THE USE FGSI AS PREDICTIVE OF UROLOGICAL SIRS PATIENTS

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ABSTRACT

Objective: *To demonstrate the usefulness of Fournier's Gangrene Severity Index (FGSI) score for differentiating the outcome between Systemic Inflammatory Response Syndrome (SIRS) patients with upper and lower urological abnormalities.* ***Material & Method:*** *A retrospective study of case records from year 2009-2012 of SIRS patients with urological abnormalities at Saiful Anwar General Hospital (SAGH) Malang was carried out. The data were collected from the Medical Record Division in SAGH Malang. SIRS was clinicaly diagnosed based on medical history, physical examination and laboratory findings. SIRS without urological abnormalities were excluded from the analysis. The FGSI, which was developed to assign a numerical score that describes the severity of disease, was used in our study. This index presents patients vital signs (temperature, heart and respiratory rates) and metabolic parameters (sodium, potassium, creatinine, and bicarbonate levels, hematocrit, and white blood cell count). Patients with SIRS and urological abnormalities were divided according to upper tract and lower tract urological abnormalities. Total FGSI score was classified as mild (0-8), moderate (9-17), severe (> 17). The data were assessed according to whether the patient survived or died.* ***Results:*** *75 of the 203 evaluated patients died. From those 75 patients, 67% were male and 33% were female, 75% with upper urological abnormalities and 25% with lower abnormalities ($p < 0,05$). From those 203 patients; the results were analyzed with binary logistical regression and Spearman correlation analysis using SPSS 15 software with 95% confidence interval (CI). There is significant relationship between FGSI and outcome of the patient with upper urological abnormalities and lower urological abnormalities, with correlation coefficient more high in relationship between FGSI and outcome of the patient with upper urological abnormalities (0,4 vs 0,1).* ***Conclusion:*** *FGSI is simple and objective outcome predictor to differentiate survival between SIRS patients with upper urological abnormalities and lower urological abnormalities. There is a significant difference in outcome between SIRS patient with upper urological abnormalities and lower urological abnormalities even with same level of FGSI score.*

Keywords: *Fournier's gangrene severity index, systemic inflammatory response syndrome, upper urological abnormalities, lower urological abnormalities, outcome predictor.*

ABSTRAK

Tujuan penelitian: *Menunjukkan kegunaan nilai Fournier's Gangrene Severity Index (FGSI) untuk membedakan keluaran pasien Systemic Inflammatory Response Syndrome (SIRS) dengan abnormal urologi atas dan abnormal urologi bawah.* ***Bahan & Cara:*** *Penelitian retrospektif rekam medis dari tahun 2009-2012, dengan subyek pasien SIRS dengan kelainan urologi di RS Saiful Anwar Malang. Data dikumpulkan dari Divisi Rekam Medis RS Saiful Anwar Malang. SIRS secara klinis didiagnosa berdasarkan anamnesis, pemeriksaan fisik dan pemeriksaan laboratorium. SIRS tanpa kelainan urologi tidak termasuk dalam penelitian. FGSI yang dikembangkan untuk menetapkan nilai numerik yang menjelaskan kegawatan penyakit, yang digunakan pada penelitian ini. Indeks ini menampilkan pasien dengan tanda vital (temperatur, jantung dan tingkat pernapasan) dan parameter metabolik (natrium, kalium, kreatinin, dan level bikarbonat, hematokrit, dan jumlah sel darah putih). Pasien dengan SIRS dan kelainan urologi dibagi kedalam dua kategori kelainan urologi atas dan bawah. Nilai FGSI dibagi dalam 3 kategori, ringan (0-8), sedang (9-17), dan parah (> 17). Data dianalisa berdasarkan apakah pasien bisa hidup atau bertahan atau meninggal.* ***Hasil penelitian:*** *73 dari 203 pasien yang dievaluasi meninggal. Dari 75 pasien, 67% laki-laki dan 33% perempuan, 75% dengan kelainan saluran kemih atas dan 25% dengan kelainan saluran kemih bawah ($p < 0,05$). Dari 203 pasien, hasil dianalisa dengan regresi logistik biner dan analisa korelasi Spearman menggunakan piranti SPSS 15 dengan interval kepercayaan 95% (CI). Terdapat hubungan yang bermakna antara FGSI dan keluaran pasien dengan kelainan urologi saluran atas dan bawah, dengan koefisien korelasi lebih tinggi dalam hubungan antara FGSI dan hasil pasien dengan abnormal urologi atas (0,4 vs 0,1).* ***Simpulan:*** *FGSI adalah suatu skor yang sederhana dan akurat untuk prediksi kesintasan pasien SIRS dengan kelainan saluran kemih atas dan bawah. Terdapat perbedaan bermakna antara pasien SIRS dengan kelainan saluran kemih atas dan bawah meskipun dengan nilai FGSI yang sama.*

