

# Is the frequency of simultaneous umbilical hernia repairs in laparoscopic and open cholecystectomy similar?

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## ABSTRACT



The aim of this study was to compare the frequency of umbilical hernia repair during open and laparoscopic cholecystectomies. Consecutive patients who underwent laparoscopic and open cholecystectomy between January 1993 and June 2005 were retrospectively reviewed. Among those, cases of patients who underwent simultaneous cholecystectomy and umbilical hernia repair were included in the study, and the distribution of hernia repairs via laparoscopic and open cholecystectomy were investigated. In addition, patients who underwent umbilical hernia repair only during the study period were also screened and the type of repair was noted in order to be compared to the types of hernia repair in the patients who underwent cholecystectomy. In total, there were 3,028 patients who underwent cholecystectomy, out of which 2,281 were performed via laparoscopy. In total, 46 patients underwent cholecystectomy and simultaneous umbilical hernia repair; 44 underwent laparoscopic cholecystectomy and umbilical hernia repair at the same time ( $P < 0.001$ ), out of which only 2 were repaired through the use of a mesh. In contrast, 284 patients underwent only umbilical hernia repair, out of which 156 underwent primary repair. Simultaneous umbilical hernia repair during laparoscopic cholecystectomy was more common than hernia repair during open cholecystectomy.

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## Introduction

Before the introduction of laparoscopy for gallbladder surgery, right subcostal (in general) and supraumbilical median and right paramedian incisions (to a lesser extent) were the preferred incisions for the abdominal wall. The introduction of laparoscopy led to profound changes in the approach of the abdominal wall, resulting in the use of trocar insertion points and areas. During laparoscopic surgery, surgeons are much more attentive than ever with the umbilical area during the insertion of the trocar. This heightened level of attention can cause an increase in the detection of small or asymptomatic hernias, and also an increase in the frequency of umbilical repairs.

Nearly all the studies on the relationship between cholecystectomies and umbilical hernia were published after the introduction of the laparoscopic methods [1,2]. For instance, the frequency of umbilical hernia repairs during laparoscopic cholecystectomy is reported to be 5-

9% in some studies, whereas before the introduction of laparoscopy, umbilical hernias were also present in some cases undergoing open cholecystectomy [3,4]. Nonetheless, the number of studies on open cholecystectomy and umbilical hernia are few, and comparisons between the frequency of simultaneous umbilical hernia repair during open and laparoscopic cholecystectomies do not exist [5]. These data support the hypothesis above. The present study aimed at comparing the frequency of simultaneous umbilical hernia repair during open and laparoscopic cholecystectomies.

## Materials and Methods

Consecutive patients who underwent laparoscopic and open cholecystectomy between January 1993 and June 2005 were retrospectively reviewed. Out of them, the patients who underwent simultaneous cholecystectomy and umbilical hernia repair were included in the study, and the distribution of hernia repairs between laparoscopic and

open cholecystectomies were investigated. Cases in which surgery was started via laparoscopy, and then switched to open cholecystectomy were excluded from the study. The patients who underwent only umbilical hernia repair during the study period were reviewed and the type of repair was noted in order to compare it to the types of hernia repairs in the patients who underwent cholecystectomy. The study period was chosen specifically to encompass the years during which laparoscopic surgery was initiated in our surgical center, so as to include a comprehensive number of patients in order to make valid comparisons between the two patient groups. The Uludag University School of Medicine Institutional Review Board approved the study protocol.

The data were collected from the patients' files, the patients' discharge reports, and the surgical notes. The statistical analysis was performed by our institution's Department of Biostatistics by using SPSS for Windows. The level of statistical significance was set at  $P < 0.05$ .

## Results

In total, a number of 3,028 patients underwent cholecystectomy during the study period. Laparoscopic cholecystectomy was performed in 2,281 (75.3%) of the patients. Among the 747 (24.7%) patients who underwent open cholecystectomy, a subcostal incision was performed in 672 (90%) and a median supraumbilical incision (not extending to the umbilicus) was performed in the remaining 75 (10%). Out of all the patients who underwent cholecystectomy, umbilical hernia repair was performed in 46 (1.5%); the mean  $\pm$  SE age of these 46 patients was  $52.30 \pm 1.68$  years and the male-female ratio was 16: 30.

