were collected using an electronic device with a password-protected application on a database, which was accessible only to the authors of the article.

We used the cumulative deficit model of frailty and the basic set of CGA domains which consisted of the ADL/IADL, the GDS, the BOMC/CDT, following the definition formulated by the International Society of Geriatric Oncology (SIOG). Based on the prior published literature, the detection of deficits in two or more CGA domains was used as the cut-off score for frailty [16]. We assessed the 30-day postoperative complications rate using the Clavien-Dindo scale and a score of 3 or more was considered as a major complication. The data were analyzed using Statistica 10.0 software (StatSoft, Cracow, Poland).

RESULTS

The study sample comprised of 68 patients (7 female and 61 male) with a mean age of 71 ±4.5 (range 65–82) years, who qualified for urological cancer surgery. The most common procedure was radical prostatectomy, which comprised over 32% of the cases, followed by nephron-sparing surgery, radical ne-

Table 1. *Baseline characteristics of patients*

Factor	Study population
Number (female/male ratio) [n]	68 (7/61)
Mean age [years ±SD (range)]	71 ±4.5 (65–82)
Age 65–74/75–84/85+ [n]	52/16/0
Type of procedure [n (%)]:	
Radical cystectomy	8 (11.8%)
Radical prostatectomy	32 (47.1%)
Radical nephrectomy	12 (17.5%)
Nephron-sparing surgery	13 (19.1%)
Other	3 (4.4%)
Laboratory results [mean ±SD]:	
Haemoglobin (g/dl)	13.7 ±1.8
Creatinine (µmol/l])	102.5 ±29.9
White blood cells (x10^3/µl)	7.52 ±1.1
Clinical cancer stage [n (%)]:	
Localized	51 (75%)
Locally advanced	17 (25%)
Metastatic	0 (0%)

n – number; SD – standard deviation

Table 2. *The prevalence of frailty syndrome*

Method of assessment	Study population
Detailed geriatric assessment [n (%)]:	
CGA	27 (39.7 %)
Screenieng tests [n (%)]:	
G8	7 (10.3%)
VES-13	3 (4.4%)
Fried frailty	3 (4.4%)

CGA – comprehensive geriatric assessment; G8 – Geriatric 8; VES-13 – Vulnerable Elders; n – number

Table 3. *Elements of geriatric assessment together with the proportion of patients with abnormal test results*

TEST	Number [n] (%)	TEST	Number [n] (%)
ADL (cut-off score <5)		IADL (cut-off score ≤7)	
Dependent	0 (0%)	Dependent	13 (17%)
MNA screening (cut-off score <12)		TUG (cut-off score ≥15 s)	
Malnutrition	25 (37%)	≥15 s	7 (10%)
CCS (cut-off score ≥3)		CCS (cut-off score ≥3)	
≥3	6 (9%)	≥1	36 (53%)
BOMC (cut-off score >10)		CDT-test (cut-off score >3)	
Impaired	10 (15%)	Impaired	21 (31%)
ASA (cut-off score >2)		GDS (cut-off score >5)	
Abnormal	6 (9%)	Depressed	6 (9%)
ECOG (cut-off score ≥2)		Polypharmacy (cut-off score >5)	
Abnormal	2 (3%)	>5 drugs/day	17 (25%)

ADL – activities of daily living; IADL – instrumental activities of daily living; BOMC – Blessed Orientation-Memory-Concentration Test; CDT-test – Clock Drawing Test; CCS – Charlson Comorbidity Scale; GDS – Geriatric Depression Scale; TUG – Timed Up and Go; MNA – mini nutritional assessment screening; ECOG – Eastern Cooperative Oncology Group performance status; ASA – American Society of Anesthesiologists; n – number

phrectomy and radical cystectomy. The clinical cancer stage was localized in 75% and locally advanced in 25% of patients. The detailed baseline characteristics of the patients are shown in Table 1. Almost half of patients had comorbidities, but only 9% had CCS ≥3. Polypharmacy with the daily use of 5 or more medications was present in 25% but 16% of patients were not taking any medication. The overall prevalence of frailty of 39.7% was found in CGA assessment, but only of 4.4–10.3% using screening tests alone (Table 2).

