

# Incisional Hernia in Recipients of Adult to Adult Living Donor Liver Transplantation

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## Abstract

**Background** After receiving a living donor liver transplant (LDLT), an incisional hernia is a potentially serious complication that can affect the patient's quality of life. In the present study we evaluated surgical hernia repair after LDLT.

**Materials and methods** Medical records of patients who underwent surgery to repair an incisional hernia after LDLT in Turgut Ozal Medical Center between October 2006 and January 2010 were evaluated in this retrospective study. A reverse-T incision was made for liver transplantation. The hernias were repaired with onlay polypropylene mesh. Age, gender, post-transplant relaparotomy, the type, the result of surgery for the incisional hernia, and risk factors for developing incisional hernia were evaluated.

**Results** An incisional hernia developed in 44 of 173 (25.4 %) patients after LDLT. Incisional hernia repair was performed in 14 of 173 patients (8.1 %) who underwent LDLT from October 2006 to January 2010. Relaparotomy was associated with incisional hernia ( $p = 0.0002$ ). The mean age at the time of the incisional hernia repair was 51 years, and 79 % of the patients were men. The median follow-up period was 19.2 (13–36) months after the hernia repair. Three patients with intestinal incarceration underwent emergency surgery to repair the hernia. Partial small bowel resection was required in one patient. Postoperative complications included seroma formation in one patient and wound infection in another. There was no recurrence of hernia during the follow-up period.

**Conclusions** The incidence of incisional hernia after LDLT was 25.4 % in this study. Relaparotomy increases the probability of developing incisional hernia in recipients of LDLT. According to the results of the study, repair of an incisional hernia with onlay mesh is a suitable option.

## Introduction

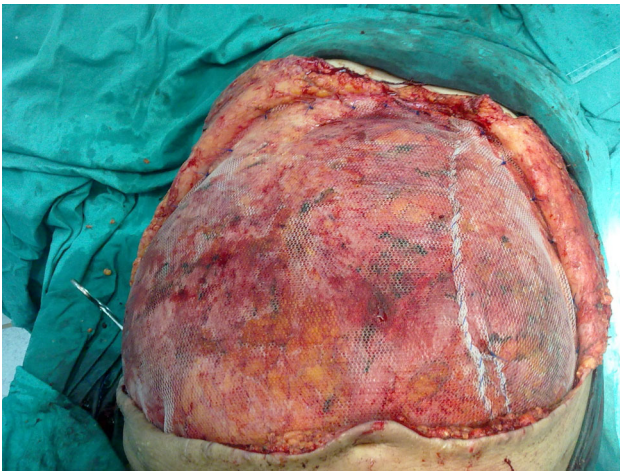
The limited number of deceased donors and an increase in the number of end-stage liver disease patients waiting on the transplant list has resulted in an increase in liver transplantation from living donors. Living donor liver transplantation (LDLT) is a well-established surgical procedure for patients with end-stage liver disease when deceased organ donation is not available [1]. However, surgical complications, such as biliary obstructions and incisional hernias (IH), are common with this complex procedure [2, 3].

After a liver transplant, IH is a major complication that can cause discomfort, intestinal incarceration, or strangulation, and ultimately decreases the patient's quality of life [4]. Incisional hernia is a late complication of liver transplantation and develops due to multiple factors [3]. The frequency of IH after orthotopic liver transplantation has been reported to be 4.6 to 34 % in recipients of a deceased donor liver [4–6]. Although it is reported that IH after LDLT are more common than hernias after orthotopic deceased liver transplantation [7], there is no reported study with clear data describing the true incidence of IH after LDLT or the results of surgical treatment.

Primary fascia repair, repair with use of mesh (inlay or onlay), and laparoscopic hernia repair are treatment options for IH after LDLT. In the present retrospective study, we evaluated the incidence, risk factors, and surgical treatment results of IH in recipients of LDLT.

