

Value of CT after laparoscopic repair of postsurgical ventral hernia

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Abstract

Background: We examined computed tomographic (CT) findings after laparoscopic repair of postsurgical ventral hernias in patients with and without symptoms.

Methods: Meshes were placed laparoscopically in 18 patients for incisional ventral hernia repair. CT of the abdominal wall was performed 1, 15, and 30 days after repair and when clinical findings indicated the procedure.

Results: Scans of four patients showed small fluid collections within the abdominal wall between the hernia sac and the mesh. These collections resolved within the first 30 days without aspiration. Scans of three patients with symptoms 4–8 months later showed fluid collections that required multiple aspirations in one patient and a recurrent hernia that was repaired laparoscopically in another patient.

Conclusion: Preliminary results suggest that CT is a useful imaging tool in patients with laparoscopic repair of incisional ventral hernia. It showed the correct site of the mesh, subclinical fluid collections in the abdominal wall, and recurrent hernia.

Key words: Computed tomography—Postsurgical ventral hernia.

Laparoscopic surgery has replaced several conventional surgical techniques because it minimizes the trauma of access without compromising the surgical field [1]. Incisional hernias of the abdominal wall may develop with any abdominal incision and represent an important source of morbidity after abdominal surgery. Because an effective ventral hernia repair should be achieved with minimal perioperative morbidity and low recurrence rate,

laparoscopic repair seems to be a promising technique [2]. A variety of laparoscopic procedures have been described and the use of prosthetic mesh has resulted in lower recurrence rates [3]. Mesh is used widely in the laparoscopic repair of ventral hernia and computed tomography of the abdominal wall easily detects the postoperative findings as fluid collections and hernia recurrence [4].

We present our preliminary CT findings of the abdominal wall in a series of cases with laparoscopic repair of ventral hernia.

Materials and methods

Within a 3.5-year period, 51 patients (age range = 42–71 years, average age = 62 years; male:female = 1:3) underwent laparoscopic repair of ventral hernias at our hospital. A standard pneumoperitoneum was created with the use of an open technique and laparoscopic instruments were introduced through small trocar ports. The herniated bowel loops were reduced into the peritoneal cavity and the herniated sac was not resected but was cauterized. A mesh was then placed between the intact peritoneum and the abdominal wall muscles over the defect. The mesh was sized to overlap the orifice of the defect at least 2.5–3 cm laterally and fixed to the abdominal wall with sutures at each corner, and staples or tacks between the sutures reduced the “dead space” between the hernia sac and the mesh. We used Gore-Tex Dual Mesh Biomaterial (W. L. Gore and Associates, Flagstaff, AZ, USA) composed of expanded polytetrafluoroethylene. One side of the patch is rough and was oriented to the peritoneal cavity. The other side is smooth and was oriented to the abdominal wall.

All patients underwent clinical examination for palpable fluid collection during the immediate postoperative

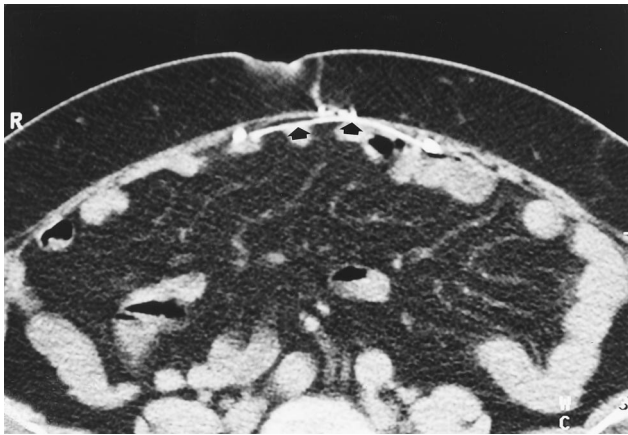


Fig. 1. CT of the abdominal wall shows a Gore-Tex Dual Mesh secured with sutures (arrows).

period and then every 6 months or when the patient had problems.

