



Factors affecting mortality and morbidity in emergency abdominal surgery in geriatric patients

Geriyatrik akut cerrahi karında mortalite ve morbiditeyi etkileyen faktörler

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BACKGROUND

The purpose of the present study was to determine the factors affecting morbidity and mortality in geriatric patients undergoing abdominal surgery.

METHODS

Ninety-two patients who had undergone acute abdominal surgery at >65 years of age were evaluated in terms of surgical indications, morbidity and mortality rates and the factors affecting morbidity and mortality. Forty-eight patients (52.2%) were males and 44 (47.8%) were females. The mean age was 73.32±6.37 (65-92) years.

RESULTS

The most common surgical indication was acute cholecystitis (26.09%). Morbidity was established as 21 (22.82%) and mortality as 14 (15.21%), and the most common cause of mortality was mesenteric vascular occlusion. American Society of Anesthesiology (ASA) IV was noted in 90.05% of the patients admitted to intensive care, and 92.85% of the patients had mortal progression. The mean hospitalization duration was 7.94±7.13 days (median, 7 days). While older age and high ASA scores were significantly correlated with morbidity, mortality and duration of hospitalization, gender was not ($p>0.05$).

CONCLUSION

In order to decrease the postoperative mortality rate in geriatric patients, precaution should be taken beforehand to avoid surgical complications. By carrying out elective surgery in geriatric patients, the likelihood of common causes of acute abdomen, such as acute cholecystitis and incarcerated hernia, can be reduced.

Key Words: Acute abdomen; geriatric patient; mortality; morbidity.

AMAÇ

Çalışmamızın amacı, abdominal cerrahi girişim uygulanan yaşlı hastalarda morbidite ve mortaliteyi etkileyen nedenleri incelemektir.

GEREÇ VE YÖNTEM

Akut karın nedeniyle ameliyat edilen 65 yaş ve üzerindeki 92 hastada cerrahi endikasyonlar, morbidite ve mortalite oranları ve bunlar üzerine etkili olan faktörler yönünden incelendi. Hastaların 48'i (%52,2) erkek, 44'ü (%47,8) kadındı. Ortalama yaş 73,32±6,37 (65-92) idi.

BULGULAR

En sık cerrahi endikasyon akut kolesistit (%26,09). Morbidite sayısı 21 (%22,82) oldu. Mortalite sayısı 14 (%15,21) olup en sık neden mezenterik vasküler oklüzyondu. Yoğun bakıma giden hastaların %90,05'i, ölümlü sonuçlanan vakaların %92,85'i Amerikan Anesteziyoloji Derneği skoru (ASA) IV idi. Ortalama hastanede kalış süresi 7,94±7,13 (medyan değeri 7) gün bulundu. İleri yaş, yüksek ASA skorunun morbidite, mortalite, hastanede kalış süresi üzerinde anlamlı etkisi görülürken, cinsiyetin anlamlı bir fark oluşturmadığı görüldü ($p>0,05$).

SONUÇ

Geriyatrik hastalarda ameliyat sonrası mortalite hızını azaltabilmek için ameliyat komplikasyonlarının ortaya çıkmadan önce önlenmesi gerekir. Akut kolesistit, boğulmuş fitik gibi yaşlılarda sık görülen akut karın nedenleri elektif şartlarda opere edilerek bu acil durumların ortaya çıkma ihtimalini azaltabiliriz.

Anahtar Sözcükler: Akut karın; geriyatrik hasta; mortalite; morbidite.

Life expectancy has been increasing steadily as a result of better living standards and advances in medicine. People >85 years of age represent the fastest growing population group in the United States (US). Life expectancy in Turkey is approximately 69 years, and the proportion of the population >65 years of age is 6% of the general population. It has been estimated that this figure will reach 10% by 2025.^[1] Accompanying this increase in the geriatric population, emergency surgery in the elderly has become more common.^[2] As a result of the aging process, there is increased deterioration at the cellular level and in organ systems. Consequently, surgical interventions, and in particular emergency abdominal surgery, can lead to severe and life-threatening conditions for senior citizens.^[3]

The purpose of the present study was to determine the factors that have an impact on morbidity and mortality in geriatric patients undergoing emergency abdominal surgery.

