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原　　著

A Clinical Study of Elderly Patients with Acute Cholecystitis

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Abstract

In recent years, an increase in average life expectancy has led to a rapid rise in the number of elderly patients undergoing surgery for acute cholecystitis. We studied the clinical characteristics of elderly patients (aged 75 years of more) undergoing surgery for acute cholecystitis, as compared with those of non-elderly patients (aged less than 75 years) undergoing similar procedures. Twenty-four of the patients were elderly, and 44 were non-elderly. [Results] Echography and abdominal computed tomography (CT) revealed no characteristic findings specific to elderly patients, but a smaller proportion of elderly patients showed a three-layered structure of the gallbladder wall. The leukocyte count on admission was significantly lower in elderly patients than in non-elderly patients. As for therapy, a significantly higher proportion of elderly patients underwent percutaneous transhepatic gallbladder drainage (PTGBD)＋cholecystectomy＋choledochotomy/choledocholithotomy, as compared with non-elderly patients. In contrast, cholecystectomy alone was performed more frequently in non-elderly patients than in elderly patients. The main postoperative complications were psychic symptoms and respiratory tract infections. The postoperative hospital stay was significantly longer for elderly patients, in part because they requested to remain in the hospital until they were able to perform activities of daily living.

Introduction

In recent years, an increase in the average life expectancy has led to a rise in the number of elderly patients with acute cholecystitis, many of whom require surgery. Few previous studies have addressed the issue of acute cholecystitis in elderly patients. We therefore studied the clinical characteristics of elderly patients (aged 75 years or more) who underwent surgery for acute cholecystitis, as compared with a non-elderly group of patients (aged less than 75 years) who underwent similar procedures.

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索引用語: 急性胆嚢炎，高齢者，超音波検査，白血球数，術後経過
Key words: Acute Cholecystitis, Elderly Patients, Ultrasonography, Leukocyte Count, Postoperative Courese

I. Subjects and Methods

1. Subjects

Between April 1989 and March 1995, a total of 381 patients were admitted to our department with a diagnosis of cholelithiasis. The diagnosis was based on the following findings at admission: fever, leukocytosis, abdominal findings, and imaging findings. Sixty-eight of these patients underwent surgery and were divided into two groups: elderly patients (aged 75 years or more) with acute cholecystitis (group I) and non-elderly patients (aged less than 75 years) with acute cholecystitis (group II). Group I consisted of 24 patients, with a mean age of 78.8 years. Ten of the patients were men, and 14 were women. Group II comprised 44 patients, with a mean age of 58.3 years. Thirty-two of the patients were men, and 12 were women (Table 1).

2. Methods

1) Ultrasnographic evaluation of acute cholecystitis

Ultrasonographic studies of the gallbladder were performed to assess five characteristics: (1) enlargement of the gallbladder (defined as longest diameter ≧8 cm; shortest diameter ≧4 cm); (2) thinckening of the gallbladder wall (defined as thickness ≧4 mm) (3) three-layered structure of the wall; and (4) the presence of debris in the gallbladder; and (5) a hypoechoic region around the gallbladder.

2) Computed tomographic (CT) evaluation of acute cholecystitis

CT evaluation of the gallbladder included assessment of four characteristics: (1) enlargement of the gallbladder; (2) thickening of the gallbladder wall (≧4 mm); (3) three-layered structure of the wall; and (4) decreased absorption around the gallbladder.

3) Time of surgery for acute cholecystitis

The time of surgery was classified as emergency surgery (within 48 hours after onset), early surgery (2 to 7 days after onset), or elective surgery (more than 7 days after onset), and group I and group II were compared.

4) Statistical analysis of data

The data were analyzed by chi-square test or Student's *t*-test. P values less than 0.05 were considered to indicate statistical significance.

Table 1 Patients of acute cholecystitis

	Number of cases
Cholelithyasis	381
Acute cholecystitis	68
Group I (75 years and more)	24
Men	10
Women	14
Group II (aged less than 75 years)	44
Men	32
Women	12

II. Results

1) Ultrasonographic findings in acute cholecystitis

Ultrasonographic findings were anlyzed in two groups. The proportion of patients with gallbladder enlargement, wall thickening (three-layered structure), and debris was 16.7% in group I, as compared with 43.2% in group II ($p<0.05$). A hypoechoic region around the gallbladder was present in 9 patients in group I (37.5%) and 11 patients in group II (25.0%). Although the prevalence of such findings was slightly higher in group I than in group II, the difference was not significant (Table 2).

