ASSESSMENT OF THE INITIAL AND MODIFIED PARSONNET SCORE IN MORTALITY PREDICTION OF THE PATIENTS OPERATED IN THE SARAJEVO HEART CENTER

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Abstract

This study has been conducted in an effort to establish more suitable and accurate scoring model we use in everyday practice. Among the specific outcome prediction models, in 1989 Parsonnet et al elaborated a method of uniform risk stratification for evaluation of the results of cardiac surgery procedures.
We have tested two forms of the Parsonnet score, Initial and Modified Parsonnet score, in our patients.
In the first half of the year 2007, 145 patients were operated in Sarajevo Heart center. All operated patients in that period, have participated in this study. The overall hospital mortality was 4,13 (6 deaths). This study shows that the initial and modified Parsonnet's scores are predictive for operative mortality in adult cardiac surgery patients.

KEY WORDS: mortality prediction, Parsonnet score, scoring systems

Introduction

In the early 1980s, CABG (coronary artery bypass grafting) operations were characterized by operative mortality rates typically in the range of 1 to 2%. A few years later, however, the severity of illness of CABG patients began a progressive rise that is still being seen today. Predictably, CABG operative mortality rates reached the 5 to 6% range (1). This rise in operative mortality was understood by cardiovascular specialists, but others were unaware of the changes that had produced these higher mortality rates, and surgeons were challenged to justify the increase in CABG mortality. It soon became apparent that databases would be essential for proper investigation of these issues. To truly analyze patient risk factors in a meaningful way required statistical risk models designed to generate a predicted operative mortality based on preoperative clinically significant factors. In 1989, Parsonnet proposed a preoperative score for adult cardiac surgery ("initial Parsonnet's score"). This score is simple, additive and grades the severity of illness of patients into five groups (Table 1, (2)). This useful

Risk factors	Assigned weight
Female gender	1
Morbid obesity (≥1,5 x ideal weight)	3
Diabetes	3
Hypertension (systolic blood pressure\140 mm Hg)	3
Ejection fraction	
> 50%	0
30–49%	2
< 30%	4
Age	
70–74	7
75–79	12
> 80	20
Re-operation	
First	5
Second	10
Preoperative intra-aortic balloon pump	20
Left ventricular aneurysm	5
Emergency surgery following PTCA or catheterisation complications	10
Dialysis dependency (peritoneal dialysis or hemodialysis)	10
Catastrophic states (acute structural defect, cardiogenic shock, acute renal failure)	10 – 50
Other rare circumstances (paraplegia, pacemaker dependency, severe asthma, congenital heart disease in adult)	2 – 10
Mitral surgery	5
Mitral surgery and pulmonary artery pressure > 60 mmHg	8
Aortic surgery	5
Aortic surgery and pressure gradient > 120 mmHg	7
CABG at the time of valve surgery	2

TABLE 1. Initial Parsonnet score

Risk factors	Assigned weight
Female gender	1
Morbid obesity (≥1.5 x ideal weight)	3
Diabetes	3
Hypertension (systolic blood pressure\140 mm Hg)	3
Ejection fraction	
> 50%	0
30–49%	2
< 30%	4
Age	
70–74	7
75–79	12
> 80	20
Reoperation	
First	5
Second	10
Preoperative intra-aortic balloon pump	20
Left ventricular aneurysm	5
Emergency surgery following PTCA or catheterisation complications	10
Dialysis dependency (peritoneal dialysis or hemodialysis)	10
Catastrophic states (acute structural defect, cardiogenic shock, acute renal failure)	10 – 50
Other rare circumstances (paraplegia, pacemaker dependency, severe asthma, congenital heart disease in adult)	2 – 10
Mitral surgery	5
Mitral surgery and pulmonary artery pressure > 60 mmHg	8
Aortic surgery	5
Aortic surgery and pressure gradient > 120 mmHg	7
CABG at the time of valve surgery	2
Left main coronary stenosis > 90%	3
Unstable angina	3
Ventricular tachycardia or fibrillation	5
Cardiogenic shock	25
Myocardial infarction during the last 48 h	7
Cardiac insufficiency	5
Permanent pacemaker in place	2
Active endocarditis	10
Post-myocardial infarction septal defect	20
Chronic pericarditis	5
Adult congenital heart disease	10
Chronic pulmonary obstructive disease	5
Mean pulmonary pressure ≥ 30 mmHg	10
Idiopathic thrombopenic purpura	10
Pre-operative intubation	5
Severe asthma	15
Lower limb arterial disease	2
Carotid arterial disease	7
Abdominal aortic aneurysm	5
Aortic dissection	10
Severe neurological disease	5
Severe hyperlipidaemia	3
Jehovah's witness	10
Preoperative therapy with antiplatelet agents	2
Severe chronic intoxication	3
Active AIDS	10
Active cancer	5
Long term corticosteroids or immunosuppressive therapy	2

TABLE 2. Modified Parsonnet score

score has been rapidly taken up by several cardiac surgery teams, and other authors have confirmed its predictive value on hospital mortality and morbidity (3, 4). Two risk factors of the "initial Parsonnet's score" are however imprecise and their weights are arbitrarily chosen by the surgeon (catastrophic states, other rare circumstances, Table 1). Thus, the reliability of the initial Parsonnet's score decreases when these 2 risk factors are present. This original score was later modified, including thirty new risk factors according to the SUMMIT system (5,6). These 30 new risk factors take the place of the 2 imprecise risk factors of the initial score, and this new score is referred to as the "modified Parsonnet's score" (Table 2). We wanted to assess the predictive value of the different Parsonnet's scores and their risk in our patients (7,8).

