Surgical mortality in patients more than 80 years of age

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ABSTRACT

INTRODUCTION Patients aged >80 years account for a considerable proportion of the population admitted to hospital under general surgeons. We aimed to establish the prevalence of mortality in patients aged >80 years who underwent emergency general, vascular and urological surgery within a 13-month period at a large teaching hospital in the UK.

MATERIALS AND METHODS A retrospective analysis was carried out of all patients aged ≥80 years admitted on acute on-call emergency under general, vascular or urological surgeons. Patient demographics (including co-morbidities and sex) were recorded. American Society of Anesthesiologists scores were reviewed from anaesthetic records. The outcome measure was 30-day mortality for those who had undergone emergency general, vascular or urological surgery.

RESULTS A total of 4,069 patients were admitted under general, vascular and urological surgeons during the study period. Of these patients, 521 were aged >80 years. Sixty-three patients underwent emergency surgery and 12 died <30 days after surgery (mortality = 19%).

The most common procedure was laparotomy (20 cases). The most common co-morbidity was cardiac disease, which included hypertension, ischaemic heart disease, and hypercholesterolemia. A considerable proportion of patients also had malignant disease and arthritis.

CONCLUSIONS The present study suggests that emergency surgery should not be denied to subjects aged >80 years based on age alone. Mortality varies according to the type of emergency procedure. Mortality was highest after laparotomy and vascular surgery whereas, for more routine procedures such as hernia repair and abscess drainage, survival was almost 100% after 30 days.

KEYWORDS

Elderly – Mortality – Co-morbidity – Survival

Accepted 14 March 2015

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In a recent report from the Royal College of Surgeons of England highlighting challenges for the surgical profession, emergency surgery was a key issue. Mortality in those aged >80 years was reported to be >25%, varying 12-fold between the best- and worst-performing hospitals.¹

Patients aged >80 years now account for a considerable proportion of the population admitted to hospital under general surgeons. In the UK, 3 million people fall into this age group, and this number is expected to double by 2030.²

We hypothesised that, despite advanced age and multiple co-morbidities, offering emergency surgery to this group of patients (if indicated) is reasonably safe. Therefore, we aimed to establish the prevalence of mortality in patients aged >80 years who underwent emergency general, vascular or urological surgery within a 13-month period at a large teaching hospital in the UK.

Methods

A retrospective analysis was carried out of all patients aged ≥80 years admitted on acute on-call emergency under

general, vascular or urological surgeons. The study period was 1 July 2012 to 31 July 2013 (inclusive). Only the case notes of all appropriately aged patients undergoing surgery during acute admission were assessed. Patient demographics (including co-morbidities and sex) were recorded. Scores based on the classification system for physical status set by the American Society of Anesthesiologists (ASA) were reviewed from anaesthetic records. The outcome measure was 30-day mortality for those who had undergone emergency general, vascular or urological surgery. The information was input onto Microsoft Excel 2008 and analysed accordingly.

Results

A total of 4,069 patients were admitted under general, vascular or urological surgeons during the study period. Of these patients, 521 were aged >80 years. Sixty-three patients (34 males and 29 females; mean age, 84.5 years) underwent emergency surgery and 12 died <30 days after surgery (mortality = 19%).

Table 1 Procedure type and 30-day mortality in patients aged >80 years undergoing emergency surgery

Procedure	Number of patients	Alive after 30 days	Deceased after 30 days	Mortality (%)
<i>Laparotomy</i>	20	15	5	25%
Obstruction/resection of the small bowel	8	5	3	
Hartmann procedure	5	3	2	
Strangulated hernia	2	2	0	
Other	5	5	0	
<i>Urological</i>	5	4	1	20%
<i>Incision and drainage of abscess</i>	8	7	1	12.5%
<i>Hernia repair</i>	13	13	0	0%
Femoral	2	2	0	
Inguinal	6	6	0	
Para-umbilical	5	5	0	
<i>Vascular</i>	12	8	4	33.3%
Critical limb ischaemia necessitating embolectomy/bypass	6	4	2	
Above-knee amputation	1	0	1	
Below-knee amputation	5	4	1	
<i>Other</i>	5	4	1	20%
Total	63	51	12	19%

Table 1 denotes the type of surgery undertaken and survival at 30 days. The most common procedure was laparotomy (20 cases). Other procedures were: vascular; incision and drainage of abscesses; hernia repair; and urological procedures.

Figure 1 demonstrates the co-morbidities of all those undergoing emergency surgery. The most common co-morbidity was cardiac disease, which included hypertension, ischaemic heart disease, and hypercholesterolemia. A considerable proportion of patients also had malignant disease and arthritis.

Discussion

Surgical mortality in the elderly is controversial. However, due to an aging population as well as advancements in surgical procedures and postoperative care, surgery in this age group is becoming more common.