MATERIALS AND METHODS

Ninety-two patients >65 years of age were enrolled in the study. The participants had undergone acute abdominal surgery at İstanbul Haydarpaşa Numune Training and Research Hospital at the 5th General Surgery Clinic between December 2003 and March 2009. Patient records were used to provide a database. Variables, such as age, gender, American Society of Anesthesiology (ASA) score, and underlying medical conditions, were investigated in terms of their impact on morbidity, mortality and duration of intensive care and hospital stay. ASA IV was accepted as a high ASA score.

Table 1. Indications of acute abdominal surgery

Indications	Patients n (%)
Acute cholecystitis	24 (26.09)
Acute (with stones)	22 (91.6)
Acalculous	2 (8.4)
Mechanical intestinal obstruction	23 (25.00)
Colonic malignancy	16 (69.6)
Adhesion	4 (17.4)
Sigmoid volvulus	3 (13)
Incarcerated hernias	18 (19.57)
Inguinal	11 (61.1)
Umbilical	3 (16.7)
Femoral	2 (11.1)
Incisional	2 (11.1)
Mesenteric vascular occlusion	10 (10.87)
Peptic ulcer with perforation	9 (9.78)
Acute appendicitis	6 (6.52)
Perforated	3 (50)
Nonperforated	3 (50)
Diverticulosis perforation	2 (2.17)

NCSS 2007 and PASS 2008 Statistical Software (Kaysville, Utah, US) was used to perform statistical analyses of the study data. Along with descriptive statistics (mean and standard deviation), the Student t-test was used for age values that had a normal range and the Mann-Whitney U test for irregularly distributed data, such as ASA scores and duration of hospital stay. Qualitative data were compared using the chi-square test. The results were evaluated at a confidence interval of 95% and significance was set at $p < 0.05$.

RESULTS

Of the patients, 48 (52.2%) were males and 44 (47.8%) were females. The male-to-female ratio was 1.09. The mean age was 73.32 ± 6.37 years (range, 65-92 years). The mean ASA score was 3.30 ± 0.65 (median value, 3). Twenty-two patients (23.9%) had undergone at least one abdominal surgery. The most common surgical indication was acute cholecystitis (26.09%), followed by intestinal obstruction (25%; Table 1, Fig. 1). Morbidity occurred in 21 patients (22.82%), with the most common causes related to cardiac, pulmonary and wound location problems. Mortality occurred in 14 patients (15.21%), with the most common cause being mesenteric vascular occlusion (Table 2, Fig. 2). Seventy five patients (81.52%) had at least one underlying chronic condition, the most common of which was cardiovascular disease. Of the 14 patients with mortality (15.1%), all had at least one comorbid condition, whereas comorbid conditions existed in 61 of the surviving patients (66.3%). The morbidity rate was significantly higher in the group of patients with chronic diseases compared to those without ($p < 0.05$).

The mean hospital stay was 7.94 ± 7.13 days (median, 7 days). The mean hospital stay for patients with high ASA scores was 10.70 ± 9.53 days (median, 8 days), while patients with lower ASA scores had a mean hospital stay of 6.16 ± 4.27 days (median, 6 days). The difference between the hospital stay with

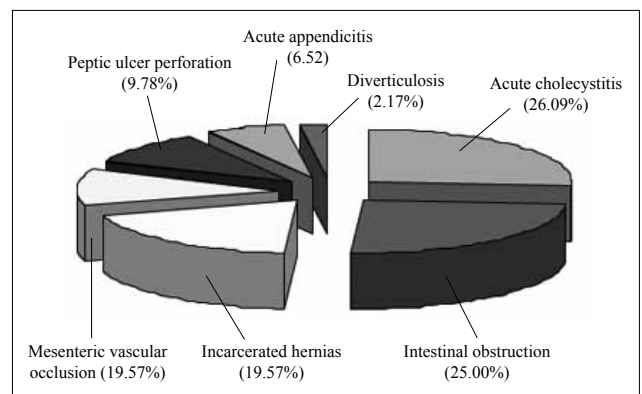


Fig. 1. Acute abdominal surgery indications in geriatric patients.