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**Fig. 1** Polypropylene mesh was used to extend approximately 3 cm around the entire repaired defect and then tacked to the anterior fascia in an onlay manner with interrupted polypropylene sutures

## Patients and methods

Between October 2006 and January 2010, 280 adults with end-stage liver disease underwent LDLT at the Turgut Ozal Medical Center (TOMC). Children younger than 14 years old and patients who survived <3 months after LDLT were excluded. Of the 280 patients, 173 were included in the study, and charts from those patients were reviewed retrospectively. Incisional hernias developed in 44 of 173 (25.4 %) patients after LDLT. Data were obtained from the patient charts and from the TOMC database. The study was approved by the ethics committee of the Medical Faculty of Inonu University.

The presence of IH in patients, age, gender, body mass index (BMI), presence of relaparotomy, the use of sirolimus, the mycophenolate mofetil (MMF) dose, and the model for end-stage liver disease (MELD) score were recorded. In all LDLT patients, laparotomy was performed via a reverse-T incision. After liver transplant, the fascia was closed in a continuous pattern with a 1-0 polypropylene loop and the skin was closed with metal staples. The fascia was closed in one layer for both the transplant operation and the reoperation. All of the patients were treated with standard tacrolimus-based immunosuppression and a tapering dose of prednisone. All of the LDLT recipient patients were followed until death or completion of the study. Incisional hernias were identified by physical examination or computed tomography (CT) scan.

## Surgical repair of IH procedure

All patients were given preoperative antibiotics, and all repairs were performed with the patient under general

**Table 1** Demographic parameters of patients

No.	Sex/age	C/Me	PTR	Hernia size (cm)
1	M/46	C/18	No	10
2	F/67	B/20	Yes	10
3	M/39	A/12	No	3, 2, 2
4	M/51	C/17	No	10
5	M/30	B/15	No	10
6	F/48	C/23	Yes	10
7	M/57	B/16	Yes	5
8	M/38	C/18	No	5
9	M/54	B/12	Yes	5
10	F/59	C/22	No	10
11	M/41	C/28	No	5
12	M/60	C/20	Yes	5
13	M/58	B/18	Yes	10
14	M/62	C/22	Yes	15

*M* male, *F* female, *PTR* post-transplant relaparotomy, *C* child score (B or C), *Me* model for end-stage liver disease (MELD) score

anesthesia. The fascial defect was exposed and flaps were prepared to expose healthy fascia. A primary fascia repair was performed and reinforced with polypropylene mesh, which extended to an area about 3 cm around the entire repaired defect. The mesh was tacked to the anterior fascia in an onlay manner with simple interrupted sutures of 0-0 polypropylene (Fig. 1). The skin was closed with 3-0 polypropylene suture. A closed suction drain was left in the subcutaneous space and then removed when the drainage was <20 mL per day.

## Results

Incisional hernias occurred in 44 of the 173 patients (25.4 %) in this study. There were 123 male and 50 female patients, with a mean age of 45 years. There was no statistically significant difference when we compare age, sex, BMI, MMF dose, and MELD score between patients with hernia and patients without hernia ( $p > 0.05$ ). However, the number of relaparotomies was statistically significantly greater in the patients with hernia ( $p = 0.0002$ ) (Table 1). Fourteen (8.1 %) patients underwent surgery to repair the IH. The remaining 30 patients did not undergo surgery, either because of their health status or their refusal of treatment. The mean age at the time of the incisional hernia repair was 51 years. Eleven of the 14 (79 %) patients were males. Demographic parameters and clinical data of the 14 patients are shown in Table 2. All hernias were repaired with onlay polypropylene mesh as described at surgical repair of IH procedure. The median time between liver transplantation and hernia repair was 17.6 months (range:

**Table 2** Risk factors for incisional hernia after living donor liver transplantation (LDLT)

Risk factors	Hernia (+) ( <i>n</i> = 44)	Hernia (–) ( <i>n</i> = 129)	<i>p</i> value
Age years	47.18 ± 1.66	44.2 ± 1.1	0.16
Gender—male <i>n</i> (%)	31 (70)	92 (71)	1
BMI (kg/m <sup>2</sup> )	26.05 ± 0.86	25.41 ± 0.36	0.41
Relaparotomy <i>n</i> (%)	21 (47.7)	23 (17.8)	0.0002
Sirolimus <i>n</i> (%)	11 (25)	7 (5.4)	0.25
Mean MMF concentration (mg/dl)	1,818 ± 59	1,890 ± 28	0.22
MELD score	18.54 ± 1.46	18.15 ± 0.72	0.80

*BMI* body mass index, *MMF* mycophenolate mofetil

8–31 months). The median patient follow-up period was 19.2 months (range 13–36 months) after hernia repair. Three patients (nos. 1, 7, and 9) underwent surgery on an emergency basis because of intestinal incarceration. Small bowel resection was required in one patient (no. 7). Seroma formation occurred in one patient (no. 7), and wound infection occurred in another (no. 14). No IH recurrence was detected during the follow-up period.