CT of the abdominal wall was performed in 18 patients during the last 9 months. The first CT examination was performed the first day after the laparoscopic proce-

dure and before the patient left the hospital. The second and third CT examinations were performed on days 15 and 30, respectively. CT was repeated when symptoms such as nausea or abdominal pain were present. Scanning was performed with spiral equipment using 6-mm collimation and 1:1 pitch. Before scanning all patients received 800 mL of contrast medium orally (Gastrografin 2%, Schering, Kenilworth, NJ, USA). Scans were reviewed for postoperative changes at the mesh site and the presence of a hernia sac. The presence, size, and shape of fluid collection within the hernia were evaluated. Recurrence of the hernia, i.e., projection of the bowel loop beyond the staples, also was evaluated.

Results

CT visualization of the mesh used for laparoscopic repair of ventral hernias was easy in all patients (Fig. 1). CT scans performed on postsurgical day 1 also showed empty hernia sacs in all patients (Fig. 2). CT scans performed on day 15 showed small fluid collections in four patients; collections were subclinical in three (mean = 2 cm) and

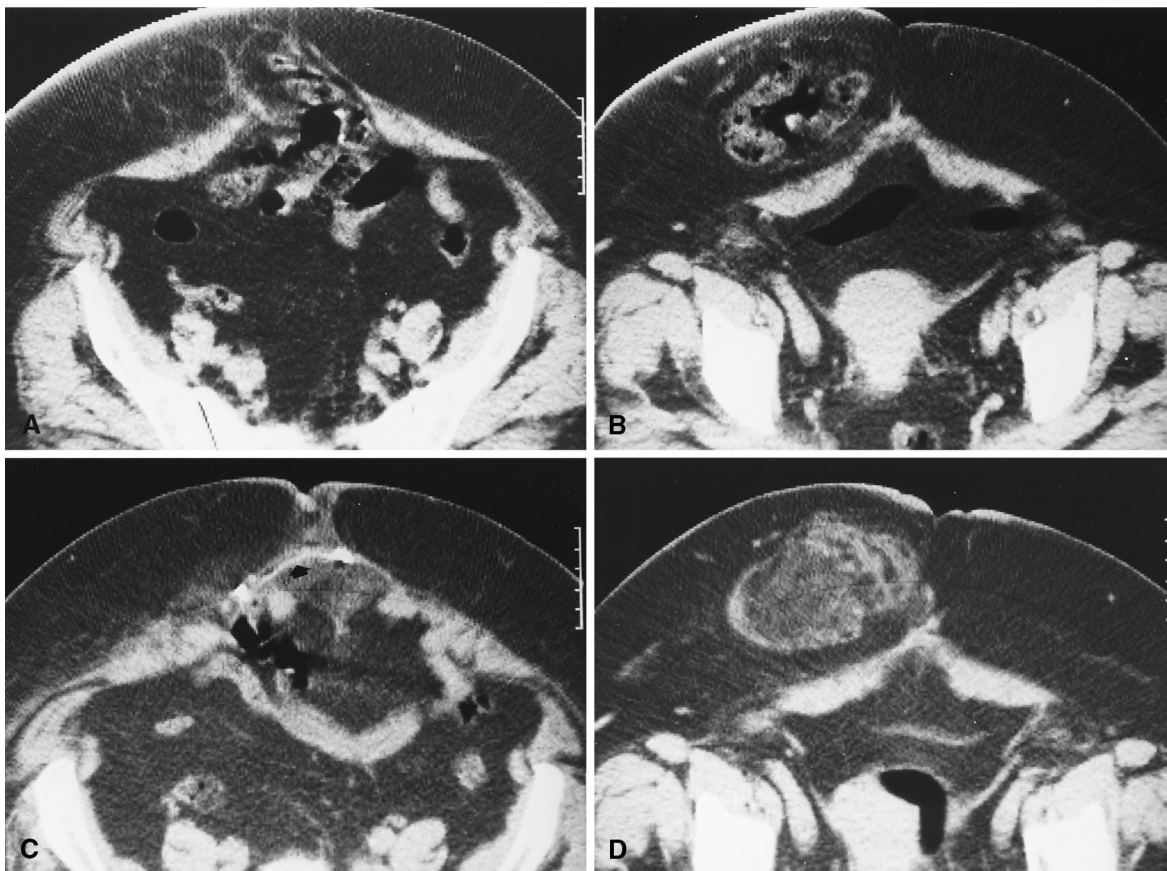


Fig. 2. A, B CT of the postsurgical ventral hernia at different levels. C, D After laparoscopic repair, the mesh is easily visualized (arrow); the hernia sac was not resected and does not contain bowel loops. CT findings did not change after 30 days.