2) CT findings in acute cholecystitis

On CT scan an enlarged gallbladder was seen in 91.7% of the patients in group I and 95.5% of those in group II. Thickening of the gallbladder wall was noted in 100% of the patients in group I and 84.1% of those in group II. Neither of these differences was significant. A three-layered structure of the gallbladder wall was found in 33.3% of the patients in group I and 77.3% of those in group II. This differences was significant, with the incidence of a three-layered structure being sig-

Table 2 Ultrasonographic evaluation of acute cholecystitis

Findings	Number of cases Group I	Number of cases Group II
Enlargement, Thickening	3 (12.9%)	4 (9.1%)
Enlargement Thickening (three-layer structure)	2 (8.3%)	5 (11.4%)
Enlargement, Thickening Debris	6 (25.0%)	5 (11.4%)
Enlargement Thickening (three-layer structure) Debris	$p<0.05$ 4 (16.7%)	19 (43.2%)
Enlargement, Thickening, Debris Hypoechoic region around the gallbladder	3 (12.5%)	3 (6.8%)
Enlargement Thickening (three-layer structure) Debris Hypoechoic region around the gallbladder	6 (25.0%)	8 (18.2%)

nificantly higher in group II ($p<0.05$). There was no difference between the groups with respect to the presence of decreased absorption around the gallbladder (Table 3).

3) Time of surgery for acute cholecystitis

Emergency surgery was performed in 14 patients in group I (58.3%) and 25 patients in group II (56.8%). Early surgery was carried out in 6 patients in group I (25.0%) and 8 patients in group II (18.2%). Elective surgery was performed in 4 patients in group I (16.7%) and 11 patients in group II (25.0%). There was no significant difference between group I and group II with respect to the time of surgery (Table 4).

4) Leukocyte count

The leukocyte count on admission was compared between group I and group II. The leukocyte count was significantly lower in group I ($12,100\pm5200$ cells/mm^3) than in group II ($14,700\pm4700$

Table 3 Computed tomographic (CT) evaluation of acute cholecystitis

Finding	Number of cases Group I	Number of cases Group II
Enlargement	22 (91.7%)	42 (95.5%)
Thickening	24 (100%)	37 (84.1%)
Sonolucent layer	8 (33.3%)	34 (77.3%) ($p<0.05$)
Decreased absorption around the gallbladder	8 (33.3%)	12 (27.3%)

Table 4 Time of surgery of acute cholecystitis

	Group	Number of cases	%
Emergency surgery Within 48 hours after onset	Group I	14	58.3
	Group II	25	56.8
Early surgery 2 to 7 days after onset	Group I	6	25.0
	Group II	8	18.2
Elective surgery More than 7 days after onset	Group I	4	16.7
	Group II	11	25.0

cells/mm^3) ($p<0.05$; Fig. 1).

5) Therapy

In group I, the surgical procedure performed for acute cholecystitis was cholecystectomy in 13 patients (54.2%), cholecystectomy+choledochotomy/choledocholithotomy in 3 patients (12.5%), percutaneous transhepatic gallbladder drainage (PTGBD)+cholecystectomy in 2 patients (8.3%), and TPGBD+cholecystectomy+choledochotomy/choledocholithotomy in 6 patients (25.0%). In group II, cholecystectomy was performed in 36 patients (81.8%), cholecystectomy+choledochotomy-/choledocholithotomy in 5 patients (11.4%), PTGBD+cholecystectomy in 2 patients (4.5%), and PTGBD+cholecystectomy+choledochotomy/choledocholithotomy in 1 patient (2.3%). Cholecystectomy alone was performed in a significantly lower percentage of patients in group I ($p<0.05$), and PTGBD+cholecystectomy+choledochotomy/choledocholithotomy was performed in a significantly higher percentage of patients in group I ($p<0.01$). Among the 36 patients in group II who underwent cholecystectomy alone, 4 (11.1%) had residual stones in the common bile duct on postoperative ERCP. Cancer was diagnosed in 1 patient in group I (Table 5).