## Discussion

Incisional hernias are a common complication after abdominal surgeries. Each year, approximately 2 million laparotomies are performed, and incisional hernias occur in 2–11 % of cases. The factors of IH occurrence are related to the patient, the surgical technique, the suture material used, and the experience of the surgeon. The abdominal wall strength of patients with advanced and chronic liver disease is stressed by chronic ascites before transplantation and a large incision postoperatively. Many risk factors for IH have been reported, including age, gender, primary disease, wound infection, obesity, steroid use, abdominal distention, diabetes mellitus, collagen technical problems, previous surgery, preoperative ascites, and pulmonary complications [8–10]. Relaparotomy was a risk factor for incisional hernia after LDLT according to this study.

Bilateral subcostal, Mercedes, or J-shape incisions can be used for liver transplantations. A reverse-T incision is used at the medical center in this study to provide good exposure of the abdomen during liver transplantation. Heistercamp et al. [11] found that a J-shaped incision led to fewer early and late abdominal wall complications while still providing good surgical exposure during hepatectomy and implantation. In our experience, the most common place for eventration was at the junction of the transverse and median incisions. Although it has been reported that IH is more commonly seen after a deceased LT than a LDLT,

the results of this study confirm that the incidence of IH after LDLT (15.5 %) was similar to that after deceased LT (4.6–34 %). Polypropylene mesh was recommended as the first choice for the surgical treatment of the incisional hernia in the transplant recipients in the same study [10]. Some surgeons advise using mesh only when the hernia orifice is >6 cm. However, the present study showed that using mesh for small hernias was better than direct suturing. Implantation of mesh did not result in an increased infection rate, despite the use of immunosuppressive drugs [12]. As a result, we used mesh to repair the IH in all of the patients. If the patient's liver failure was not due to autoimmune causes, no steroids were given after the third month after liver transplantation. All of the patients' hernia repairs were performed 6 months after the liver transplantation. No patient took steroids after the hernia repair.

Postoperative complications did occur in one patient (seroma formation and wound infection). Generally, nearly 50 % of hernia recurrence after hernioplasty does not appear until 5 years after the surgery [4]. The follow-up period in this study (19.2 months) was short, but the follow-up results were excellent.

Inlay mesh repair is difficult because of intra-abdominal cohesiveness after liver transplantation. Mesh placed in direct contact with the viscera can have negative consequences, such as tissue erosion and enterocutaneous fistula formation, complications that may occur years after the hernia repair. The anterior abdominal wall of a liver transplant patient has already been enlarged by acid. As a result, the approximation of facial edges is easy. Using mesh to repair a hernia is better than a primary closure regardless of the size of the hernia [13]. Use of an onlay mesh is a suitable option for IH repair after LDLT according to our study. Although laparoscopic IH repair after liver transplantation has been reported [14, 15], we did not use that technique.

The Component release technique, a type of rectus abdominis muscle advancement flap, was first used to reconstitute the linea alba, reduce abdominal wall tension, and provide a dynamic abdominal wall in patients with large abdominal wall defects. Applying this technique may be difficult at reoperation as the rectus muscle was likely transected during the first surgery. In those patients the abdominal wall is generally relaxed because of the presence of ascites before transplantation. For this reason abdominal wall tension is not a problem.

One-year survival rate of liver transplantation is more than 85 % with improved surgical techniques and immunosuppressive therapy. Thus, it is expected that incisional hernias in these patients will continue to occur, and this potential complication should be discussed with transplant patients. Although the early results are excellent, patients should be followed for a longer period of time because

more than 50 % of IH relapses occur at least 5 years after transplantation. As a result, relaparatomy is a predisposing factor for incisional hernia after LDLT. Repair of an incisional hernia with onlay mesh is a suitable option according to the results of the study.

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