Table 2. Mortality rates

Emergency abdominal surgery	Mortality n (%)	Percentage with respect to all cases with mortality n (%)
Acute cholecystitis (n=24)	2 (8.4)	2 (14.3)
Mesenteric vascular occlusion (n=10)	8 (80.0)	8 (57.1)
Peptic ulcer with perforation (n=9)	3 (33.3)	3 (21.4)
Colonic obstruction (n=23)	1 (4.3)	1 (7.2)
Incarcerated hernias (n=18)	–	–
Acute appendicitis (n=6)	–	–
Diverticulosis (n=2)	–	–
Total (n=92)	14 (15.21)	14 (100)

respect to ASA classification was statistically significant ($p<0.05$). The hospital stay was significantly longer in patients observed with morbidity compared to patients without morbidity ($p<0.01$; Table 3).

Twenty-two patients (23.91%) were followed in the intensive care unit after surgery. Of these, 20 (90.01%) had an ASA score of IV. Of the patients with mortal progression, 13 (92.85%) were observed to have an ASA score of IV. Mortality occurred in 14 patients (63.6%) among those who were followed in the intensive care unit. A high ASA score was established to be significantly correlated with morbidity and mortality ($p<0.01$). The mean age of the patients with mortality was significantly higher than that of the surviving patients ($p<0.05$). Gender was not established to be significantly correlated with mortality (Table 4).

DISCUSSION

An increase in life expectancy has been observed in developed and developing nations, including Turkey, due to advances in the diagnoses and treatments of cardiovascular and pulmonary diseases, as well as of chronic conditions, such as diabetes mellitus. Consequently, there has been an increase in the number of geriatric patients requiring surgical interventions.^[4]

Medical conditions leading to acute abdomen in

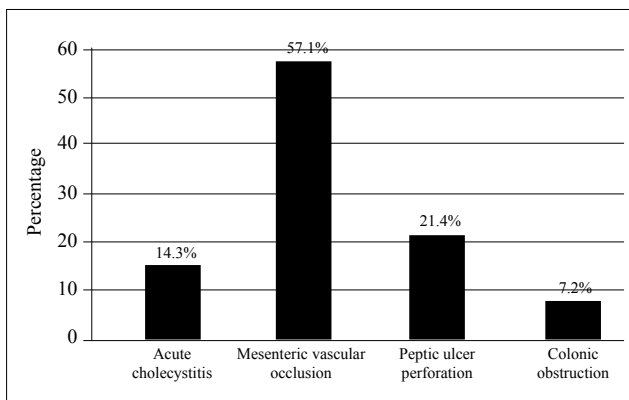


Fig. 2. Percentage of emergency abdominal surgery cases with respect to all cases with mortality.

geriatric patients are different from those in younger people. Altered metabolic and endocrine responses, as well as depressed physiologic capacity, have an effect on the symptoms and findings of the medical condition, thus leading to delayed diagnosis or a more complicated peri-operative period. Another problem encountered in geriatric patients is the difficulty in taking anamnesis. This is partly due to their poor general health, failing memory, hearing problems, and dependence on others in hospital admissions.