6) Duration of surgery and intraoperative bleeding

The mean operation time was 132.1±58.2 min in group I and 107.6±34.9 min in group II. Duration of surgery was significantly longer in group I than in group II ($p<0.05$; Fig. 2). The intraoperative bleeding volume was 230.0±139.5 ml in group I and 340.1±207.3 ml in group II. The bleeding volume was significantly lower in group I ($p<0.05$). When emergency or early surgery was compared with elective surgery, in group I the bleeding volume was 196.2±80.0 ml in pa-

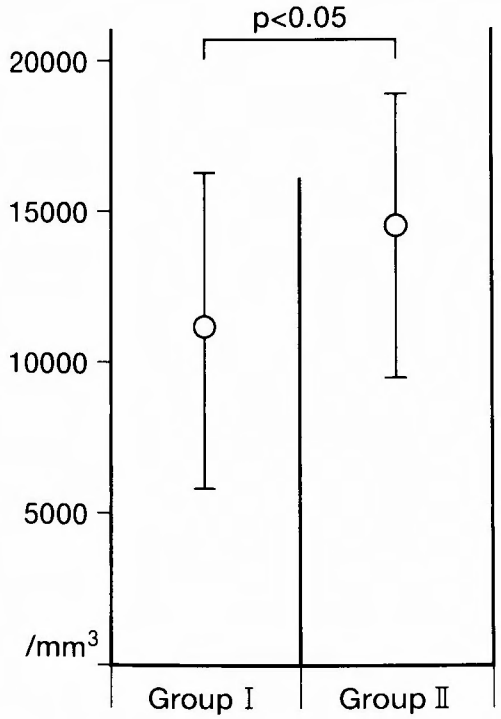

Fig. 1 Leukocyte count
The leukocyte count on admission was compared between group I and group II.

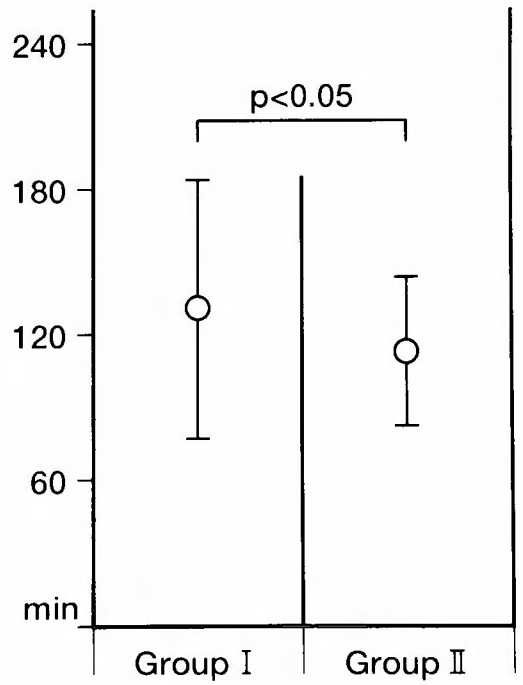

Fig. 2 Duration of Surgery
Duration of Surgery was significantly longer in group I than in group II.

Table 5 Therapy of acute cholecystitis

	Number of cases Group I	Number of cases Group II
Cholecystectomy	p<0.05 13 (54.2%) residual stone 3 cases	36 (81.8%) residual stone 4 cases
Cholecystectomy Choledochotomy	3 (12.5%)	5 (11.4%)
PTGBD Cholecystectomy	2 (8.3%)	2 (4.5%)
PTGBD Cholecystectomy Choledochotomy	p<0.01 6 (25.0%)	1 (2.3%)

