

# A Retrospective and Prospective Descriptive Study to Assess the Prognostic Indicators of Outcome in Emergency Major Abdominal Surgeries in Elderly Patients

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## ABSTRACT

**Introduction:** Compared with younger patients, older patients undergoing surgery have been found to have more cardiopulmonary postoperative complications and an increased length of hospital stay. Several factors are thought to relate to the postoperative outcome. The present study was carried out to identify some of those prognostic factors that are associated with poor outcome of abdominal surgical procedures in elderly patients and to observe the various associated intra-op and post-operative complications.

**Material and Methods:** The present retrospective and prospective descriptive observational study was conducted among 40 patients undergoing Major abdominal surgery. These patients were observed from the time of admission till discharge. During their stay in hospital, their clinical presentation, hematological and biochemical reports, anesthesia records, surgical procedures performed and outcomes post-surgery was documented. All the collected data was analyzed using SPSS-17. Association between variables was assessed using Chi-Square test and unpaired t-test and p value  $\leq 0.05$  was considered statistically significant.

**Results:** Out of total 40 patients, 27 (67.5%) patients survived while mortality was observed in remaining 32.5%. Significantly poor outcome in elderly (Mortality: 41.9% vs 0%) was observed in patients with associated co-morbidities ( $p < 0.05$ ). The multivariate analysis showed that significant predictors of poor outcome in elderly patients undergoing emergency major abdominal surgeries were ASA (above III), tachycardia, anaemia, high TLC count, raised serum bilirubin and reduced serum albumin, high serum creatinine and increased duration of surgery.

**Conclusion:** Thus to conclude, surgical outcome of a major abdominal operation in the elderly will be dependent on the physical status of the patient preoperatively demonstrated by the ASA grade.

**Keywords:** Abdominal Surgery, Co-morbid diseases, Old age; Prognostic factors

## INTRODUCTION

In developing countries like India the life expectancy of the population continues to increase such that the average life expectancy is 67.3 years and 69.6 years for males and females respectively.<sup>1</sup> The rate of surgical procedures are nearly twice more for persons aged over 65 years as for persons less than 65 years. Approximately half of all emergency surgical procedures are performed in the elderly and the proportion is set to increase in future years as more of the population survive into their seventies.<sup>2</sup> In spite of, advancements in surgical and anaesthetic field as well as improvements in the medical care of older surgical patients, medical complications that particularly consists of adverse postoperative outcomes, still remain more common in older people when compared with their younger

counterparts.<sup>3-6</sup> These complications are particularly significant as 30-day postoperative complications are more important than preoperative risk factors and intra-operative factors in determining survival after major surgery.<sup>3,6</sup> There has been a focus on age and pre-existing co-morbidities as the main predictors of adverse postoperative outcome in the older surgical population.<sup>7</sup>

Compared with younger patients, older patients undergoing surgery have been found to have more cardiopulmonary postoperative complications and an increased length of hospital stay.<sup>8-10</sup> A recent cross-sectional study using data from the National Inpatient Sample<sup>11</sup> showed that elderly patients were 50 % less likely to undergo surgery than younger patients, a finding attributed to increased risk from co-morbid conditions. Several factors are thought to relate to the postoperative outcome. The present study was undertaken to identify some of those prognostic factors that are associated with poor outcome of abdominal surgical procedures in elderly patients and to observe the various associated intra-op and post-operative complications.

## MATERIAL AND METHODS

The present retrospective and prospective descriptive observational study was conducted among 40 patients from July 2012 to October 2015 (July 2012- August 2015: Retrospective, September 2015 to October 2015: Prospective) in the department of Surgery of T.N.M.C and B.Y.L. Nair Hospital, Mumbai. Patients aged more than 60 years and undergoing Major abdominal surgery<sup>12</sup> (Surgery of luminal GI-tract from Esophagus to Colorectal region, Hepatopancreaticobiliary surgery and surgery of spleen) were included in the study.

For Patients included on a prospective basis, written informed consent was taken prior to enrolment in the study. These patients were observed from the time of admission till discharge. During their stay in hospital, their clinical presentation, hematological and biochemical reports, anesthesia records, surgical procedures performed and outcomes post-surgery was documented.

For Patients included on retrospective basis, waiver of consent

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was taken from the Ethics Committee and similar medical details i.e. clinical presentation, haematological and biochemical reports, anesthesia records, surgical procedures performed and outcomes post-surgery were noted in the Study Case proforma.