From our data collected over 13 months, there were 4,069 admissions to the surgical admissions unit of a teaching hospital. Of these admissions, 521 of patients were

aged >80 years (13%). We established that 30-day mortality after emergency surgery in this age group was 19%. However, this figure takes into account all types of emergency surgery that was carried out, ranging from laparotomy to hernia repair to vascular procedures. Similar studies looking at surgical outcomes in this age group state that, in common procedures such as hernia repair, 30-day mortality can be <2% but, if postoperative complications occur, then mortality can increase to 33%.⁵

Several factors predispose to postoperative complications in this age group: pre-existing disease, ASA >III, and the need for a major surgical procedure.⁴

In the present study, the ASA scores of the 12 patients who died were >III, suggesting that poor preoperative status led to an unfavourable postoperative outcome. Also, 55 of the 63 patients who underwent emergency surgery had cardiac co-morbidities (most commonly hypertension). However, also included in this category were ischaemic heart disease, atrial fibrillation and previous myocardial infarction. Other prevalent co-morbidities were arthritis (which would be expected in this age group) but also

malignant disease. The latter was mainly colorectal malignancy, hence the need for emergency laparotomy due to bowel obstruction.

Hessman *et al* looked at survival in elderly patients with colorectal cancer. They concluded that age should not be a disqualifying factor for surgery. They also reported that the ASA score was a better predictor of perioperative mortality and survival than age alone.⁵ ASA score is a subjective assessment of physical health based on five classes. Class III denotes severe systemic disease.⁶ In relation to postoperative mortality in emergency surgery, ASA = I reflects a 1/1000 chance of postoperative complications, whereas ASA $\geq$ IV denotes a 26.5/1000 risk.⁷

In 2005, Abbas and Booth investigated mortality after major abdominal surgery in octogenarians. After emergency surgery, 30-day mortality was 29%, yet only 7.5% after elective procedures.⁸ Also, patients with ASA = IV/V were less likely to survive than those with ASA = II/III. This finding is in accordance with our study in which >70% of those who underwent emergency surgery had ASA >III (including 11 out of the 12 patients who died). Mortality in the study by Abbas and Booth appears to be higher than ours, but their study focused only on abdominal surgery. Furthermore, long-term survival was similar regardless of whether surgery was emergency or elective when compared with an age-matched population.

Various studies carried out in the UK have demonstrated a similar prevalence of mortality in this age group. In 2012, Saunders *et al* investigated variations in mortality after emergency laparotomy across 35 National Health Service Hospitals. Results showed that mortality in all age groups was 14.9%, and was 24.4% in those aged $\geq$ 80.⁹ ASA

score was a better predictor of postoperative mortality, and ASA $\geq$ III was classified as 'high risk'. Mortality was also affected by whether the patient was transferred to the ward or to the intensive care unit postoperatively, suggesting that surgical mortality is dependent on the ability of clinicians to recognise and manage surgical complications.¹⁰

Byrne *et al.* highlighted that a considerable burden of mortality lies outside the 30-day 'window', and suggested that 90-day mortality should be considered. In their study, mortality after colorectal surgery was 8.5% after 30 days and 11.3% after 90 days.¹¹ They also stated that mortality was greater with advancing age and increasing number of co-morbidities.

A recent review looking at 17 studies of elderly patients undergoing elective colorectal resection highlighted 30-day mortality of 0–13%.¹² However, that study also questioned the value of recording 30-day mortality in the elderly because mortality can remain $\leq$ 1% even 1 year after surgery.

Conclusion

The present study suggests that emergency surgery should not be denied to subjects aged >80 years based on age alone. Mortality varies according to the type of emergency procedure. In our study, mortality was highest after laparotomy and vascular surgery whereas, for more routine procedures such as hernia repair and abscess drainage, survival was 100% after 30 days.

Our study had limitations. Firstly, we focused only on patients who had a surgical intervention. Hence, we could not comment on patients who did not undergo surgery. Secondly, the study cohort was small: only 63 patients had

emergency procedures. Thirdly, as noted by other scholars, 30-day mortality in individuals aged >80 years may not be the most accurate way to assess survival. Hence, if we had employed a much longer follow-up, more accurate survival data could have been obtained. Finally, it is important to note that our study carried out at a single university hospital. Comparison of outcomes from smaller district general hospitals would have enabled a more general overview of emergency surgical outcomes in this age group. Thus, though we deem it reasonably safe for emergency surgical procedures in those aged >80 years to be carried out at our hospital, this may not be the case for smaller hospitals in terms of postoperative recovery, beds in the intensive therapy unit, and access to emergency imaging.

Overall, we have shown that age should not be a disqualifying factor for emergency surgery in those aged >80 years. Most patients who underwent surgery had ASA $\geq$ III and multiple co-morbidities, but the majority survived 30 days after surgery. Of the patients who died, many had poor functional status preoperatively, and surgery may have been a 'last resort' that failed. Further work is needed on a larger cohort over a longer period of time, but these data are useful additions to the evidence base.

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