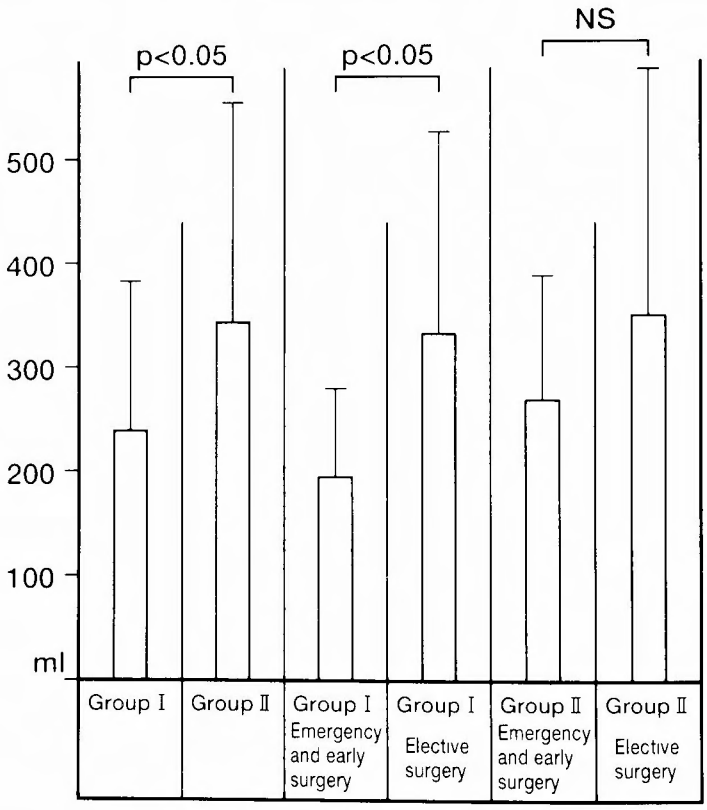

Fig. 3 Intraoperative bleeding volume
The bleeding volume in patients undergoing emergency or early surgery was significantly lower than in those under going elective surgery in group I.

tients undergoing emergency or early surgery, as compared with 330.4±195.3 ml in those undergoing elective surgery; the bleeding volume in patients undergoing emergency or early surgery was significantly lower than in those undergoing elective surgery ($p<0.05$). In group II, there was no significant difference in bleeding volume (Fig. 3).

7) Postoperative complications

Postoperative complications in group I included 4 cases (16.7%) of psychic symptoms such as delirium and 3 cases (12.5%) of respiratory tract infection such as pneumonia. In group II, there was 3 cases of wound infection and 2 cases of respiratory tract infection. Although the incidence of postoperative complications was significantly higher in group I ($p<0.01$), all but 1 patient survived postoperatively. The patient in group I who died was operated on for perforation of the gallbladder and biliary peritonitis associated with acute cholecystitis; the direct cause of death was multiple organ failuer (Table 6).

8) Postoperative course

The number of days until the patient was able to ingest an all-rice-gruel diet after surgery was

Table 6 Postoperative complications of acute cholecystitis

	Number of cases Group I	Number of cases Group II
Psychic symptoms	4 (16.7%)	
Respiratory tract infection	3 (12.5%)	2 (4.5%)
Wound infection	2 (8.3%)	3 (6.8%)
Biliary fistula	1 (4.2%)	1 (2.3%)
Doudenal ulcer		1 (2.3%)
Death	1 (4.2%)	
Total	p<0.01	
	11/24 (41.2%)	7/44 (15.9%)

Table 7 The number of days until the patiets was to ingest an full liquid diet after surgery

Group I	9.8±5.0 (days)	p<0.01
Group II	7.1± 2.3 (days)	

Table 8 The number of days of the postoperative hospital stay

Group I	27.1±10.2 (days)	p<0.01
Group II	21.0± 8.7 (days)	

9.8±5.0 days in group I and 7.1±2.3 days in group II; the number of days was significantly greater in group I ($p<0.01$; Table 7). The postoperative hospital stay was also significantly longer in group I (27.1±10.2 days) than in group II (21.0±8.7 days) ($p<0.01$; Table 8).