The elements of geriatric assessment together with the proportion of patients with abnormal test results are presented in Table 3. The positive and negative predictive values of used screening tests with CGA as a reference method are presented

Table 4. *The positive and negative predictive values of CGA and screening tests, ASA and CCI*

Method of assessment	PPV	NPV
Detailed geriatric assessment [n (%)]:		
CGA	100%	100%
Screening tests [n (%)]:		
G8	26%	67%
VES-13	11%	63%
Fried frailty	11%	63%

PPV – positive predictive value; NPV – negative predictive value; CGA – comprehensive geriatric assessment; G8 – Geriatric 8; VES-13 – Vulnerable Elders 13; n – number

Table 5. *The rate of all complications and major complications in frail and non-frail patients depending on frailty assessment tool*

Frailty assessment tool	All complications: (n = 30)	Major complications (n = 4)
CGA		
frail [n (%)]	17 (57%)	4 (100%)
non-frail [n (%)]	13 (43%)	0 (0%)
	p = 0.01	p = 0.04
	(chi- squared test)	(Yates's chi-squared test)
VES-13		
frail [n (%)]	2 (7%)	1 (25%)
non-frail [n (%)]	28 (93%)	3 (75%)
	p = 0.83	p = 0.42
	(Yates's chi-squared test)	(Yates's chi-squared test)
G8		
frail [n (%)]	2 (7%)	1 (25%)
non-frail[n (%)]	28 (93%)	3 (75%)
	p = 0.64	p = 0.88
	(Yates's chi-squared test)	(Yates's chi-squared test)
Fried frailty	1 (3%)	1 (25%)
frail [n (%)]	29 (97%)	3 (75%)
non-frail [n (%)]	p = 0.83	p = 0.42
	(Yates's chi-squared test)	(Yates's chi-squared test)

CGA – comprehensive geriatric assessment; G8 – Geriatric 8; VES-13 – Vulnerable Elders 13; n – number

in Table 4. The prevalence of frailty increased with age [p = 0.015 (ANOVA test)]. The evaluation of the presence of frailty by experienced urologists was inaccurate [(p = 0.168 (chi-squared test)]. The presence of frailty syndrome correlated with all complications and major complications rate only when frailty was assessed with CGA (Table 5).

DISCUSSION

The population of elderly people in Poland will double in the next 15 years, reaching 30–35% [17]. Today, more than half of cancer surgeries, including urological procedures, are performed in this group. Therefore, urologists will increasingly have to face difficulties in management of elderly patients [18]. The question whether to operate or not is crucial in elderly uro-oncological patients due to possible toxicity of treatment, postoperative complications and further quality of life. The decision making should be based on patients' expectations, but also on risk stratification.

Preoperative assessment model

The commonly used preoperative risk assessment tools are medical history taking (sometimes presented with the use of CCI), ECOG, ASA and expected further lifetime. It is worth mentioning that the metrical age, especially in older patients, should not be considered as the biological age – however estimation of metrical age is easy and obvious, while a doctor`s ability to estimate biological age is very limited. Despite the availability of many other tools, the most common method of estimation of life expectancy remains eyeballing and physician's intuition [19]. In 2005 Wilson et al. [20] showed that estimation of patient's life-expectancy among urologists and oncologists is limited; the accuracy of the assessment was based mainly on the physician's experience and the chances of a 10-year survival generally were underestimated, so up to 34% of patients would not receive optimal treatment because of a too pessimistic prognosis. Schwartz et al. [21] in 2003 showed the impact of age on suboptimal treatment of prostate cancer reaching 47–73% of patients aged 70 or older while in all subjects it was 14%. The CCI, ECOG and ASA score are based on already diagnosed conditions and the experience of a doctor does not include evaluation of subclinical conditions and are designed to be accurate in younger patients. Aronson et al. [22] showed a tendency to overestimation of preoperative risk by physicians assessing ASA score and high inter-observer variability. The fact that a metrical age should no longer be the basis for therapeutic decision-making in elderly patients is confirmed in the recommendation of SIOG which classifies men into 4 groups, as follows: 'healthy', 'vulnerable', 'frail', and 'terminal'. 'Healthy' and 'vulnerable' men should receive the standard treatment, regardless of metrical age and frail patients should undergo a broader geriatric assessment [23, 24]. Although the assessment of 'healthy' and 'terminal' status seems to be obvious, in order to recognize the 'frail' and 'vulnerable' groups of elderly patients, more specific tools are needed. This was confirmed by the results of our study – experienced urologists were generally unable to correctly recgonize frail patients. Surprisingly, patients were significantly accurate in the estimation of their own health status – the prevalence of frailty increased with decreasing rating.

