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Abdominal Surgery in Nonagenarians: Short-Term Results

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Abstract
Purpose. To determine the short-term results of abdominal surgery in nonagenarians.
Methods. Retrospective analyses of 193 patients aged 90 and older operated on for abdominal complaints during a 15-year period (1990–2004) in a 500-bed tertiary care institutional hospital and 100-bed rural institutional hospital in Spain. The factors analyzed included the following: perioperative risk, diagnosis, operative procedures, timing of operation (elective or emergency), morbidity, mortality, and length of hospital stay.
Results. The most common diagnoses were hernia in 69 cases, colorectal cancer in 39, and biliary lithiasis in 24. One hundred and thirty-seven patients (71%) were operated on on an emergency basis. Forty-seven patients died (24%), with mortality rates of 9% (5/56) and 31% (42/137) respectively, for elective and emergency surgery. None of the 15 patients classified as grade I according to the criteria of the American Society of Anesthesiologists (ASA) died and only 3 out of 63 (5%) died who were ASA grade II. Eighty patients (41%) had postoperative complications. Local morbidity was 16% (n = 30), and systemic morbidity was 30% (n = 58).
Conclusions. Our results support the notion that elective and acute abdominal surgery in nonagenarians can be performed with acceptable rates of mortality and morbidity. Mortality for surgery in nonagenarians is strongly related to the perianesthetic risk (ASA grade), emergency operation, and seriousness of the disease in question.

Key words Nonagenarians · Elderly · Mortality · Morbidity · Abdominal surgery

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Introduction

Parallel to the increase in life expectancy in Western countries, there has been a dramatic increase in the number of very old patients presenting pathologies susceptible to surgical treatment. Although elderly surgery is one of the focal points of current medical research, the number of reports about surgery in nonagenarians is still small.[1–10] Surgeons have to decide whether surgical treatment is justified in these patients, who have a limited life expectancy. Despite advances in surgical technique, anesthetic procedures and postoperative care, there is reticence in treating elderly people in the same way as their younger counterparts. Often, for therapeutic decisions, the age of the patient has more weight than comorbidity, surgical possibilities, or the capacity to benefit. The importance of appropriate surgical treatment does not decrease with age. The aim of this report is to analyze the short-term results of patients aged 90 years and over operated on for abdominal pathology. Long-term results are beyond the scope of this paper.

Methods

During a 15-year period (1990–2004), 193 patients over 89 years of age operated on for abdominal complaints in the University Hospital Río Hortega in Valladolid (500-bed tertiary care hospital) and Hospital of Medina del Campo (100-bed rural hospital) were analyzed retrospectively. No cases were excluded in this study. The analyses was focused on sex, associated conditions, perianesthetic risk (American Society of Anesthesiologists (ASA) grade (11)), diagnosis, operative procedures, timing of operation (elective or emergency), morbidity, mortality, and in-hospital stay. Morbidity was divided into local (related to surgical technique) and systemic types (cardiac, pulmonary, thromboembolic, etc.). The

chi-squared test with Yates' correction and Student's *t*-test were used to assess the presence of any significant differences.

Results

The patients ranged from 90 to 104 years of age (mean 92 years). There were 112 women and 81 men. One hundred and six patients were operated on between 1986 and 2000 and 87 in 2001–2004. One hundred and fifteen patients (60%) had significant comorbidity. According to the perianesthetic risk 15 patients (8%) were classified as ASA I, 63 (33%) ASA II, 70 (36%) ASA III, 35 (18%) ASA IV, and 10 (5%) ASA V. One hundred and thirty-seven patients (71%) were operated on on an emergency basis. An operation was indicated because of disorders of the abdominal wall in 69 cases, colorectal in 46, hepatobiliary in 30, small bowel in 22, gastroduodenal in 13, appendicular in 7, and other pathologies in 6. The diagnosis of patients operated on on an emergency basis were: intestinal obstruction in 59 cases, diffuse peritonitis in 17, local peritonitis in 17, intestinal ischemia in 10, acute appendicitis in 7, and other diagnoses in 35. Fifty-four patients (28%) were operated on for gastrointestinal cancer, 9 of them having distant metastasis (17%). Fifty-five percent of the patients operated on electively were treated for gastrointestinal cancer ($n = 31$) in comparison to 17% ($n = 23$) of those operated on on an emergency basis ($P = 0.0001$, 1 df, $\chi^2 = 29$).

