Risk factor stratification in emergency colon surgery.

BY,

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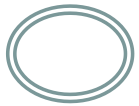
Introduction



- In contrast with elective colectomies, which carry less than 1% mortality, emergency colonic resections might constitute surgical challenges, resulting in high mortality and morbidity rates. It is estimated that 17–20% of patients with colon cancer , as well as 22–28% of those with diverticular disease , present with septic complications or bowel obstruction.

- High rate of morbidity and mortality following emergency colon surgery indicate that multiple parameters are likely to be involved .

- These parameters can be related:

(1) to the patient's condition (ASA score, advanced age, comorbidities),

(2) to the septic consequences of the disease (fecal or purulent peritonitis), and

(3) to the consequences of the procedure itself (bleeding, extent of colectomy, stoma creation). The latter parameter has been underestimated or ignored, in most existing predictive scoring systems

- Preoperative risk reduction, vital to optimal surgical care, is possible only when the risk is identified

Risk stratification tools

- A “risk stratification tool” was defined as **a scoring system or model used to predict or adjust for either mortality or morbidity after surgery**, and which contained at least two different risk factors

- Risk stratification tools may be subdivided into risk scores and risk prediction models. Both are usually developed using multivariable analysis of risk factors for a specific outcome

Examples of risk stratification tools and their application in colon surgery.

(1)ASA score

Preoperative Risk Stratification

American Society of Anaesthesiologists (ASA) Grading

ASA Grade	*Description of Patient*	*Mortality Rate (%)*
Class I	A normally healthy individual	0.1
Class II	A patient with mild systemic disease	0.2
Class III	A patient with severe systemic disease that is not incapacitating	1.8
Class IV	A patient with incapacitating systemic disease that is a constant threat to life	7.8
Class V	A moribund patient who is not expected to survive 24 h with or without operation	9.4
Class E	Added as a suffix for emergency operation	

- Although the ASA score is mainly used to alert the anesthesia team of underlying illness, it can also be used to aide the surgeon with the assessment of perioperative risk and mortality.

- K.Skala et al .,assess the risk factors associated with mortality and morbidity in 462 patients who underwent emergency colon resection :

✓ Overall non lethal complication is 35% and the following parameters were associated with increased risk of postoperative morbidity :

ASA score ≥3, colonic ischemia, and *stoma creation* .

✓ Overall mortality rate was 14% and the the only parameter associated with increased risk of postoperative death was blood loss >500 cm^3 .

Variable	Category	Death rate (%)	*p* value
Age	<70	10	0.002
	≥70	21	
Gender	Female	14	0.870
	Male	14	
BMI	<25	7	0.108
	≥25	15	
ASA score	1, 2	1	<0.001
	≥3	23	
Diagnosis	Cancer	12	<0.001
	Ischemia	34	
	Other	12	
Disease location	Rectum	12	0.259
	Left colon	12	
	Right colon	17	
Duration of surgery	<180	13	0.762
	>180	14	
Blood loss (ml)	<500	12	0.001
	>500	31	
Transfusion	Yes	44	<0.001
	No	14	
Type of colectomy	Subtotal	25	0.030
	Segmental	13	
Anastomosis technique	End-to-end	16	0.038
	Side-to-end	16	
	Side-to-side	3	
Stoma	None	10	<0.001
	Ileostomy	32	
	Colostomy	13	

Variable	Category	Morbidity (%)	*p* value
Age	<70	44	0.046
	≥70	54	
Gender	Female	48	0.805
	Male	47	
BMI	<25	37	0.097
	≥25	50	
ASA score	1, 2	30	<0.001
	≥3	60	
Diagnosis	Cancer	40	<0.001
	Ischemia	72	
	Diverticulitis	48	
Disease location	Rectum	62	0.325
	Left colon	48	
	Other	46	
Blood loss (ml)	<500	43	0.121
	>500	55	
Transfusion	Yes	76	0.004
	No	44	
Status	Emergency	50	0.024
	Urgent	32	
Type of colectomy	Subtotal	63	0.025
	Segmental	46	
Anastomosis technique	End-to-end	57	<0.001
	Side-to-end	41	
	Side-to-side	33	
Stoma	None	35	<0.001
	Ileostomy	69	
	Colostomy	55	

(2)POSSUM score

- **POSSUM - Physiological and Operative Severity Score for the Enumeration of Mortality & Morbidity**

Physiological Factors - 12	Operative Factors - 6
Age (years)	Operative complexity
Cardiac status	Single vs. multiple procedures
Respiratory status	Expected blood loss
Systolic blood pressure	Peritoneal contamination
Pulse rate	Extent of any malignant spread
Glasgow Coma Score	Urgency of surgery
Haemoglobin concentration	
White cell count	
Serum urea concentration	
Serum sodium concentration	
Serum potassium concentration	
ECG rhythm	

Possum score can be easily calculated online through
http://www.riskprediction.org.uk/

P P Tekkis et al ., aimed to investigate the predictive capability of POSSUM and P-POSSUM in emergency and elective colon resection in (1017) patients in different age groups.

Results:

Both scoring systems over predicted mortality in young patients and under predicted mortality in the elderly ($P < 0.001$). Death was under predicted by both systems for emergency cases.

