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An unusual complication

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Iatrogenic diaphragmatic hernia following laparoscopic left colectomy for splenic flexure cancer. An unusual complication

Diaphragmatic hernias are a migration of abdominal structures into the thorax via a diaphragmatic defect; they may be classified as congenital or acquired and acquired hernias can be hiatal, traumatic or iatrogenic, generally complications of thoracic or abdominal surgery. We report a case of iatrogenic diaphragmatic hernia after a laparoscopic left colectomy for splenic flexure tumor; to our knowledge, in literature this case is the first reported. A 51-years-old woman was readmitted to our Hospital on 11th post-operative day for bowel occlusion and a CT – scan revealed left diaphragmatic herniation with fluid dilatation of the small bowel that appeared in the left hemithorax. Laparoscopic surgery resolution was decided and after the reduction of the small bowel in the abdomen we closed the defect using two direct absorbable auto-block hemi-continuous sutures that were covered by a synthetic absorbable mesh. Probably we didn't notice a minimal injury of the left diaphragm caused by ultrasonic scalpel and we can suppose that this delay in presentation may be a result of the gradual enlargement of a microscopic lesion. Patient's gas exchanges were good during surgery and during post-operative course.

KEY WORDS: Diaphragmatic hernia, Iatrogenic, Laparoscopy, Left colectomy, Ultrasonic scalpel

Introduction

Diaphragmatic hernias are a migration of abdominal structures into the thorax via a diaphragmatic defect; they may be classified as congenital or acquired^{1,2}. Congenital diaphragmatic hernias are the result of an embryonic diaphragmatic defect and Bochdalek and Morgagni hernias are the most common^{1,2}. Acquired

diaphragmatic hernias are hiatal, traumatic (usually result from penetrating or blunt trauma) or iatrogenic, generally complications of thoracic or abdominal surgery³. In literature are described diaphragmatic hernias following oesophagectomy, gastrectomy, laparoscopic cholecystectomy, fundoplication, gastric banding, radiofrequency ablation of liver lesions, splenectomy, nephrectomy, fenestration of liver cyst and adrenalectomy¹⁻⁴. We report a case of iatrogenic diaphragmatic hernia after a laparoscopic left colectomy for splenic flexure tumor; to our knowledge, in literature this case is the first reported.

Case Report

A 51-years-old woman was diagnosed with cancer of the left flexure of the colon. Pre-operative staging computed tomography (CT) showed stenosing neoplasm of

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splenic flexure that appeared high just below the diaphragm without other pathological features. She underwent laparoscopic left colectomy; there were no surgical and cardio-respiratory intraoperative and postoperative complications: she maintained good gas exchanges during surgery, she had an uneventful post-operative course with spontaneous bowel canalization and she was discharged on 8th post-operative day.

On 11th post-operative day she was readmitted to our Hospital for bowel occlusion; she wasn't dyspnoeic, her oxygen saturation value was 98% and she didn't report thoracic pain. Laboratory examinations were in the normal ranges except for mild leukocytosis and slight increase of C-reactive protein; naso-gastric tube was placed and showed biliary gastric stagnation.

Urgency chest-abdominal CT was performed and revealed left diaphragmatic herniation with fluid dilatation of the small bowel that appeared in the left hemithorax (Fig. 1).

Surgery resolution was decided: the patient was placed in a supine position and a four trocars technique was performed using previous accesses. Exploration of the abdominal cavity revealed a 4 cm left diaphragmatic defect above and lateral to the spleen, small bowel herniated through this defect and atelectasic lower lung lobe; there was no injury of the bowel invaginated into the thoracic cavity.

We easily reduced small bowel in the abdomen. The diaphragmatic defect was closed using two direct absorbable auto-block hemi-continuous sutures. After then, the suture was covered by a synthetic absorbable



Fig. 2: Laparoscopic repair of diaphragmatic hernia using two direct absorbable auto-block hemi-continuous sutures.

Vicryl mesh that was fixed with fibrin sealant (Fig. 2); we chose absorbable mesh to avoid infections because of the risk of abdominal contamination after previous surgery and we didn't use suture or tacks and staples to avoid injury of phrenic nerve. A thoracic drain was placed and it was removed 72 hours later after a chest radiography control. Post-operative course was uneventful and she was discharged on 5th post-operative day. Two months after discharge patient underwent chest - abdominal CT scan that confirmed the healing of the diaphragmatic injury.



Fig. 1: Chest - abdominal CT scan performed on 11th post-operative day when patient was readmitted for bowel obstruction. It revealed left diaphragmatic herniation with fluid dilatation of the small bowel that appeared in the left hemithorax.

Discussion

Presentation of a diaphragmatic hernia varies depending on the extent and nature of the organs that herniated. There may be epigastric or chest pain, nausea and vomit, bowel obstruction, respiratory distress, fever or no clinical manifestations¹⁻⁶.