Kata kunci: *Fournier's gangrene severity index, systemic inflammatory response syndrome, kelainan urologi atas, kelainan urologi bawah, hasil prediksi.*

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INTRODUCTION

The Systemic Inflammatory Response Syndrome, known as SIRS is a response to a wide variety of clinical insults, which can beinfectious as in sepsis, but may be non-infectious in aetiology (e.g. burns, or pancreatitis). This systemic response is manifested by two or more of the following conditions: temperature more than 38°C or less than 36°C, heart rate more than 90 beats per minute, respiratory rate more than 20 breaths per minute or partial pressure of carbon dioxide (PaCO2) less than 32 mmHg (less than 4.3 kPa), white blood cells (WBC) more than 12,000 cells/mm^3 or less than 4,000 cells/mm^3 or more than 10% immature (band) white blood cell forms.[1]

SIRS is recognised as the first event in a cascade to multi-organ failure. Mortality is considerably increased with presence of severe sepsis or septic shock, although overall prognosis of urosepsis is better than from other infectious sites.[1] Urosepsis also depends on local factors, such as urinary tract calculi, obstruction at any level in the urinary tract, congenital uropathy, neurogenic bladder disorders, or endoscopic manoeuvres. However, all patients can be affected by bacterial species that are capable of inducing inflammation within the urinary tract.[2]

The symptoms of SIRS which were initially considered tobe 'mandatory' for the diagnosis of sepsis,[2] are now considered to be alerting symptoms.[3] Many other clinical or biological symptoms must be considered.

Sepsis syndrome in urology remains a severe situation with a mortality rate as high as 20-40%.[4] A recent campaign, 'Surviving Sepsis Guidelines', aimed at reducing mortality by 25% in the next few years has been published recently.[5] Early recognition of the symptoms may decrease the mortality by timely treatment of urinary tract disorders, e.g. obstruction, or urolithiasis. Adequate life-support measures and appropriate antibiotic treatment provide the best conditions for improving patient survival. The prevention of sepsis syndrome is dependent on good practice to avoid nosocomial infections and using antibiotic prophylaxis and therapy in a prudent and well-accepted manner.

Laor et al. developed the Fourniere's gangrene severity index (FGSI) to stratify risk in Fournier's Gangrene patients.[5] FGSI is a numerical score obtained from a combination of physiological hospital admission parameters that include temperature, heart rate, respiratory rate, sodium, potassium, creatinine, leukocytes, hematocrit and bicarbonate. They established that an FGSI above 9 is sensitive and specific as a mortality predictor in Fournier's gangrene patients.[5] Previous research concluded that FGSI can be used as an outcome predictor of SIR Spatients with urological abnormalities. Urological abnormalities have a wide range from upper to lower urinary tract, and each abnormality have different prognosis. We try to predict survival outcome (prognosis) of patients with SIRS between upper and lower urological abnormalities at Saiful Anwar General Hospital (SAGH) Malang using FGSI.

