CASE REPORT

Liver resection in a patient with concomitant thoraco-abdominal and cerebral aneurysms

L. R. JIAO, J. R. TYSOME, G. NAVARRA & N. A. HABIB

Department of Surgical Oncology and Technology, Imperial College School of Medicine, Hammersmith Hospital Campus, Du Cane Road, London W12 0NN, UK

Abstract

Background. Surgical resection remains the only curative procedure for liver metastases but even in expert hands it has appreciable morbidity and mortality rates. The presence of a concomitant aortic aneurysm greatly increases these risks. Case outline. A 66-year-old woman who was known to have large aneurysms of the thoraco-abdominal aorta and middle cerebral artery presented with colorectal liver metastases. After detailed preoperative assessment, she underwent resection of segments V and VI of the liver. The surgical procedure was uneventful. She made a good initial recovery, but on day 7 she suddenly became hypotensive and died from a cardiorespiratory arrest. Post-mortem examination revealed a ruptured thoracic portion of the thoraco-abdominal aortic aneurysm. Conclusion. Despite careful control of perioperative blood pressure and the lack of abdominal complication, intrathoracic aneurysmal rupture on day 7 highlights the risk of major unrelated operations in patients with aneurysmal disease.

Key Words: Thoraco-abdominal aneurysm, colorectal liver metastasis

Introduction

The increasing age of the population has led to the more frequent occurrence of multi-organ disease. Although the combination of abdominal aortic aneurysm (AAA) and gastrointestinal malignancy is uncommon, the incidence varying from 0.4 to 14% [1], surgical management of these patients remains controversial [2].

Liver resection presently offers the best opportunity for cure in patients with colorectal liver metastasis [3,4], yet it remains a major undertaking with the risk of death from haemorrhage, infection or liver failure [5,6]. However, the decision not to operate can be difficult because of the patient’s expectation and choice, the technical advances in liver surgery and improvements in perioperative care. Thus preoperative evaluation is crucial to minimise risk, particularly in patients with pulmonary or cardiac co-morbidity. We report a case of liver resection for colorectal liver metastasis in the presence of concomitant large thoraco-abdominal aortic and cerebral aneurysms.

Case report

A 66-year-old woman with an inoperable thoraco-abdominal aortic aneurysm measuring 6.8 cm in diameter (Figure 1) was referred to this unit with a colorectal liver metastasis. Twenty-three years previously she was found to have an extensive thoraco-abdominal aortic aneurysm extending from the origin of the thoracic aorta to the right common iliac artery, with occlusion of the right renal artery and a non-functioning right kidney. In addition, she had a middle cerebral artery aneurysm. The thoraco-abdominal aortic aneurysm was considered unsuitable for surgical repair, and over the years it had increased in size. She had been on atenolol 50 mg once daily to control her blood pressure. Thirteen years ago she underwent a left hemicolectomy for Dukes’ C adenocarcinoma of the colon with no adjuvant chemotherapy or radiotherapy. She had remained remarkably well since the operation with no evidence of recurrent or metastatic disease until a new follow-up ultrasound scan detected an abnormal lesion in the liver consistent with a liver metastasis. CT showed a 7-cm poorly enhancing...
tumour occupying segments V and VI, which was biopsied and confirmed to be a colorectal liver metastasis. Although the metastasis was favourable for resection, her underlying co-morbidity required a careful assessment involving several specialties, in particular cardiothoracic and vascular surgeons. In spite of being advised of a markedly increased operative risk, she opted for hepatic resection.

The laparotomy was performed via a modified right roof-top incision. A single large tumour occupied segments V and VI (Figure 2) and was intimately adherent to the vena cava and the right branch of the portal vein. The tumour had invaded into the base of the gallbladder, but there was no ascites, peritoneal deposits or any other lesions in the liver on intra-operative ultrasound scan. After careful protection of the abdominal aortic aneurysm, the right liver was mobilised followed by dissection of the hilus and mobilisation of the right hepatic artery and portal vein away from the tumour. For liver resection using radiofrequency ablation (RFA), the standard technique developed in this unit was employed [7,8]. In

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Figure 1. (a) Chest X-ray and (b) CT scan of the abdomen showing the thoraco-abdominal aortic aneurysm.