The pathogenesis of this late diaphragmatic hernia is unclear; we can point out two major considerations.

Firstly, during the mobilization of left colon flexure from the diaphragm we used an ultrasonic scalpel which can sometimes cause diaphragmatic contractions and burn as a result of a direct stimulation resulting in a weak point that can progressively evolve in a diaphragmatic hernia; according to hernia's position a microperforation of the diaphragm could be occurred during this step because of the big volume of cancer that appeared strictly adhering to the spleen and because of the anatomically uncomfortable high position of the splenic flexure that appeared just below the diaphragm.

Secondly, when a patient is intubated respiratory failure may not arise and the immediate herniation of visceral organs into the thorax may not occur due to positive

pressure ventilation. Following extubation and withdrawal of the positive end-expiratory pressure, increased intra-abdominal pressure may increase the size of the diaphragmatic tear and may displace organs into the thoracic cavity.

Probably we didn't notice a minimal injury of the left diaphragm during surgery and we can suppose that this delay in presentation may be a result of the gradual enlargement of a microscopic lesion.

Surgery is the treatment of choice of this complication¹⁻⁶. The optimal management of acute diaphragmatic hernias is the repair via a transabdominal approach and laparoscopy can be considered as first choice especially in patients with stable conditions and that lately underwent previous laparoscopic surgery; in chronic diaphragmatic hernias transthoracic repair may be suggested because of common intrathoracic adhesions². We performed a laparoscopic repair of diaphragmatic defect using the surgical accesses of previous surgery: two months after patient was in good health and radiological follow-up confirmed the healing of the diaphragmatic injury. Laparoscopic repair of iatrogenic hernias is suggested when diaphragmatic hernia is diagnosed shortly after previous surgery, when no visceral damages were described in the diagnostic work-up and in patients with stable conditions that underwent previous laparoscopic surgery.

Riassunto

Le ernie diaframmatiche sono descritte come una migrazione di alcune strutture addominali in torace attraverso un difetto del diaframma e possono essere classificate come congenite (Bochdalek e Morgagni) o acquisite; tra queste ultime distinguiamo le ernie iatali, quelle post-traumatiche e quelle iatrogene (dopo chirurgia addominale o toracica). In letteratura sono riportati vari esempi di ernia diaframmatica complicante chirurgia (chirurgia dell'esofago e dello stomaco; chirurgia della colecisti e del fegato); in questo lavoro abbiamo descritto il caso clinico di un'ernia dell'emidiaframma sinistro insorta dopo intervento di emicolectomia sinistra laparoscopica per cancro della flessura splenica. Il decorso intra e post-operatorio della paziente è stato del tutto regolare e la paziente è stata dimessa in ottava giornata post-operatoria. In undicesima giornata post-operatoria la paziente è rientrata presso la nostra struttura per quadro occlusivo senza alcun tipo di sintomo respiratorio; abbiamo eseguito una TC torace – addome in urgenza che ha mostrato un difetto dell'emidiaframma sinistro con migrazione di anse ileali distese nell'emitorace omolaterale. È stata decisa risoluzione chirurgica del problema ed è stata eseguita una laparoscopia diagnostica che ha evidenziato un difetto di circa 4 cm dell'emidiaframma sinistro senza alcun danno a carico delle anse erniate che sono quindi state delicatamente ridotte in addome. Il difetto dia-

frammatico è stato riparato sempre in laparoscopia usando due suture emicontinue in filo autobloccante e la sutura è stata poi ricoperta con una protesi in Vicryl fissata con colla di fibrina. Il decorso post-operatorio è stato regolare e la paziente è stata dimessa in quinta giornata post-operatoria.

La patogenesi di questa ernia diaframmatica non è così chiara; noi abbiamo tratto due principali considerazioni. In primo luogo durante la mobilizzazione della flessura splenica abbiamo usato uno strumento ad ultrasuoni che può causare scottatura del diaframma provocando quindi un punto di debolezza che può poi evolvere in un'ernia; considerando che il tumore era a livello della flessura e che questa si presentava molto alta probabilmente durante tali manovre abbiamo causato un piccolo danno al diaframma del quale non ci siamo accorti in corso di intervento. In secondo luogo la ventilazione positiva dell'intubazione ha evitato l'insorgenza di insufficienza respiratoria ed ha continuato a mantenere il polmone ben espanso. Dopo l'estubazione l'incremento della pressione addominale può aver causato l'aumento delle dimensioni del difetto diaframmatico e l'erniazione delle anse in emitorace sinistro.

La chirurgia è il trattamento di scelta per la risoluzione di questo tipo di complicanza e la laparoscopia dovrebbe essere considerata l'approccio di scelta se il pregresso intervento era stato condotto con il medesimo approccio, se i parametri del paziente sono tutti stabili e se l'ernia viene diagnosticata a distanza di poco tempo dal pregresso intervento chirurgico.

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