Case report - Thoracic non-oncologic

Splenic injury following diaphragmatic plication: an avoidable life-threatening complication

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Abstract

We report an unusual complication of left-sided diaphragmatic plication, namely bleeding from the spleen due to tearing of adhesions between the spleen and the abdominal aspect of the diaphragm. We believe that making a small incision in the diaphragm prior to the plication to identify and divide the adhesions could have prevented the complication, and that this manoeuvre should be a standard part of the operation.

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1. Introduction

Diaphragmatic paralysis is an uncommon condition, which usually presents with chronic dyspnoea and is due to damage to the ipsilateral phrenic nerve. Most cases are idiopathic and are probably caused by a mononeuritis affecting the nerve. Other aetiologies include cervical trauma, damage to the phrenic nerve during dissection of the internal thoracic artery for coronary artery surgery and thoracic malignancy. Diaphragmatic plication is a well-established treatment for the condition and several studies have demonstrated it to be a safe procedure with good long-term results [1]. However, there is paucity in the literature regarding the different techniques used for the operation and the surgical complications that can follow. We present an unusual complication that has not been described previously, and which we feel is preventable by attention to surgical technique.

2. Case report

A previously healthy obese woman was referred with a year’s history of increasing dyspnoea. The chest radiograph revealed a markedly elevated left hemi-diaphragm, which showed paradoxical movement on fluoroscopy. Other routine preoperative investigations were unremarkable. The patient reported a history of abdominal tuberculosis as a child. Calcification was noted in the spleen on preoperative imaging (Fig. 1).

The operation was carried out via a left posterolateral thoracotomy through the bed of the eighth rib. Plication was performed using multiple interrupted horizontal mattress sutures (number one polypropylene) between Teflon strips; between six and eight small bites of diaphragm were taken with each stitch. The diaphragm was lifted between finger and thumb for 5–10 mm to prevent an inadvertently large bite. The diaphragm was not opened.

The patient remained well in the immediate postoperative period. Three days later she developed sinus tachycardia, hypotension and a diffusely tender abdomen. An emergency CT-scan revealed blood in the peritoneum and a splenic haematoma. The patient was taken directly to the operating theatre where the thoracotomy was re-opened and the plication taken down. A generous incision was made in the central portion of the diaphragm revealing an extensive intraperitoneal haematoma and free bleeding from the diaphragmatic surface of the spleen, compatible with torn adhesions from its diaphragmatic surface. The spleen could not be preserved and was therefore removed. The diaphragm was re-plicated uneventfully using the same technique as in the initial repair, closing the incision in the diaphragm in the process.

Apart from a short period of respiratory and renal failure the patient recovered uneventfully. She obtained a good symptomatic result from the operation and remains well over a year afterwards.

3. Discussion

Diaphragmatic plication can be achieved via the thorax or abdomen, either by open or minimally-invasive surgery. There are several techniques available to carry out the plication. One of the commonest is the ‘accordion’ operation described by Schwartz and Filler [2] and was used previously in our practice and in the patient presented. A series of folds are created in the diaphragm by the placement of multiple bites of horizontal mattress sutures. Buttressing the outer bites of the sutures with polytetra-
fluroethylene strips or pledgets helps to prevent cutting out of the sutures [3]. Entry into the peritoneal cavity is avoided. A similar technique is to use multiple individual mattress sutures with single bites of diaphragm, such that the diaphragm is progressively tightened and the previous layers of sutures emerge as a ‘keel’ which projects towards either the abdomen or the thorax, depending on the surgeon’s preference. Again opening the peritoneal cavity is not a requirement, although for both of these techniques some surgeons describe incising the diaphragm to aid suture placement and preventing inadvertent damage to the adjacent abdominal organs.

The alternative technique of plication is a two-layer ‘flag’ repair, where a large fold of diaphragm is sutured flat to itself in an overlapping manner [1]. Both techniques have advantages and potential disadvantages. In our patient, especially with the history of abdominal tuberculosis and splenic calcification on preoperative scanning, we feel that incising the diaphragm and inspecting its abdominal surface could have prevented the bleeding which followed the plication. Although it is possible that the sutures passing through the diaphragm directly injured the spleen rather than torn adhesions, we feel that this is unlikely given the ease with which the diaphragm was lifted as the sutures were inserted. We cannot explain why the bleeding took three days to become clinically important; presumably this is due to a delayed rupture of the haematoma, which must have formed at the time of the original plication.

As a result of our experience with this patient we now make a small incision in the diaphragm prior to plication to inspect its abdominal surface to be able to deal with any unexpected adhesions. We feel there are no disadvantages to this manoeuvre and feel that its routine use will make diaphragmatic plication safer.

References