III. Discussion

There is an increasing trend in the prevalence of acute cholecystitis among elderly patients, many of whom require surgery, which carries an elevated risk of morbidity and mortality. Although surgery may be withheld in patients with mild tenderness of fever, it is strongly recommended in patients with severe right epigastric pain, patients with gangrenous cholecystitis asslociated with distinct evidence of acute inflammation of the gallbladder on imaging studies, and patients with gallbladder perforation or a pericystic abscess. Some studies have reported the use of conservative therapy or temporary gallbladder drainage in such patients[1-3]. In the present study, we surveyed the clinical characteristics of elderly patients, aged 75 years or more, who underwent surgery for acute cholecystitis. These characteristics were compared with those of a group of patients aged less than 75 years who underwent surgery for acute cholecystitis. Enlargement of the gallbladder has previously been defined on the basis of a longest diameter of ≧8 cm and a shortest diameter of ≧3 cm[4], and thickening of the gallbladder wall has been defined on the basis of a wall thickness of ≧3.0 mm to ≧ 5.0 mm[5-7]. According to diagnostics of acute cholecystitis by ultrasonography (YASUDA et al.[8]) in the present study, we defined gallbladder enlargement as a longest diameter of ≧8 cm and a shortest diameter of ≧4 cm and wall thickening as a thickness of ≧4 mm.

Ultrasonographic findings of acute cholecystitis did not differ substantially between group I and group II. The degree of inflammation of the gallbladder estimated by ultrasonography indicated that bile stasis within the gallbladder, which may be caused by a number of factors, leads to enlargement of the gallbladder. Inflammation extends to the gallbladder wall, and debris is formed as a consequence of edematous wall thickening and bile stasis. Further inflammation leads to circulatory disturbances of the gallbladder wall, which cause necrosis and perforation of the wall and abscess formation around the gallbladder. However, in some patients, such as those with acalculous cholecystitis, circulatory disturbances of the gallbladder arteries rapidly lead to necrosis and perforation of the gallbladder wall.

Gallbladder enlargement, wall thickening, and debris were present in 10 patients (41.7%) in group I and 24 patients (54.6%) in group II. In contrast, a hypoechoic pattern around the gallbladder was seen in 9 patients (37.5%) in group I and 11 patients (25.0) in group II. These findings suggest that acute cholecystitis rapidly causes abscess formation around the gallbladder.

On abdominal CT examination, the percentage of patients with a three-layered structure of the gallbladder wall, a finding of acute cholecystitis, was significantly higher in group II (77.3%) than in group I (33.3%, $p<0.01$). Echographic evidence of thickening of the gallbladder wall was found in all patients in group I, but 7 (15.9%) of the 44 patients in group II showed no distinct signs of thickening. Furthermore, development of three-layered structure was detected in heigher rate by ultrasonography (50.0%) than CT examination (33.3%) in group I, but not in group II (72.8%, 77.3%; respectively). That is, three-layered structure tend to be detectable by ultrasonography in group I (elder cases), and this could be attribute to the ratio of circuratoly disorder of the gall bladder[9,10]. OHNUKI et al.[11] reported that patients with pathologic evidence of acute inflammation may show various findings on CT scan. At regions showing low absorption around the gallbladder on CT

scan, there was agreement between the echographic findings in group I and those in group II.

There was no significant difference between group I and group II in the time of operation. In particular, elderly patients did not require long-term PTGBD solely because of their age. Some investigators have recommended that patients with acute cholecystitis initially undergo a cholecystostomy or ultrasound-guided drainage of the gallbladder, followed by a secondary cholecystectomy after the resolution of inflammation[12]. Because elderly patients are at increased risk for gallbladder perforation and gangrenous cholecystitis, which may precipitate biliary peritonitis and multiple organ failure, it is important to perform surgery in a timely fashion, assessed on the basis of clinical findings and imaging examinations such as abdominal echography and abdominal CT[13].

The leukocyte count on admission was $12,100 \pm 5,200$ cells/mm^3 in group I as compared with $14,700 \pm 4,700$ cells/mm^3 in group II. Elderly patients appeared to have a low leukocyte count more frequently than evidence of cholecystitis on abdominal or imaging examinations. Persistence of a low leukocyte count despite the exacerbation of inflammation was found in a significantly higher percentage of elderly patients than non-elderly patients. Pericystic inflammation in elderly patients may lead to peritonitis, which is a risk factor for DIC, and the leukocyte count may decrease. Once a diagnosis is established, surgical or drainage procedures, such as PTGBD or percutaneous transhepatic gallbladder aspiration (PTGA[14]), are therefore considered necessary, especially in elderly patients.