MATERIAL & METHOD

Retrospective revision of case records from the years 2009-2012 of patients identified as having SIRS with urological abnormalities was carried out from Medical Record Division at Saiful Anwar General Hospital Malang. SIRS diagnosis was clinically established based on medical history, physical examination and laboratory findings. SIRS is manifested by two or more of the following conditions, temperature more than 38°C or less than 36°C, heart rate more than 90 beats per minute, respiratory rate more than 20 breaths per minute or PaCO2 less than 32 mmHg (less than 4.3 kPa), WBC more than 12,000 cells/mm^3 or less than 4,000 cells/mm^3 or more than 10% immature (band) forms. Patients diagnosed with SIRS without urological abnormalitieswere excluded from the analysis. A total of 203 patients diagnosed with SIR Saccompanied by urological abnormalities were included. FGSI was calculated by evaluating nine hospital admission parameters: temperature, heart rate, respiratory rate, sodium, potassium, creatinine and serum bicarbonate, leukocyte count and hematocrit. Evaluation criteria were gauged from 0 to +4 as described by Loar et al. In Table 1, patients with SIRS and urological abnormalities divide to two categories upper urological abnormalities and lower urological abnormalities. FGSI score is divide three categories mild (0-8), moderate (9-17), severe (> 17). Clinical parameter differences were compared between survivors and non-survivors and SPSS 15 software was used for information analysis. Central tendency measures, means and percentages were used.

Inclusion criteria is patients diagnosed with SIRS accompanied by urological abnormalities.

Table 1. Fournier's Gangrene Severity Index.

Physiological variables	High abnormal values			Normal values			Low abnormal values		
Assigned numerical score	4+	3+	2+	1+	0	1+	2+	3+	4+
Temperature °C	>41	39-40.9	—	38.5-38.9	36-38.4	34-35.9	32-33.9	30-31.9	<29.9
Heart rate	>180	140-179	110-139	—	70-109	—	56-59	40-54	<39
Respiratory rate	>50	35-49	—	25-34	12-24	10-11	6-9	—	<5
Serum sodium (mmol/L)	>180	160-179	155-159	150-154	130-149	—	120-129	111-119	<110
Serum potassium (mmol/L)	>7	6-6.9	—	5.5-5.4	3.5-4	3-3.4	2.5-2.9	—	<2.5
Serum creatinine (mg/100ml)	>3.5	2-3.4	1.5-1.9	—	0.6-1.4	—	<0.6	—	—
Hematocrit %	>60	—	50-59.9	46-49	30-45.9	—	20-29.9	—	<20
Leukocytes (total/mm^3 x 1,000)	>40	—	20-39.9	15-19.9	3-14.9	—	1-2.9	—	<1
Serum bicarbonate (venous, mmol/L)	>52	41-51.9	—	32-40.9	22-31.9	—	18-21.9	15-17.9	<15

Exclusion criteria is patients diagnosed with SIRS without urological abnormalities were excluded from the analysis.

RESULTS

Of the 203 patients evaluated75 died (37%). From those 75 patients, 50 of them (67%) were male and 25 of them (33%) were female. Those 75 patients had an FGSI score 5 or above with a mean FGSI score 14. From those 203 patients; patient with FGSI score 0-8, 14% died (43% upper urology abnormality, 57% lower urology abnormality); patient with FGSI score 9-17, 38% died (62,5% upper urology abnormality, 37,5% lower urology abnormality); patient with FGSI score > 17,84% died (67% upper urology abnormality, 33% lower urinary abnormality). Physiological parameters were bicarbonate (13,468 ± 0,775), creatinine (5,537 ± 0,528), heart rate (100,492 ± 1,624), respiratory rate (25 ± 0,606), hematocrit (27,808 ± 0,699), leukocytes (18,606 ± 0,786), potassium (4,602 ± 0,136), sodium (130,225 ± 1,810) and temperature (37,153 ± 0,149).