Figure 2. The intra-operative picture shows the colorectal liver metastasis adherent to gallbladder which has been lifted up after dissection, and IVC.
brief, the line of resection was first marked 2 cm away from the tumour using diathermy on the surface of the liver. An RFA probe was then inserted into the parenchyma of the normal liver along this line to achieve ablation. Resection of segments V and VI was completed with a scalpel after RFA (Figure 3). The length of operation was 4 h including the RFA resection time of 130 min. Intra-operative cardiac monitoring was carried out closely to maintain a stable normal blood pressure with intravenous infusion of labetalol and phentolamine to achieve full sympathetic blockade and reduce the risk of dissection of the thoraco-abdominal aneurysm and rupture of the cerebral aneurysm.

Postoperatively, the patient was admitted to the intensive care unit for further cardiac monitoring. On day one, she was extubated and made good progress. Postoperative pain control was achieved with patient-controlled analgesia and the blood pressure was maintained well within the normal range. On day 7, she became suddenly hypotensive, had a cardiopulmonary arrest and died unexpectedly. Post-mortem examination revealed that the thoracic portion of her extensive thoraco-abdominal aortic aneurysm had ruptured but the abdominal aortic aneurysm was intact with no intra-abdominal collection or haemorrhage.

**Discussion**

Laparotomy in patients with an abdominal aortic aneurysm increases the risk of aneurysmal rupture in the immediate postoperative period. Swanson and colleagues reported rupture of previously asymptomatic aortic aneurysms in 10 patients within 36 days of laparotomy [9]. All but one of these aneurysms were > 6 cm in size. The mechanism is poorly understood, but the authors speculated that laparotomy might have precipitated rupture by reducing the collagen content of the aneurysm and thus weakening its wall. Trueblood and associates further reported another 17 patients with abdominal aortic aneurysm undergoing unrelated operations of whom 4 died in the immediate postoperative period from aneurysm rupture, representing a 24% mortality rate [10]. They suggested that operative manipulation and trauma were responsible for the rupture. When risk of rupture is high, repair of an abdominal aortic aneurysm can be performed either before or in the same setting of an unrelated laparotomy. However, the management of abdominal aortic aneurysm in the presence of a co-existing intra-abdominal pathology is still debatable. The successful resection of a hepatocellular carcinoma with a simultaneous repair of an abdominal aortic aneurysm has recently been described [11]. In our case, the patient withstood two laparotomies for colectomy and liver resection, respectively, without rupture of the abdominal aortic aneurysm, indicating that the aneurysmal wall might have stabilised over the years.

The risk of rupture of thoraco-abdominal aortic aneurysm is high. Nearly 20% of 165 patients with thoraco-abdominal aneurysms underwent rupture during the follow-up period despite periodic careful surveillance [12]. The size of the aneurysm has been shown to be a major predictive factor; rupture is much more likely to occur when an aneurysm exceeds 5 cm in diameter, and the risk rises as the aneurysm increases further in diameter [12]. Smoking and chronic obstructive pulmonary disease are also strongly associated with
an increased risk of aneurysm rupture. Hypertension is present in most patients with aneurysms and is correlated with their initial development [13]. Consequently, vigorous treatment of hypertension with beta-adrenergic blockers and other antihypertensive agents is universally recommended to minimise progression of the disease. Pain is also considered a risk factor for rupture. Even vague and uncharacteristic pain at the time of follow-up in patients with thoracic or thoraco-abdominal aneurysms is significantly associated with subsequent rupture, with an odds ratio of 2.3 [12]. In the absence of other risk factors, postoperative pain and stress in our patient probably contributed to the rupture of the thoracic portion of her thoraco-abdominal aneurysm, although she was given adequate analgesia.

References