The operations for colorectal pathologies comprised 15 elective resections (6 right colectomies, 5 left, and 4 anterior resections) and 13 nonelective resections (5 right colectomies, 4 left, 2 anterior resections, and 2 subtotal colectomies). A colostomy was performed in 13 cases, (5 elective and 8 nonelective). Other techniques were employed in 5 cases. For abdominal wall hernias, 17 elective repairs were made and 52 nonelective (7 with intestinal resection). For hepatobiliary pathology 5 elective and 19 nonelective cholecystectomies were indicated (4 with sphincterotomy); other types of surgery were done in 6 cases (3 elective and 3 nonelective each). For elective gastroduodenal disease, 1 subtotal gastrectomy and 3 gastroentero-anastomoses were performed. In 10 nonelective cases 6 perforation sutures and 4 piloroplastia were performed. Laparoscopy was used only in two cases for a cholecystectomy. Mean intensive care unit stay was 1 day for elective and emergency cases.

The patients operated on because of small bowel disorders underwent a resection in 7 cases, a correction of adhesions in 9, an enterotomy in 2, and other procedures in 4. The overall mortality was 24% ($n = 47$). The overall morbidity was 41% ($n = 80$), while the reoperation rate was 5% ($n = 10$). Analyses of mortality are shown in Table 1. Mortality for elective surgery was 9%, and 31% for emergency surgery. For emergency surgery, the highest mortality rates were in cases of intestinal ischemia, diffuse peritonitis, and bowel obstruction ($P = 0.0007$, 1 df, $\chi^2 = 19$).

Mortality in relation to the timing of operation is described in Table 2. No deaths were recorded in the ASA grade I patients operated on electively, and only 3 out of 63 (5%) of those ASA II patients, thus increasing the mortality rate in relation to the ASA score increase ($P = 0.0001$, 1 df, $\chi^2 = 44$). No differences in the mortality were found throughout the period of study. No deaths were computed for elective hernia repair, cholecystectomy and laparotomy. The mortality for gastrointestinal resection was 12% (2/17) and 25% for palliative bypass and stoma (3/12). Mortality for each surgical technique increased in the emergency cases.

For patients undergoing surgery on an emergency basis, the rate of mortality was 16% (8/50) when the time from the onset of symptoms to surgery was less than 48 h, and it increased to 39% (34/86) when this time was longer than 48 h ($P = 0.0075$, 1 df, $\chi^2 = 8$). The causes of mortality were: multiorgan failure 23 cases, respiratory insufficiency 6, cardiac failure 5, acute renal failure 4, cardiac arrest 4, acute cerebrovascular accident 4, and terminal cancer 1.

Morbidity is described in Table 3. Local morbidity was 16% ($n = 30$) while systemic morbidity was 30% ($n = 58$). The median hospital stay was 10 days (range 1–47), namely 12 days for patients with complications and 8 days for those without.

Discussion

The present series shows that abdominal surgery in nonagenarians represents a far from negligible amount

Table 1. Mortality analyses

	Cases	Deaths	%
*Type of surgery**			
Elective	56	5	9
Nonelective	137	42	31
*Acute pathology***			
Obstruction	59	17	28
Diffuse peritonitis	17	12	71
Local peritonitis	17	4	23
Intestinal ischemia	10	5	50
Other nonelective	34	5	14
Hospital			
Tertiary	139	37	27
Rural	54	10	19

* $P = 0.0026$, 1 df, $\chi^2 = 9$; ** $P = 0.0007$, 1 df, $\chi^2 = 19$

Table 2. Mortality and timing of operation

	Elective Death/cases (%)	Nonelective Death/cases (%)	Total %
ASA grading	*	**	***
ASA I	0/2 (0)	0/13 (0)	0/15 (0)
ASA II	0/30 (0)	3/33 (9)	3/63 (5)
ASA III	3/21 (14)	17/49 (35)	20/70 (23)
ASA IV	1/2 (50)	15/33 (45)	16/35 (46)
ASA V	1/1 (100)	7/9 (78)	8/10 (80)
Period			
1990–2000	3/25 (12)	23/81 (28)	26/106 (25)
2001–2004	2/31 (6)	19/56 (34)	21/87 (24)
Operation		†	††
Gastrointestinal resection	2/17 (12)	10/32 (31)	12/49 (25)
Hernia repair	0/17 (0)	4/43 (9)	4/60 (7)
Cholecystectomy	0/5 (0)	2/19 (11)	2/24 (8)
Palliative bypass and stoma	3/12 (25)	6/10 (60)	9/22 (41)
Laparotomy (nontherapeutic)	0/2 (0)	6/10 (60)	6/12 (50)
Appendectomy	—	3/7 (43)	3/7 (43)
Other	0/3 (0)	11/16 (69)	11/19 (57)