Results were analyzed with binary logistical regression and Spearman correlation analysis using SPSS 15 software. Odds Ratio (OR) was 0,213 with 95% Confidence Interval (CI). There was a significant relationship between FGSI and outcome of the patient with correlation coefficient -0,4. There was a correlation between FGSI and the outcome of the patient. Patients with higher FGSI had a lower chance to survive. The threshold of FGSI at Saiful Anwar General Hospital Malang was 5. From logistic regression analysis (odds ratio 0,213) shows that the chance of patients to survive was 0,213. It means that the chance of patient to survive was smaller than the chance of patient to die.There is a significant difference outcome between SIRS patient with upper urological abnormalities and lower urological abnormalities even with same level of FGSI score ($p < 0,05$; $r = 0,4$ vs 0,1).

DISCUSSION

SIRS is recognised as the first event in a cascade to multi-organ failure. Mortality is considerably increased when severe sepsis or septic shock are present, although overall prognosis of urosepsis is better than that of sepsis from other infectious sites.[1] Urosepsis also depends on local factors, such as urinary tract calculi, obstruction at any level inthe urinary tract, congenital uropathy, neurogenic bladder disorders, or endoscopic manoeuvres. However, all patients can be affected by bacterial species that are capable of inducing inflammation within the urinary tract. Moreover, it is now recognized that SIRS may be present without infection (e.g. pancreatitis, burns, or nonseptic shock).[2]

We could used a clinical definition of SIRS to describe sepsis, as recommended by the Sepsis definition Consensus Committee in 1992, which was reviewed and accepted at the 2001 consensus meeting.[6]

Severe sepsis is a severe situation with a reported mortality rate of 20-42%.[7] A recent campaign, 'Surviving Sepsis Guidelines', aimed at reducing mortality by 25% in the next few years has been published recently.[5] Most severe sepsis reported in the literature is related to pulmonary (50%) or abdominal (24%) infections, with urinary

tract infections accounting for only 5%.[8] Sepsis is more common in men than in women.[9] In recent years, the incidence of sepsis has increased by 8,7% per year,[7] but the associated mortality has decreased, which suggests improved management of patients (total in-hospital mortality rate fell from 27,8% to 17,9% during 1995-2000).[10] Globally (this is not true for urosepsis), the rate of sepsis due to fungal organisms has increased while Gram-positive bacteria have become the predominant pathogen in sepsis, even if Gram-negative bacteria remain predominant in urosepsis.

There is no consensus on clinical variables for predicting SIRS or sepsis results. Mechanisms of organ failure and death in patients with sepsis remain only partially understood.[8] Early recognition of the symptoms may decrease the mortality by timely treatment of urinary tract disorders, e.g. obstruction, or urolithiasis. Adequate life-support measures and appropriateantibiotic treatment provide the best conditions for improving patient survival. The prevention of sepsis syndrome is dependent on good practice to avoid nosocomial infections and using antibiotic prophylaxis and therapy in a prudent and well-accepted manner.[1]

Laor et al. developed the Fourniere's Gangrene Severity Index (FGSI) to stratify risk in Fournier's Gangrene patients.[5] FGSI is a numerical score obtained from a combination of physiological hospital admission parameters that include temperature, heart rate, respiratory rate, sodium, potassium, creatinine, leukocytes, hematocrit and bicarbonate. They established that an FGSI above 9 is sensitive and specific as a mortality predictor in Fournier's Gangrene patients.[5] But still, there is no previous study that demonstrate the use of FGSI as an outcome predictor of SIRS patients with urological abnormalities. From this retrospective study, there was a significant relationship between FGSI and outcome of the patients, with correlation coefficient -0,4. There was a strong correlation between FGSI and the outcome of the patient. Patients with higher FGSI had a lower chance to survive, and patients with lower FGSI had a higher chance to survive. The threshold of FGSI at Saiful Anwar General Hospital Malang was 5. There is a significant difference outcome between SIRS patient with upper urological abnormalities and lower urological abnormalities even with same level of FGSI score ($p < 0,05$; $r = 0,4$ vs $0,1$). With the same level FGSI, patient with upper urological abnormality had a lower chance to survive.

CONCLUSION

FGSI is simple and objective outcome predictor between SIRS patients with upper urological abnormalities and lower urological abnormalities. There is a significant difference outcome between SIRS patient with upper urological abnormalities and lower urological abnormalities even with same level of FGSI score.

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