PTCD is considered the treatment of choice in patients with suspected acute obstructive purulent cholecystitis who have jaundice or remarkably elevated biliary enzymes on addmission[15]. After the resolution of symptoms, Various methods have been proposed to treat acute cholecystitis. Some authors recommend PTGBD followed by stone collection via the drainage tube after the remission of symptoms[3], while others have reported the improvement of symptoms after conservative therapy with laparoscopic cholecystectomy or PTCA alone[16]. However, we performed open surgery in our series of patients. Immediate surgery for acute cholecystitis was performed in 66.7% of the patients in group I and 93.2% of those in group II. Imaging via the cystic duct was attempted intraoperatively in all patients, but was precluded by severe inflammation of the cystic duct in 5 patients (20.8%) in group I and 6 patients (13.6%) in group II. Detailed examination of the bile ducts was performed intraoperatively in the other patients. However, among the patients in whom imaging was not possible, 3 patients in group I and 4 patients in group II had evidence of residual stones on postoperative ERCP. The stones were removed by endoscopic papillotomy.

No prior study has compared operation time and bleeding volume between elderly and younger patients. We found that the duration of surgery was significantly longer in group I, and bleeding volume and significantly higher in group II (both $p < 0.05$). When bleeding volume was compared between patients undergoing early surgery and those undergoing elective surgery in group I, early surgery was associated with a significantly lower bleeding volume, consistent with the results of HANYU et al.[13]. This was apparently because ablation of the gallbladder is easier in patients who undergo emergency or early surgery. In patients who undergo elective surgery, the operation is generally postponed until inflammation has resolved slightly, which creates difficulty in ablation of the gallbladder, consequently resulting in an increased bleeding volume.

As for postoperative complications, preoperative PTGBD and postoperative T-tube insertion in patients in group I resulted in longer confinement to bed. These patients thus had an increased risk of respiratory tract infections such as pneumonia and required a longer stay in the intensive care unit. Psychic symptoms such as delirium were therefore more frequent in group I than in group II. In ad-

dition, one patient in group I died of multiple organ failure 3 days after emergency surgery for acute biliary peritonitis associated with perforation of the gallbladder.

The longer hospitalization after surgery in group I was because the patients remained in the hospital until they could ingest small quantities of solid food and because children no longer look after their parents and often request that the patient remains in the hospital until activities of daily living can be resumed. Because cholecystitis in elder patient can easily be gangrenous, perforted or accompanied by (pericystic) abscess, that we would like to suggest the early surgical treatment after proper diagnosis of cholecystitis and combined change by CT or US rather than conservative therapy like PTGBD followed by long term resting in bed.

IV. Conclusion

Among the 68 patients with acute cholecystitis, 24 elderly patients with acute cholecystitis were studied clinically, and the following results were obtained.

1) Echographic and abdominal CT examinations revealed a lower incidence of a three-layered structure of the gallbladder wall among elderly patients.
2) The leukocyte count on admission was significantly lower in elderly patients than in non-elderly patients.
3) Although the operation time was longer in elderly patients, the bleeding volume was lower.
4) In patients in good physical condition, emergency or early surgery was easier to perform and had a lower bleeding volume than elective surgery.
5) The most frequent postoperative complications were psychic symptoms and respiratory tract infections.
6) Elderly patients had a longer hospital stay after surgery than non-elderly patients.

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和文抄録

高齢者急性胆嚢炎症例の臨床的検討

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［要旨］近年，平均寿命の延長に伴い，高齢者の急性胆嚢炎手術例も急増してきた．高齢（75歳以上）と非高齢者（75歳未満）を比較し，高齢者の急性胆嚢炎手術症例について臨床的特徴を検討した．1989年4月より6年間に急性胆嚢炎として手術した症例は68例であった．高齢者は24例で，非高齢者は44例であった．［成績］echo 像，腹部 CT 検査所見では，特徴的な所見は得られなかったが，壁の三層構造を示す症例が少なかった．入院時の白血球数は非高齢者より有意に少なかった．治療法では胆摘のみの症例よりもPTGBD＋胆摘＋総胆管切開術の症例が有意に多かった．術後合併症では精神症状や呼吸器感染が多く認められた．また，壊疽性胆嚢炎に胆嚢穿孔と胆汁性腹膜炎併発し，術後多臓器不全で死亡した症例以外は前例救命しえた．在院日数は日常生活が出来るまで在院させてほしいとの希望もあり有意に長かった．