Materials and Methods

Patients

Data on 145 patients have been collected. After validation of the data, during preoperative preparation, we have bolded all patient's co morbidities and in the same time from medical documentation as well as different examinations, that have been already performed. Afterward, collected data we putted into two Parsonnet model equitation and compared results.

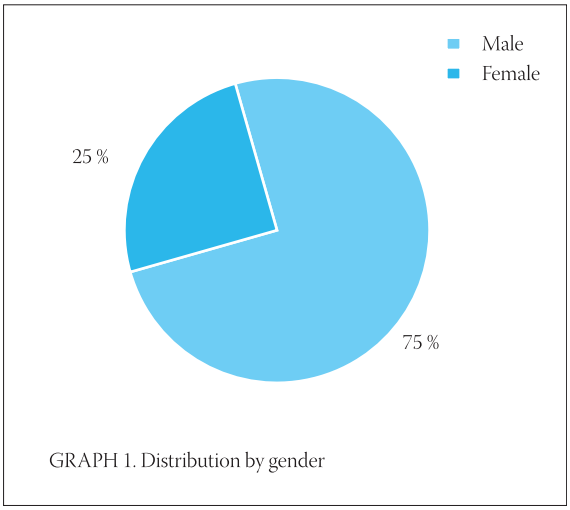
Gender	Number	Age/medium
Male	109	59,02± 18
Female	36	61, 94 ± 20
Total	145	

TABLE 3. Demographic data

Tested patients 145 (109 male age/medium 59,02±18 and 36 female age/medium 61,94 ± 20) (Graph 2, Table 3)

Results

This study has been conducted in the time period between January - July 2007, and it included 145 patients all of which underwent open heart surgery. The overall hospital mortality was 4,13 (6 deaths). This mortality also includes all emergency procedures. For coronary artery surgery it was 1,8,



GRAPH 1. Distribution by gender

and for valvular surgery 2,1% . The two Parsonnet's scores are predictive for operative mortality. The predictive value of the modified Parsonnet's score is better than the initial Parsonnet's score.

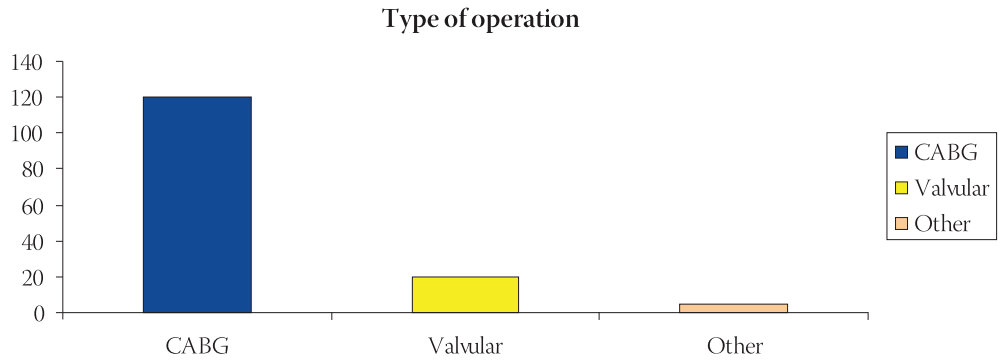
From the tables below we can realize that modified Parsonnet score create groups in the manner that low risk group contain more observed patients and that low risk and medium risk group contain 68% observed patients, meanwhile excluded mortality in large number of patients, unlike initial Parsonnet score does. The biggest group formed by initial Parsonnet score was high risk group which contain 101 patients or 69,65% observed patients. It means that initial Parsonnet score overestimate risk factors and predict high mortality in most number of patients.

Discussion

Operative mortality is an easily defined, readily measured outcome, and its value to patients is undeniable. Most studies that have attempted to define effective care have focused on mortality as an outcome for the preceding reasons. For most of the history of cardiac surgery, quality generally was equated with operative mortality (i.e., outcome measure). As the new millennium got underway, a distinct change in the landscape of quality assessment occurred. The narrow focus on operative mortality gave way to a broader analysis that also included operative morbidity (9,10).

R/B	Risk groups	N° Patients	Predicted mortality by modified Parsonnet(%)	Mortality(n)	Mortality (%)
1	low risk (< 2%)	44	1,44	0	0
2	medium risk (2-5%)	55	3,45	1	1,81
3	high risk (>5%)	46	11,53	5	10,86
	Total	145			4,13

TABLE 4. Observed mortality by modified Parsonnet score



GRAPH 2. Type of the performed operations in studied group

R/B	Risk groups	N° Patients	Predicted mortality by initial Parsonnet (%)	Mortality (n)	Mortality (%)
1	low risk (< 2%)	9	0,3	0	0
2	medium risk (2-5%)	35	4,31	1	2,85
3	high risk (>5%)	101	12,8	5	4,95
	Total	145			4,13

TABLE 5. Observed mortality by initial Parsonnet score

Conclusion

This study shows that the initial and modified Parsonnet's scores are predictive for operative mortality of the cardiac surgery in adults. However, these scores remain imperfect:
– many risk factors are non-significant
– the initial Parsonnet's score has only a moderate predictive value
– use of modified Parsonnet's score is too complex and many of its risk factors are subjective or not well defined.
Establishment of a new score seems to be necessary. Ideally it has to be as predictive as the modified Parsonnet's score and as objective and simple to use as the initial Parsonnet's score.

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