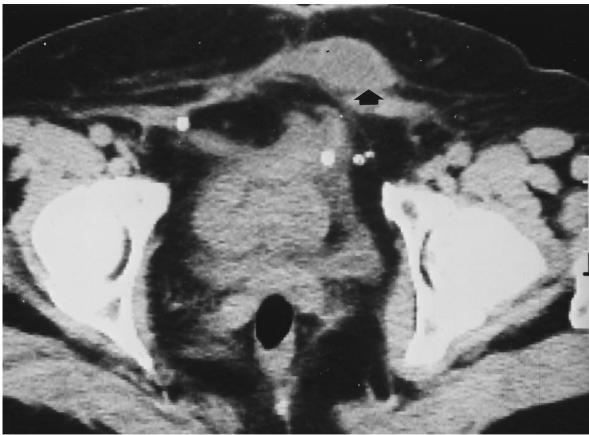


Fig. 3. CT after laparoscopic repair of the ventral hernia shows a globular fluid collection in the hernia sac that resolved over the first 30 days (*arrow*).

palpable in one. Collections were located within the abdominal wall ventral to the mesh in the hernia sac and were globular or tubular; one collection contained air–fluid levels resembling bowel loops (Fig. 3). These resolved during the first 30 days without aspiration. CT was performed in three patients 4 and 8 months postsurgery because of symptoms such as nausea and abdominal pain. CT demonstrated clinically evident fluid collections that

required multiple aspirations in one patient; in another patient, CT clearly showed a recurrent hernia. The patch had become wrinkled and had moved from the side of recurrence. It was repaired by reducing the bowel loop into the peritoneal cavity and laparoscopically placing another, wider mesh without removing the original mesh (Fig. 4). CT showed nothing unusual in the third patient.

Discussion

Incisional hernias represent an important element of morbidity after abdominal surgery. They are common and occur in 3–13% of patients undergoing laparotomies [5]. They may lead to bowel ischemia by causing obstruction and strangulation, if they remain untreated. Open surgical repair of ventral hernias has the disadvantage of the patient having to spend several postoperative days in the hospital, with frequent abdominal drains and a long recovery period at home [6]. Moreover, the recurrence rate is high at 18–41% after the initial repair [7].

Laparoscopic repair of ventral hernias with mesh uses a minimally invasive approach. Patients recover quickly and leave the hospital within a few days, and the complication (3.7%) and recurrence (7.5%) rates are low [8]. The laparoscopic intraperitoneal technique places a pros-