It is known that cardiac, renal and pulmonary reserves begin to become depleted in the older ages. Although ample time may be available before elective surgery to evaluate operative indications and comorbid conditions, this is not the case in emergency surgery. Therefore, complications and mortality rates following emergency surgery are higher in the geriatric patient population than they are after elective surgery.^[3,5,6] Lyon^[7] reported mortality rates of between 15% and 34% following emergency abdominal surgery. Juan^[8] established the mortality rate to be 22%. Post-operative pneumonia, cardiac complications and sepsis are known to account for a large part of the deaths. The presence of an underlying chronic condition has an adverse effect on the prognosis in patients undergoing emergency surgery, and it increases the mortality more than in elective surgery cases. The mortality rate was 15.21% in the present study; all those patients had at least one underlying chronic condition, such as congestive heart failure, chronic obstructive pulmonary disease (COPD) or diabetes. According to the ASA classification, which is a subjective system, it is known that mortality and morbidity rates are significantly higher in patients with ASA scores of IV or V. In the present study, we observed significantly higher ASA scores in patients with morbidity and mortality ($p<0.01$).

Acute cholecystitis is one of the leading causes of abdominal surgery in the geriatric population, resulting in high morbidity and mortality rates.^[9-11] While the incidence of cholelithiasis is 5% for women <40 years of age, the incidence rises to 30% for women >80 years

Table 3. Factors affecting morbidity rates

	Morbidity			p
	General Mean±SD (Median)	No Mean±SD (Median)	Yes Mean±SD (Median)	
Hospital stay (days)*	7.94±7.13 (7)	5.86±4.16 (5)	14.47±10.17 (7)	0.001
	n (%)	n (%)	n (%)	
ASA score**				
Low	54 (57.7)	48 (67.9)	6 (28.6)	0.001
High	38 (41.3)	23 (32.4)	15 (71.4)	
Comorbid condition**				
Yes	62 (67.4)	46 (64.8)	16 (76.2)	0.04
No	30 (32.6)	25 (35.2)	5 (23.8)	

*Mann-Whitney U test; **Chi-square test.

ASA: American Society of Anesthesiology; SD: Standard deviation.

Table 4. Factors affecting mortality rates

	General	Survived	Exitus	p
	Mean±SD (Median)	Mean±SD (Median)	Mean±SD (Median)	
Age (years)*	73.32±6.37	72.65±6.24	77.07±5.95	
ASA**	3.30±0.65 (3)	3.19±0.64 (3)	3.92±0.27 (4)	
	n (%)	n (%)	n (%)	
Gender**				
Female	44 (47.8)	39 (50.0)	5 (35.7)	0.324
Male	48 (52.2)	39 (50.0)	9 (64.3)	
ASA score***				
Low	54 (57.7)	53 (67.9)	1 (7.1%)	0.001
High	38 (41.3)	25 (32.1)	13 (92.9)	

*Student t-test; **Mann-Whitney U test; ***Chi-square test.

ASA: American Society of Anesthesiology; SD: Standard deviation.

of age.^[12] It is noteworthy that the patients with acute cholecystitis represented the largest patient group that had undergone surgery in the present study (Fig. 1).

It is evident that performing surgery promptly for asymptomatic gallstones is of critical importance for geriatric patients. Decreased gallbladder motility and cholesterol metabolism in older people have been implicated in the formation of gallstones. Older patients often present late and with increased complication risks. As a result, the need for emergency surgery is higher, which also represents increased risks for morbidity and mortality. Patients with symptomatic gallstones should be offered surgical therapy regardless of their age. Geriatric patients should undergo surgery as do younger patients after the comorbid conditions have been addressed.

Incarcerated hernia is another common cause of surgery in the geriatric population. Patients with hernias who have not been offered elective surgery due to

a comorbid condition or older age have high rates of morbidity and mortality when they undergo emergency surgery.^[2] Strangulation can occur in hernia cases when the blood flow of the organ inside the herniation sac is impaired or obstructed due to a narrow herniation neck or intrinsic band. Resection was performed in two (11.1%) patients with segmentary gangrene in the intestines as a result of strangulation. Adesunkami^[13] reported in his study that the incidence of gangrenous intestinal necrosis induced by strangulation was 14%.