General Examination	Outcome		Total	p- value
	Death	Alive		
Tachycardia	11	6	17	< 0.01
	64.7%	35.3%	100.0%	
High BP	11	11	22	< 0.01
	50.0%	50.0%	100.0%	
Pallor	8	3	11	< 0.01
	72.7%	27.3%	100.0%	
Odema	1	0	1	0.14
	100.0%	0.0%	100.0%	
Systemic Examination	Outcome		Total Death	p- value
	Death	Alive		
Disoriented	3	0	3	< 0.01
	100.0%	0.0%	100.0%	
Murmur	0	1	1	0.48
	0.0%	100.0%	100.0%	
AEBL Reduced/ Ronchi	4	0	4	0.01
	100.0%	0.0%	100.0%	

**Table-1:** Association of General and of Systemic Examination Findings with outcome

Blood Indices	Outcome	N	Mean	SD	p- value
Haemoglobin (gm%)	Death	13	9.28	1.12	< 0.01
	Alive	27	10.85	1.07	
WBC (10 <sup>3</sup> /cumm)	Death	13	22.96	6.90	< 0.01
	Alive	27	13.40	4.06	
Platelets (lakh/cu mm)	Death	13	1.77	0.35	0.026
	Alive	27	2.00	0.25	

**Table-2:** Association of Blood Indices with outcome

Association of Liver Function Tests with outcome					
Liver Function Tests	Outcome	N	Mean	SD	p- value
Total Bilirubin (mg%)	Death	13	1.42	0.41	.016
	Alive	27	1.17	0.22	
Direct Bilirubin (mg%)	Death	13	0.52	0.28	< 0.01
	Alive	27	0.34	0.06	
Alk. Phosphatase (mg%)	Death	13	209.00	102.25	.028
	Alive	27	154.52	49.97	
SGOT (IU/L)	Death	13	53.23	18.86	.045
	Alive	27	44.78	7.03	
SGPT (IU/L)	Death	13	65.23	17.94	.010
	Alive	27	55.48	4.06	
Sr. Albumin (mg%)	Death	13	2.22	0.50	< 0.01
	Alive	27	3.38	0.42	
Sr. Proteins (mg%)	Death	13	3.97	0.84	< 0.01
	Alive	27	5.19	0.62	
PT/ INR	Death	13	1.12	0.08	0.362
	Alive	27	1.10	0.07	
Association of Renal Function Tests with outcome					
Renal Function tests	Outcome	N	Mean	SD	p- value
Sr. Creatinine (mg%)	Death	13	2.16	0.59	< 0.01
	Alive	27	1.13	0.24	
BUN (mg%)	Death	13	30.62	10.72	< 0.01
	Alive	27	16.44	4.81	

**Table-3:** Association of Liver and Renal Function Tests with outcome

All the collected data was analyzed using SPSS-17.

Qualitative data was arranged in the form of frequency and percentage. Association between qualitative variables was assessed using Chi-Square test. Quantitative data was represented using Mean± SD and analysis was carried out using unpaired t-test and p value ≤ 0.05 was considered statistically significant.

## RESULTS

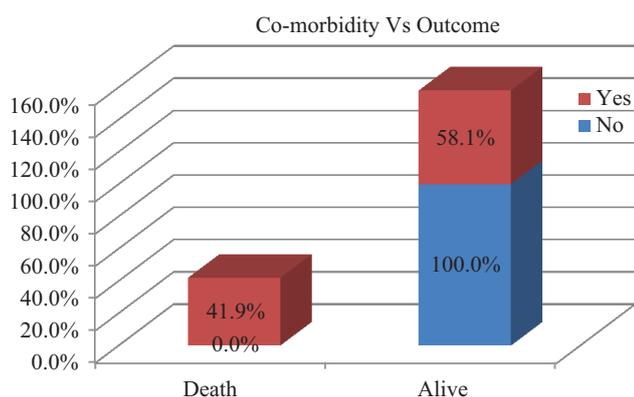
Mean age of the study subjects was 66.7 years with over half of them (55%) were between 60-65 years of age. Out of total 40 patients, 27 (67.5%) patients survived while mortality was observed in remaining 32.5%. Significantly poor outcome in elderly (Mortality: 41.9% vs 0%) was observed in patients with associated co-morbidities (p< 0.05) (graph 1). ASA grade III or above were associated with significantly poor outcome (Mortality: 90% vs 13.3%; p< 0.05). Tachycardia, high blood pressure and pallor were associated with significantly poor outcome in elderly (p< 0.05) (table 1). Disoriented mental status was associated with significantly poor outcome in elderly patients (p< 0.05) (table 1). Poor outcome was significantly associated with lower mean haemoglobin and platelet levels and higher mean TLC count (p< 0.05) (table 2).