(3)CR POSSUM

CR-POSSUM

Physiological	Operative
Age	Operation
Cardiac status	Peritoneal contamination
BP	Extent of malignancy
Pulse	Emergency / Elective
Hb	
Urea	

Mesut Tez et al ., aimed to evaluate the predictive accuracy of P-POSSUM and CR-POSSUM models on patients undergoing colorectal resection.

- ✓ The results revealed that CR-POSSUM has reasonable discriminatory power for mortality suggesting that CR-POSSUM may provide a better estimate of the risk of mortality for patients who undergoing colorectal resection.

Edmund et al., concluded that CR-POSSUM is the simplest system of all three and the most accurate prediction of mortality after colon resection.

(4)The Association of Coloproctology of Great Britain and Ireland (ACPGBI) scoring system,

The Association of Coloproctology of Great Britain and Ireland (ACPGBI) scoring system, which is based only on five parameters :

- age, completeness of cancer resection, ASA score, cancer stage, and urgency of operation, is better at predicting mortality in patients having colorectal resection when compared with the POSSUM, P-POSSUM, and CR-POSSUM surveys.(*Ferjani A M et al.2007 lancet oncology*)

(5)IRCS(Identification of risk in colorectal surgery)

- F. J. van der Sluis et al., 2014 developed a novel and simple score model designed to estimate in-hospital mortality of patients undergoing colorectal surgery.
- The strongest predictors of in-hospital mortality were emergency surgery , tumor stage ,age ,pulmonary failure and cardiac failure.
- The results of this study have shown that the IRCS score is a good predictor of in-hospital mortality after colorectal surgery despite the relatively low number of model parameters.

Table 3. The Identification of Risk in Colorectal Surgery score chart.

Variable	Points
Age (years)	
≤ 60	0
61−70	1
71−80	2
≥ 81	3
Disease category	
No malignancy or stage I/II colorectal cancer	0
Stage III/IV colorectal cancer	1
Emergency surgery[a]	
No	0
Yes	2
Signs/symptoms of cardiac failure	
None or mild[b]	0
Intermediate or severe[c]	1
Signs/symptoms of pulmonary failure	
None or mild	0
Intermediate or severe	1

[a] Surgery required and took place within 24 h after admission.
[b] Diuretic, digoxin, antianginal or antihypertensive therapy.
[c] Intermediate, peripheral oedema and/or warfarin therapy; severe, elevated venous jugular pressure and/or cardiomegaly on chest X-ray.

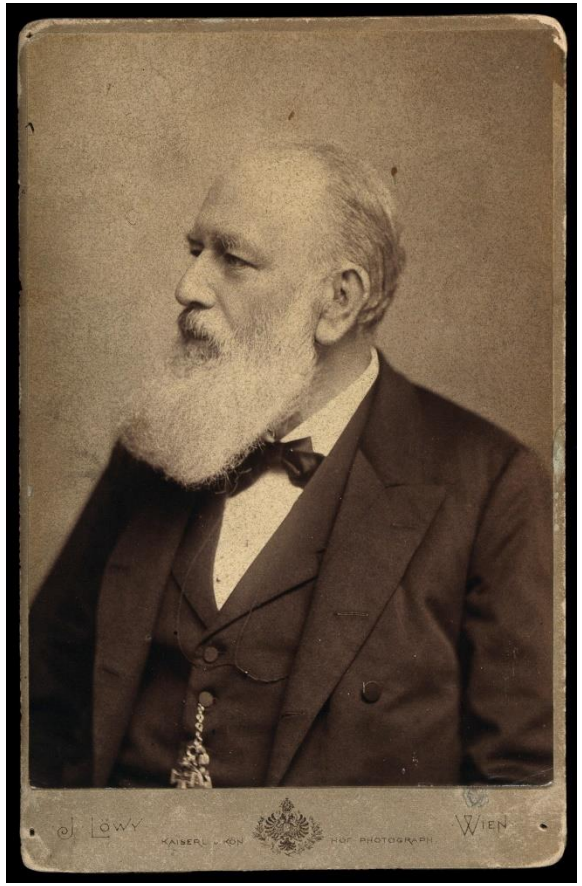
overview

- A good predictive model should be simple, and able to discriminate or identify outcomes accurately.
- To date, although some of these models have been validated in the countries where they were devised or in other developed countries, there is no consensus about the most appropriate instrument for risk stratification.

Why is risk stratification important?

- Emergency colon surgery is highly complex and involves significant risks that can lead to unfavorable short-term outcomes.
- Operative mortality (death after surgery before discharge from hospital or within 30 days of surgery) is a quality indicator for surgery, because of its relationship with preoperative preparation and the quality of postoperative care, so it is of the utmost importance to have explicit criteria to know which patients require stricter surveillance.

Thank you



Theodor Billroth
1881

We are only entitled to operate when there are reasonable chances of success. To use the knife when those chances are lacking is to prostitute the splendid art and science of surgery, and to render it suspect among the laity and among one's colleagues. We have to ask ourselves, then, by what standard we can measure the chances of success. We shall learn then through the indefatigable study of our science, through shrewd criticism of our own and others' observations, through careful consideration of individual cases, and through the meticulous appraisement of our results.