The majority of the patients who underwent umbilical hernia repair were included in the laparoscopic cholecystectomy group ( $n = 44$  [1.9%]) ( $P < 0.001$ ), (Table 1). The Chi-square trend analysis showed that there was no significant increase nor decrease in the frequency of hernia repairs from January 1993 to June 2005 ( $P > 0.05$ ). Out of the 46 patients who underwent umbilical hernia repair during cholecystectomy, only 2 (4.3%) were treated using a patch, whereas the remaining patients underwent primary repair. The two patients treated using a patch were included in the laparoscopic cholecystectomy group. None of the patients had early complications following hernia repair during surgery. In contrast, during the study period, a number of 284 patients underwent umbilical hernia repair without cholecystectomy, out of which 156 (55%) were treated via primary repair (Table 2).

The patients who underwent open cholecystectomy were divided into 2 subgroups: cholecystectomy via subcostal incision and cholecystectomy via median incision. The 2 subgroups were compared to the patients who underwent laparoscopic cholecystectomy. Umbilical hernia repair was performed in only 1 (1.3%) of the 75

patients who underwent open cholecystectomy via median supraumbilical incision, whereas umbilical hernia repair was performed in 44 (1.9%) of the 2,281 patients who underwent laparoscopic cholecystectomy (Table 3). There were no significant differences in the hernia repair rates according to the incision site ( $P > 0.05$ ).

Two patients who underwent surgery due to acute cholecystitis underwent simultaneous open cholecystectomy and umbilical hernia repair; a supraumbilical median incision was performed in one of these patients and a subcostal incision was performed in the other. Surgery was performed electively in all the patients who underwent laparoscopic cholecystectomy and hernia repair.

**Table 1.** Patients with cholecystectomy and simultaneous umbilical hernia repair

	Laparoscopic Cholecystectomy (n: 2281)	Open Cholecystectomy (n: 747)	P
Hernia repair, n (%)	44 (1.9)	2 (0.03)	< 0.001 *
* Fisher's exact test			

**Table 2.** Patients with umbilical hernia treated with primary or graft repair

	Laparoscopic Cholecystectomy n (%)	Open Cholecystectomy n (%)	Hernia repair only n (%)
Primary repair	42 (95.4)	2 (4.3)	156 (55)
Graft repair	2 (4.6)	0	128 (45)
Total	44	2	284

**Table 3.** Hernia repair rate according to incision

	Laparoscopic Cholecystectomy	Open Cholecystectomy		p*
		Median incision n:75	Subcostal incision n:672	
Hernia repair	44(1.9%)	1(1.3%)	1(0.15%)	>0.05
*Z test				

## Discussion

Earlier studies report that only 16% of the patients who undergo simultaneous hernia repair during laparoscopic cholecystectomy are symptomatic and that most of them

are unaware of the fascial defect [6]. Similarly, nearly 50% of the patients with ventral hernia have an occult hernia that cannot be detected via clinical examinations, but which can only be confirmed via laparoscopic exploration [7]. In addition, Ramachandran et al. reported that the incidence of fascial defects was 18% in the patients who underwent laparoscopic abdominal surgery and that the defect was asymptomatic in 43.5% of the cases [8]. On the other hand, some small hernias that could not be detected prior to surgery were detected during the development of pneumoperitoneum [6]. These findings indicate that some umbilical hernias cannot be detected during the preoperative period in asymptomatic patients.