Deranged Liver function test were significantly associated with poor outcome in elderly patients (p< 0.05). Poor outcome in elderly patients was significantly associated with higher mean creatinine and BUN levels (p< 0.05) (table 3).

Poor outcome after surgery in elderly was strongly associated with increased duration of surgery (p< 0.05). The multivariate analysis showed that significant predictors of poor outcome in elderly patients undergoing emergency major abdominal surgeries were ASA (above III), Obesity, tachycardia, anaemia, high TLC count, raised serum bilirubin and reduced serum albumin, high serum creatinine and increased duration of

Binary Logistic Regression for Outcome						
Variables	B	S.E.	Wald	df	p value	OR
Obesity	1.02	0.48	4.57	1	< 0.05	2.76
ASA Grade	2.19	0.36	12.59	1	< 0.05	11.62
Pulse	2.33	0.44	5.55	1	< 0.05	2.72
Pallor	1.53	0.46	4.01	1	< 0.05	1.86
Haemoglobin	-1.28	0.55	3.86	1	< 0.05	1.19
WBC	1.50	0.39	2.38	1	< 0.05	1.08
Billirubin	1.36	0.58	5.44	1	< 0.05	6.88
S. Creatinine	2.29	0.47	2.72	1	< 0.05	3.80
Albumin	2.08	0.25	2.77	1	< 0.05	5.12
Operative Time	1.02	0.21	15.89	1	< 0.05	12.76

**Table-4:** Logistic Regression Analysis for Predictors of Outcome



**Figure-1:** Association of Co-morbidities with outcome

surgery (table 4).

**DISCUSSION**

A Retrospective and Prospective Descriptive Observational Study was conducted with the aim of studying the various prognostic factors affecting the outcome in elderly patients undergoing emergency major abdominal surgeries. Mean age of the study subjects was 66.7 years with over half of them (55%) were between 60-65 years of age. Male predominance was observed in study subjects with 72.5% males to 27.5% females. On univariate analysis, higher mean age of study population was associated with mortality but on multivariate analysis no significant association was observed between age and gender with outcome after surgery ( $p > 0.05$ ).

The age and sex distribution in our study was similar to a study conducted by El Haddawi et al<sup>13</sup> assessed the factors affecting surgical outcome in the elderly. The mean age of the patients in the study was 64.73 years, with 53.8% male and 46.2% female patients. In a similar study by Lawrence et al<sup>14</sup> the mean age of study subjects was 69.6 years with 56% men and 44% women patients.

There is no doubt that chronologic age is a predictor of a decreased postoperative survival rate. This is not surprising, because the net result of the aging process is death. Aging causes disease, and the aging process adversely affects the survival of the organism from disease. Studies have documented that increased age adversely affects operative mortality rates. Hosking and colleagues<sup>15</sup> reviewed operations in 795 patients and found mortality rates of 8.1% for patients 90 to 94 years of age, 9.4% in patients 95 to 99 years of age, and 15.4% in

patients older than 100 years of age. However, chronologic age only slightly affects the morbidity and mortality rates from surgical intervention.

In a study by Marita C et al<sup>16</sup> surgical outcomes in the elderly age group were compared. The results showed that the post-operative complication rate was not statistically different between elderly cohorts (50–64 and >65 years group;  $p=0.26$ ).

Most common co-morbidity observed was hypertension (60%) followed by diabetes (57.5%). No co-morbidity was observed in 22.5% patients. About one fourth of the total subjects (25%) were ASA grade IV and above. Significantly poor outcome in elderly was observed in patients with associated co-morbidities and in ASA grade IV and above ( $p < 0.05$ ). Co-morbid medical conditions and emergency situations adversely affect survival from surgical intervention to a much greater degree than chronologic age alone. Older patients are simply at high risk for both concomitant medical disease and urgent situations, and that is why surgery appears to be riskier in older individuals.