Frailty syndrome

Frailty syndrome is a concept introduced by geriatricians that identifies vulnerable patients at increased risk for falls, hospitalizations and death. The prevalence of frailty increase with age [25]. In numerous studies, screening for frailty was superior to traditional preoperative assessment tools in predicting complications, so frailty syndrome became a broadly accepted risk factor of poor surgical outcomes in many surgical settings [26, 27]. The golden standard in diagnosing frailty is detailed geriatric assessment (GA), however, many attempts to use a variety of screening tests have been made. The heterogeneity of methods used and the many modifications of existing frailty screening tests make comparisons of the available literature difficult. However, the searching for 'perfect' screening test is understandable and to some point justified because GA is time consuming – full assessment takes 1–1.5 hours- and should be performed by a well-trained physician [1]. Nowadays, GA seems not to be necessary in all elderly patients, and the role of screening tests is to indicate patients requiring broader geriatric assessment [28, 29]. Despite the literature on GA in elderly patients growing among several surgical disciplines [1, 30–33], the aims and methods used are very heterogeneous and it is difficult to make any broader comparisons. However, frailty seems to be a promising and strong predictor of postoperative complications [27]. Revening et al. [34] screened for frailty 80 patients qualified to minimally invasive urological surgery. A total of 16.25% patients were frail and were 6-times more likely to experience 30-day postoperative complications. Lascano et al. [22], in a retrospective study, used the modified frailty index to screen patients undergoing urological surgery due to malignancy.

Patients with a high frailty index score were at a 4-times higher risk of a Clavien-Dindo grade IV complication and almost 6-times greater risk of 30-day mortality than non-frail patients. In the study of Suskind et al. [35], complications rate increased with increasing of frailty index regardless of patients' age. Similarly, Isharwal et al. [36] stated that preoperative frailty correlates with complications, mortality and other measures of poor surgical outcomes. The prevalence of frailty in elderly urological patients varies between studies, probably due to the heterogeneity of methods used and populations screened. Rosiello et al. [37] retrospectively evaluated 91,618 individuals who had undergone radical prostatectomy and found 13.3% to be frail. The frailty assessment was applied not strictly to patients, but to database records and cannot be considered as a preoperative assessment. Using the same methods, Michel et al. [38] found the prevalence of frailty to be 7.1%, however patients over 18 years of old were included. In the study of Yao-Dan Liang et al. [39] the prevalence of frailty among 229 elderly individuals in different surgical settings was 18.8% to 41.9%, depending on method of frailty assessment.

In most studies frailty was assessed with the use of only one screening test. Studies in which broader geriatric assessment was performed often included younger patients or individuals qualified to surgeries other than for urological cases. The prevalence of frailty in our group differed extremely depending on the frailty assessment method used. The screening tests were very specific but of poor sensitivity. This suggests that, in many studies in which only frailty screening tests were performed, the actual prevalence of frailty may be different – probably greater.

In our study we considered the CGA as a reference method in diagnosing frailty and assumed it to be of 100% sensitivity and specificity. The prevalence of frailty syndrome on the basis of CGA results seems to be high when compared with the available literature. However, Kenig et al. [1] found the prevalence of frailty in patients qualified to abdominal cancer surgery to be as high as 78% when CGA was performed. In our study, the geriatric assessment was performed on the day before surgery and did not affect the therapeutic decisions. The purpose for which CGA was designed is to reveal subclinical and undiagnosed conditions and to plan a tailored intervention before treatment, to achieve optimal results and decrease the risk of complications. On the basis of available literature, the optimal time of CGA is 4–6 weeks before treatment, to make any intervention possible [40]. In our group, any intervention was precluded due to CGA performance one day before the surgery. However, the presence of frailty syndrome diagnosed with the use of CGA predicted all of the postoperative and major complications. The screening tests were generally invaluable as predictive tools of postoperative complications, but this may be due to the small sample size. This suggests that the time-consuming CGA procedure cannot be effectively replaced by an already existing screening test.

Our findings, together with the very limited good quality data in the literature, suggest that it is worth performing a full geriatric assessment, which takes 1–1.5 hours, instead of any other screening tests, not only to predict complications, but also to plan a preoperative intervention as part of prehabilitation protocol.

The strengths and limitations of this study

Our group was relatively small. The majority of patients were male. Since we included elderly patients qualified to elective surgery, our patients were rather healthy and fit. Generally, our group does not reflect the population of urological patients. The qualification to surgery was performed on the basis of traditional tools – observation, experience of the surgeon, and ASA, so patients disqualified from surgery did not undergo geriatric assessment nor screening for frailty. Despite these limitations, this is the first study conducted in Poland in which CGA was used in the field of urology.

We performed a broad preoperative assessment of health status of patients qualified to urological surgery using a variety of screening tests and a full carefully administered geriatric assessment, which is extremely rare in the available literature.

CONCLUSIONS

Frailty syndrome commonly occurs in elderly urological patients. Screening tests can be quickly administered but their predictive values are low comparing to comprehensive geriatric assessment. The impact of frailty syndrome on management of urological malignancy needs further studies.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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