

Diaphragmatic Hernia after Adult Orthotopic Liver Transplantation: A Rare Surgical Complication Associated to Immunosuppression?

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Abstract

Diaphragmatic Hernia (DH) after adult Orthotopic Liver Transplantation (OLT) is a rare event with only two cases reported in English literature. It is not clear if this complication is related to surgery or to immunosuppression therapy or both. We describe a well-resolved case of left-sided DH in a 43-year-old man taking Tacrolimus and mycophenolate mofetil (MMF) as immunosuppressants, 27 months after OLT. Authors from previously reported cases considered that ascites and incisional hernia, as well as Mammalian Target Of Rapamycin (mTOR) inhibitors therapy, as predisposing factors for DH development. In the case presented here, none of the possible surgical triggering factors described before were present. MMF is associated to impaired wound healing and incisional hernias, like mTOR inhibitors. Maybe minor and not evident diaphragmatic injury during hepatectomy associated to immunosuppression with mTOR inhibitors and/or MMF have an important role in DH occurrence after OLT in adults.

Keywords: Diaphragmatic hernia; Orthotopic liver transplantation; Immunosuppression

Introduction

Diaphragmatic hernia (DH) after adult Orthotopic Liver Transplantation (OLT) is a rare event. To the best of our knowledge, there are only two cases reported in English literature [1,2]. It is not clear if this complication is related to surgery or to immunosuppression therapy or both. Herein, we report a case of left-sided DH after OLT in adult and discuss this theme.

Case Report

A 43-year-old man was admitted with epigastric pain, vomiting and bowel obstruction for 48 hours. He denied fever or gastrointestinal bleeding. Leukocytosis (18,000/mm³) and elevated CRP (35.2 mg/dL) were present. Liver enzymes and bilirubin were normal. Physical examination revealed dehydration, tachycardia and painful epigastrium palpation. Twenty seven months before he had been submitted to OLT for cirrhosis due to primary sclerosing cholangitis associated to Crohn's Disease. Transplantation and post-operative period occurred uneventful. No injury to the diaphragm or preexisting Bochdalek hernias were observed during surgery. At the time of OLT, patient status was: Child-Pugh score B8, MELD score 28 and absence of ascites. Immunosuppression has been done with Tacrolimus (through level 8 ng/ml) and Mycophenolate Mofetil (MMF) 720 mg twice daily.

Chest x-ray showed elevated left hemidiaphragm and hydro-aerial level in left hemithorax (Figure 1). CT scan confirmed left-sided diaphragmatic hernia with pleural effusion, lung parenchymal compression on the same side and heart deviation to contralateral side (Figure 2). Patient was submitted to left thoracotomy and an eight cm sized defect was detected in left hemidiaphragm. The gastric fundus, epiploon and a segment of transverse colon were found to be herniated into the thorax, but no signs of necrosis were observed. After decompressing the stomach with a nasogastric tube, herniated organs could be delivered into the abdomen and the diaphragmatic defect was repaired by simple sutures with polypropylene. Oral feeding and immunosuppressive drugs were resumed on the third post-operative day. Patient received empiric antibiotic therapy (ciprofloxacin and metronidazole) for seven days and CRP levels return back to normal (1.2 mg/dL). He was discharged 8 days after surgery and is doing well 31 months after diaphragmatic hernia repair.

Discussion

Diaphragmatic herniation after adult OLT is an exceptional event. We found only two cases reported in English literature [1,2]. Wagner et al. [1] reported a case of right-sided DH four years after OLT, in a 58-year-old woman receiving Everolimus, MMF and corticosteroids to treat allograft rejection [1]. In this case, patient had massive ascites at the time of transplantation. Authors believe that increased intra-abdominal pressure, due to ascites, caused diaphragmatic muscle weakness, predisposing herniation. Rossetto et al. reported a case of a 58-year-old man, with a large incisional hernia that developed left-sided DH 16 months after OLT [2]. He was taking Sirolimus as immunosuppressant. Before admission, he suffered from retching with alimentary vomiting. Authors suggest that incisional hernia was



Figure 1: Chest x-ray image showing elevated left hemidiaphragm and hydro-aerial level in left hemithorax.

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Received September 29, 2015; **Accepted** November 14, 2015; **Published** November 21, 2015

Citation: Steinbrück K, Fernandes R, Enne M (2015) Diaphragmatic Hernia after Adult Orthotopic Liver Transplantation: A Rare Surgical Complication Associated to Immunosuppression? J Clin Case Rep 5: 644. doi:10.4172/2165-7920.1000644

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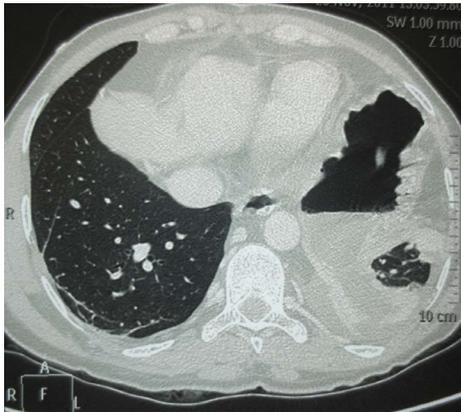


Figure 2: CT scan image showing left-sided diaphragmatic hernia with pleural effusion, lung parenchymal compression on the same side and heart deviation to contralateral side.

an accessory factor for diaphragmatic herniation since it could have induced a more vigorous contraction of the diaphragm muscle to reach an intra-abdominal pressure so effective to induce vomiting, might causing diaphragm rupture. In addition, they suggest that a probable iatrogenic vascular injury (even in the absence of visible iatrogenic damage during hepatectomy) strengthened by the anti-proliferative and antiangiogenic effects of Sirolimus [3-5], could have contributed to the spontaneous diaphragmatic rupture.

In the case presented here, none of the possible surgical triggering factors described before were present. No evident injury to diaphragm, excessive bleeding (needing extreme use of energy device for hemostasis) or preexisting Bochdalek hernias were observed during hepatectomy. Patient had no ascites or incisional hernia that could contribute to diaphragm muscle weakness or distension. There are cases of DH after partial liver transplantation (living donor, split and reduced graft) [6,7], in which herniation is attributed to an unprotected area in the right diaphragm. As our patient received a full-size adult liver graft, no unsupported space was present in this case.

Regarding immunosuppression, the two cases reported before, were receiving mammalian target of rapamycin (mTOR) inhibitors (Everolimus and Sirolimus) [1,2]. This class of drugs is related to incisional hernias and impaired wound healing after transplantation [3,4,8]. Adani et al. [9] consider that the use of mTOR inhibitors in both cases had an important role in diaphragmatic herniation, as it could have weakened the previously damaged diaphragm structure, facilitating a spontaneous rupture [9]. Our patient was taking Tacrolimus and MMF. Like mTOR inhibitors, the use of MMF is a risk factor for impaired wound healing and incisional hernias [4,10,11], probably

because of its antiproliferative effect, that may interfere with the healing of the muscles and fascia. We believe that the hypothesis advocated by Adani et al. for diaphragmatic herniation in the previous cases, may be considered for our patient too, with MMF playing the role of mTOR inhibitors. In this case, we suggest that development of DH after OLT in adults is related to the surgical procedure (diaphragmatic muscle injury during hepatectomy, even if not evident) and the immunosuppressant regimen (mTOR inhibitors and/or MMF).

As only three cases (including this one) of DH after OLT in adults have been reported so far, we can only speculate about the physiopathology of this complication. However, it is the first step for further discussion.

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