Pre-existing medical conditions in this older age group place them at increased risk of an adverse outcome. Elderly patients with co-morbid conditions have the highest postoperative mortality and morbidity rates in the adult surgical population. Postoperative events of particular concern are cardiac, pulmonary and cerebral injury and cognitive dysfunction. When operating on the elderly, the surgeon must consider the pre-existing morbidity and life expectancy of the patient, before making a decision regarding the requirement and the type of surgery. In addition, the appropriate postoperative rehabilitation regime should be considered. The elderly have diminished physiological reserves and are less able to maintain haemostasis.<sup>17</sup>

Most common indication for emergency surgeries in our study was perforative peritonitis (32.5%) followed by small bowel obstruction and hemoperitonium (7.5% each). About a third of the patients of perforative peritonitis were above 70 years of age. The association was statistically significant ( $p < 0.05$ ).

Although intra-abdominal sepsis affects all age groups, however it takes a greater toll on the elderly age group than it does on younger age group. As individuals age increases, various physiologic alterations become manifest, which affects eradication of infection, immunosurveillance, wound healing and oxygen delivery to tissues. A loss of physiologic reserve, along with concomitant systemic illness leads to worse prognosis for intra-abdominal sepsis. According to Cooper et al<sup>18</sup> elderly patients with intra-abdominal sepsis present to physicians with less acute and delayed symptoms, compared with younger patients and has poor outcome.

About one fourth of the total subjects (25%) were obese while 15% were thinly built. Tachycardia and high blood pressure was observed in 42.5% and 55% patients respectively and pallor was seen in 27.5% patients. Systemic abnormality was observed in relatively fewer patients with disoriented mental status and b/l reduced air entry was seen in 3 patients each and 1 each had diastolic murmur and b/ironchi. Abdominal tenderness was seen in all patients while distension and guarding was observed in 32.5% patients each. Also Poor outcome was significantly associated with lower platelet count and higher TLC count ( $p < 0.05$ ). Leukocytosis, a sign of inflammation, is also a predictor of poor outcome. Several of these factors including leucocytosis

and thrombocytopenia were found to be predictive of mortality by Champion et al and Wong et al.<sup>19,20</sup>

In the present study, deranged liver function test were significantly associated with poor outcome in elderly patients ( $p < 0.05$ ). Similarly poor outcome was associated with higher mean creatinine and BUN levels ( $p < 0.05$ ). On multivariate analysis, raised bilirubin and reduced albumin (serum proteins) and high creatinine were found to be significant predictors of poor outcome in elderly patients undergoing emergency major abdominal surgeries. Surgical literature has shown that preoperative albumin is the leading predictor of postoperative morbidity and mortality.<sup>16</sup> Operative risk correlates with the severity of the underlying liver disease and the nature of the surgical procedure.<sup>21</sup> In a study by Ysuda K et al<sup>22</sup> a poor surgical outcome after abdominal was associated with a high concentration of S. creatinine, blood urea nitrogen, hypoproteinemia and severe anaemia. They concluded that these factors should be taken into account in the perioperative management of chronic haemodialysis patients undergoing abdominal surgery.

Poor outcome after surgery in elderly was strongly associated with increased duration of surgery ( $p < 0.05$ ). Longer operations interfere more with the normal physiology of the body such as fluid and electrolyte balance. Long operations might have a greater chance of blood loss, tissue hypoxia, hypothermia, and wound exposure. Longer periods of intubation increase the postoperative respiratory complications.<sup>14</sup>

As the aging population expands, surgical management of elderly patients will require greater consideration.<sup>23</sup> Elderly patients present a greater challenge because they are more likely to have other co-morbidities and be on additional medications than their younger counterparts.<sup>24</sup> Awareness of the effects of advancing age on post-operative outcomes as well as of the factors that increases surgical risk is important for managing and preventing potential complications. Further investigation should be done on both short and long-term complication rates as well as on the functional outcomes in elderly patients undergoing surgery. In addition, more studies could be focused on outcomes in patients older than 70 or 80 years.

A major limitation of our study was the small sample size, with only 40 elderly surgical patients identified at this single tertiary care centre. But our study provided valuable insight into an understudied area. However, since our study was conducted at a single tertiary academic centre, our results might not be applicable to other hospitals.

## CONCLUSION

Thus to conclude, surgical outcome of a major abdominal operation in the elderly will be dependent on the physical status of the patient preoperatively demonstrated by the ASA grade. A better outcome is associated with the short surgical procedure. The age or sex of the patient has no significant association with the outcome. Other factors predicting the poor outcome in elderly were: obesity, tachycardia, anaemia, high TLC count, raised bilirubin, reduced serum albumin and high serum creatinine

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