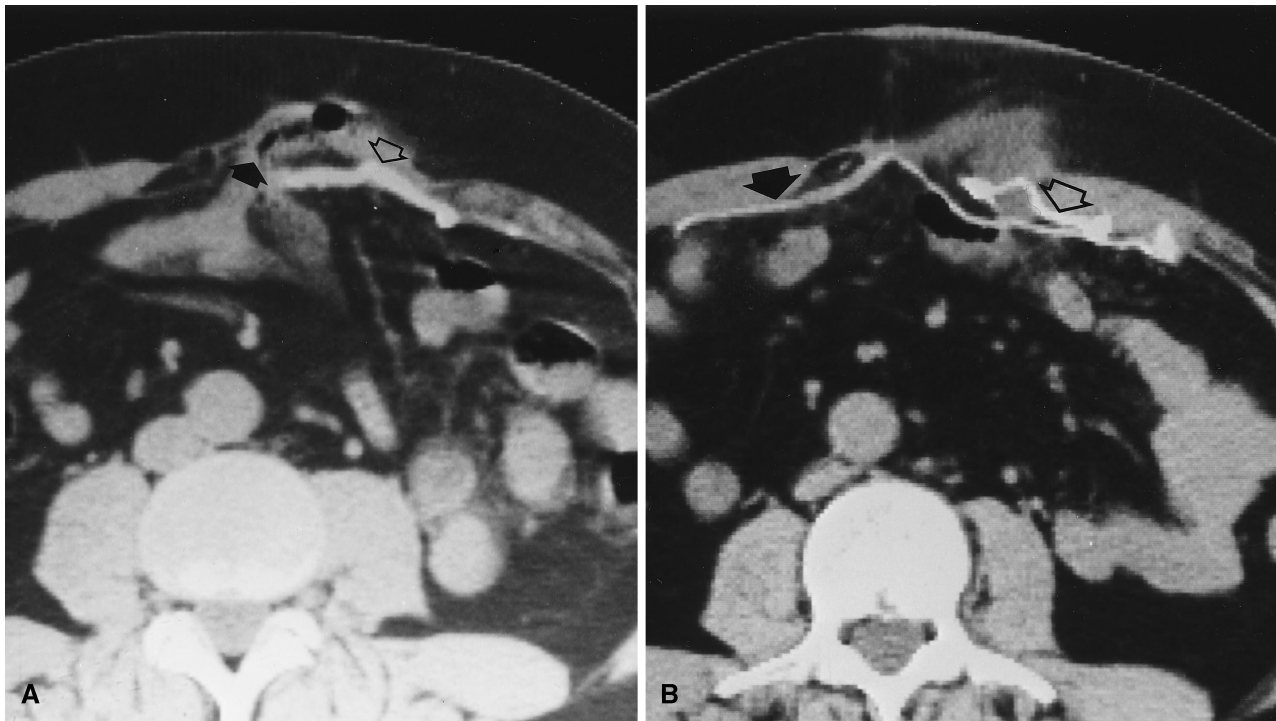


Fig. 4. Recurrence after laparoscopic repair of the postsurgical ventral hernia. **A** CT shows the recurrence of the hernia (*solid arrow*) and the transported mesh (*open arrow*). **B** After laparoscopic repair, CT shows the wider second mesh (*solid arrow*) and the initial wrinkled and transported mesh (*open arrow*). Fluid in the hernia sac is visible.

thetic mesh on the parietal peritoneum over the abdominal defect.

CT is used widely in the evaluation of abdominal hernias because the abdominal wall, its defect, and the herniated bowel are clearly demonstrated. CT also detects complications such as ischemia and obstruction of the herniated bowel [9, 10].

CT visualization of the mesh in the laparoscopic repair of ventral hernia depends on the thickness of the mesh and the composition of high-density material [4]. The Gore-Tex Dual Mesh we used in our patients was visualized clearly on CT.

The hernia sac is left in situ and creates a space that has accumulated fluid in approximately 16% of laparoscopic repairs [11]. Fluid collection also can be visualized on CT subcutaneously around the hernia sac. This fluid collection usually is a seroma (sterile fluid accumulation). Its development is caused mainly by the porosity of the mesh, through which peritoneal fluid can slowly diffuse into the abdominal wall and accumulate into and around the hernia sac, and surgical manipulation [4]. Most seromas resolve without intervention within 30 days. Aspiration is needed when the seroma is large, painful, or infected (demonstrated by fever and elevated leucocyte count) [11]. A seroma is considered a complication if it persists for more than 6 weeks, steadily grows, or produces symptoms [12]. On CT the seroma has a globular, tubular, or multilobular appearance; if it contains air–fluid levels, it closely resembles a bowel loop or a recurrent ventral hernia. The rim of the collection may enhance because of the recent surgical procedure [4].

The collections in our four cases were small, without clinical symptoms, and only one was palpable. There were no indications for intravenous contrast medium, and the collections resolved within 30 days without aspiration. Moreover, we tried to avoid aspiration because of the risk of introducing bacteria into the serum [11]. Aspirations of the seroma that had developed after 4 months was performed because of its persistence.

A ventral hernia is produced when the linea alba is disrupted by a congenital or acquired defect and an anterior hernia sac protrudes through it [9, 10, 13]. The bowel loops within the hernia may be dilated or collapsed when

a distal or proximal obstruction is present. The rate of recurrence after laparoscopy of ventral hernias seems to be low [8]. These recurrences also are repaired laparoscopically [2]. In one of our cases, the patient had a recurrent hernia after laparoscopic repair of the initial one. It was a true hernia with some fluid collection, and its repair was performed laparoscopically.

Laparoscopic repair of ventral hernia can be an effective method. Preliminary results suggest that CT is a useful imaging tool for postsurgical follow-up. CT can demonstrate the site of the mesh and its fixation to the abdominal wall, and it can show fluid collections at the repair site of the ventral hernia even when they are not palpable and follow their course. Moreover, a recurrent hernia can be detected clearly on CT.

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