Hernia support belts used for extended periods may increase fibrosis and scar tissue formation in the area, which makes surgery more difficult. Hence, hernia support belts are not recommended as they constitute an extra burden on the patients.

Mechanical intestinal obstruction accounts for 15%-20% of all emergency surgery cases in geriatric patients.^[14,15] We established this ratio to be 25% in

the present study (Table 1). The incidence of colon cancer increases with age, and the incidence in people >65 years of age is roughly five times higher than in younger people.^[3] Postoperative mortality and morbidity also increase with age. Colonic malignancies with mechanical intestinal obstruction were established to have an incidence of 69.6% in the present study. Intestinal obstruction as a result of postoperative adhesions was another major mechanical intestinal obstruction and accounted for 17.4% of all obstruction cases.

Sigmoid volvulus is another cause of colonic obstruction, particularly common in elderly persons. Sigmoid volvulus is the most common type of colonic volvulus (75%-80%).^[7] Of all the cases of obstruction, three patients (13%) were shown to have sigmoid volvulus (Table 1). Those cases failed to respond to reduction and decompression through sigmoidoscopy during the pre-operative period.

Mesenteric vascular occlusions are particularly common in elderly patients with cardiovascular disease. Mesenteric vascular occlusion accounts for 10% of all emergency acute abdominal indications in the geriatric population.^[16] In the present study, this figure was established as 10.87%. Mesenteric vascular occlusion has a high mortality rate because of its clinical consequences.^[17] Mamode^[18] reported mortality in mesenteric vascular occlusions as 81%. This figure was 80% in the present study, and was the most frequent cause of mortality among acute abdominal surgery cases, with a rate of 57.1%.

Peptic ulcer and colonic diverticulosis with perforation readily lead to peritonitis in the geriatric population. Consequently, abdominal sepsis develops, resulting in high rates of mortality and morbidity. Therapy is delayed in elderly patients due to delayed presentation to the hospital. While the mortality rate in patients with peptic ulcer perforation is 18%-20% in the general population, the figure reaches 41.8% in geriatric patients.^[19] The mortality rate in patients with peptic ulcer perforation was 33.3% in the present study and was the second most frequent cause of mortality. Delayed hospitalization and abdominal peritonitis, observed commonly, are accountable for this outcome.

While acute appendicitis is the leading cause of acute abdominal surgery for young people, this particular condition ranks rather low in the geriatric population. It was reported that only 5%-10% of all acute appendicitis cases occurred in elderly persons.^[20] In the present study, we established this ratio to be 6.52%. Ağalar^[4] reported the figure to be 8.7%. Elderly persons, due to alterations in the threshold of pain, have problems localizing pain. Therefore, acute appendicitis is a more insidious condition for older people. Diagnosis and therapy can be delayed.

Consequently, morbidity and mortality increase due to the high incidence of perforations.^[21] One-half of our cases involving acute appendicitis were observed to have a perforation. Therefore, early diagnosis and prompt surgical intervention are of critical importance in elderly patients.

The most common indications for acute abdominal surgery in the geriatric population in the present study were acute cholecystitis, intestinal obstruction, and incarcerated hernia. Mesenteric vascular occlusion and peptic ulcer with perforation were the leading causes of mortality. While older age and high ASA scores were noted to have a significant effect on morbidity, mortality and the duration of hospital stay, gender was not shown to have a significant effect.

Although considerable progress has been made in surgical techniques, anesthesia procedures and post-operative patient care in terms of the results of surgical operations in the geriatric population, surgery remains a major cause of morbidity and mortality in elderly people due to their depleted physiologic reserves.^[22]

In an effort to decrease mortality rates, precautions should be taken beforehand particularly to avoid complications observed in geriatric patients, considering the high mortality rates observed in late-stage complications. For instance, elderly patients with common conditions, such as acute cholecystitis and incarcerated hernia, can be offered elective surgery to avoid emergency interventions. Keeping systematic disease under control will render surgical operations safer.

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