* $P = 0.0011$, 4 df, $\chi^2 = 18.4$; ** $P = 0.0001$, 4 df, $\chi^2 = 26$; *** $P = 0.0001$, 4 df, $\chi^2 = 44$
† $P = 0.0001$, 6 df, $\chi^2 = 32$; †† $P = 0.0001$, 6 df, $\chi^2 = 34$

Table 3. Morbidity

	Cases ($n = 193$)	%
Local morbidity		
Wound infection	12	6
Anastomotic dehiscence	6	3
Intra-abdominal abscess	2	1
Intestinal obstruction	4	2
Other local	13	7
Systemic morbidity		
Respiratory	20	10
Cardiac	18	9
Renal	12	6
Sepsis	10	5
Cerebrovascular	4	2
Gastroduodenal bleeding	7	4
Thromboembolic	3	2

of cases with an expected dramatic increase in the years to come. In the last four years of the study we operated on nearly the same number of nonagenarians as in the previous ten years. This underlines the importance of this problem.

Several previous reports have analyzed the surgical outcomes in elderly patients,[10,12–16] but only few have specifically dealt with surgery in nonagenarians.[1–10] It is difficult to evaluate and to compare the results reported for surgery in nonagenarians. Most previous studies are a compendium of a wide number of nonrelated pathologies.[2–5,6,9] We have only found four reports that specifically analyzed abdominal surgery in this group of patients,[1,8–10] but all four consisted of a small number of cases. The significant predominance of females is justified because of their higher life expectancy. As previously described,[1–4,8] 65% of our patients had associated diseases. The rate of acute operations in our series (71%) was similar to the previously reported rates which ranged from 60%[8,9] to 74%,[1,5] The mortality rates for abdominal surgery in nonagenarians ranged from 9% to 40%.[1–10] The mortality in our series (24%) was similar to the majority of reports for patients over 80 years of age[10,11–16] and other studies that focused on nonagenarians.[2,7] Rigberg et al.[1] and Burns-Cox et al.[9] describe mortality rates of 13% for emergency abdominal surgery, but in their series there was a significant selection bias. Other series that analyze this subject report a mortality rate of 40%.[8] The analyses of mortality in our study show that mortality for surgery in nonagenarians is strongly related to the perianesthetic risk (ASA grade), emergency operation, and seriousness of the disease in question. For acute surgery, the time lapse between the onset of symptoms and surgery is related to the mortality rate.

Abdominal surgery in elderly patients is associated with high morbidity rates, particularly those derived from previous coexisting diseases. Our results (41%) are therefore similar to those previously reported.[13,15–17] Colorectal cancer, groin hernia, and biliary lithiasis are all common reasons for surgery in nonagenarians, especially in their complicated forms, in this series. Our results support the opinion that elective and acute abdominal surgery in nonagenarians can be performed with acceptable rates of mortality and morbidity. No mortality was observed for abdominal surgery in ASA I grade patients[8,9] and rates less than 3% for ASA II

grade patients have been reported,[9] and confirmed in this series. Nonetheless, many questions remain regarding surgery in nonagenarians. What percentage of these patients could have been treated electively? Are diagnostic tools used in nonagenarians in the same manner as in their younger counterparts? What percentage of nonagenarians with surgical pathologies are rejected for elective surgery based on an overestimation of the surgical risk, incorrect concepts about surgery for this kind of patient, etc.? When should an extremely old patient not be operated on? We should therefore be careful to ensure that we are not treating moribund cases.

We believe that surgery in nonagenarians has been guided more by ethical and traditional concepts than by an objective evaluation of the results from a scientific point of view. The challenge in the future will be to find a good balance of all these factors in order to appropriately select patients for surgery. To resolve these questions, further prospective studies are necessary in the years to come.

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