In general, right subcostal, supraumbilical, and median incisions are the abdominal wall incisions of choice in patients undergoing open cholecystectomy; usually, these incisions do not include the umbilicus. In contrast, during the laparoscopic procedures, the umbilicus is the preferred region for the placement of the trocar in the abdomen, rendering it a point of major attention for surgeons, which might increase the probability of detecting small, asymptomatic hernias that cannot be discerned before surgery, resulting in a higher frequency of repair during the laparoscopic procedures. In the present study, a right subcostal incision was performed in 90% of the open cholecystectomies, which might have resulted in fascial defects in the umbilical region, thus being overlooked. The significantly higher number of hernia cases repaired during laparoscopic cholecystectomy ( $n = 44$ ) than during open cholecystectomy ( $n = 2$ ) supports this hypothesis (Table 1). In fact, according to this hypothesis, the umbilical hernia detection and repair rates in the patients who underwent open cholecystectomy via median incision were expected to be similar, and the hernia repair rate in patients who underwent cholecystectomy via subcostal incision were expected to be lower. Nonetheless, there was no significant difference in the hernia repair rates between the patients who underwent laparoscopic cholecystectomy and open cholecystectomy (via subcostal incision and median supraumbilical incision) (Table 3), which might have been due to the small hernias in the umbilicus that were overlooked due to the use of median incisions during open cholecystectomy that did not reach the umbilicus.

The majority of the umbilical fascial defects repaired during laparoscopic cholecystectomy are approximately 1.5-2 cm [4,6]. As the present study was a retrospective one, the data on the size of the fascial defects in the patients who underwent cholecystectomy were not available; however, 96% of the hernias detected during open and laparoscopic cholecystectomy were repaired primarily using simple sutures, whereas 45% of the patients who underwent surgery for an umbilical hernia only during the study period were repaired by means of a synthetic patch (Table 2), which indicates that the fascial defects in the

patients with umbilical hernia who underwent cholecystectomy were small and that the fascial apertures could be repaired without the use of a graft. The defects with a 2-cm diameter can be treated via direct suture or via mesh repair, but the latter is associated with a low incidence of recurrence, which might be a minor issue in patients receiving simultaneous treatment while undergoing cholecystectomy. The higher incidence of the surgical site infection (SSI) might be a determinant criterion in performing direct repair in such patients.

A defect in the umbilical fascia can present some problems for the surgeon, including intestinal or omental injury at the port insertion site during laparoscopic surgery; therefore, it is thought that repairing an umbilical hernia during laparoscopic surgery may decrease the probability of injury [8]. Additionally, if fascial defects in the umbilical region that are detected during surgery are not repaired, the risk of postoperative port insertion site complications, including incisional hernia and intestinal obstruction, can increase [2,9]. On the other hand, it was reported that the addition of hernia repairs to laparoscopic cholecystectomy did not affect the follow-up and the treatment of the patients during the postoperative period [3]. As such, simultaneous repairs of fascial defects in the umbilical region that are detected during laparoscopic cholecystectomy are recommended [2,8].

Although Mayo repair and graft repair are the two most commonly used techniques for repairing umbilical hernias, there is a lack of consensus as to which is more effective. Currently, most surgeons and surgical centers prefer the synthetic graft technique, which facilitates tensionless hernia repair [10]. Additionally, the incidence of recurrence is reported to be higher in cases repaired without a patch than in those repaired using a patch [4]. In contrast, as previously mentioned, most umbilical fascial defects repaired during laparoscopic cholecystectomy are 1.5-2 cm; as these are small hernias, research indicates that in 90% of the cases, they can be treated simply and primarily using non-absorbable sutures [4,6].

In the present study, it is possible to assume that the frequency of umbilical fascial defects in cases treated via open cholecystectomy might be similar to that in cases treated by means of laparoscopic cholecystectomy. Thus, the prognosis of the cases might be wondered and because long-term follow-up data were not obtained, it is not possible to know if the rate of detection of umbilical hernia differed among the patients who underwent open and laparoscopic cholecystectomy; additional research may clarify if such a difference exists.

## Conclusions

The frequency of simultaneous umbilical hernia repairs in patients who underwent laparoscopic cholecystectomy was higher than in patients who underwent open

cholecystectomy. This finding might be due to the fact that the umbilical region used for trocar insertion during laparoscopic surgery is scrutinized more carefully, leading to more frequent detection of and repair of fascial defects. Nevertheless, factors such as the risk of infection and the size of the fascial defect play an important role in determining the most effective method of hernia repair.

### Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

### Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

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