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ORIGINAL ARTICLE

Upper midline incision for liver resection

Seoung Hoon Kim & Young Kyu Kim

Centre for Liver Cancer, National Cancer Centre, Goyang-si, Gyeonggi-do, South Korea

Abstract

Objectives: The optimal incision for liver resection in living donors or patients with small tumours should be revisited. This study introduces the upper midline incision (UMI) above the umbilicus for various liver resections using a conventional open-surgery technique.

Methods: A retrospective study based on a prospectively collected database of 308 liver resections performed by a single surgeon was conducted to evaluate the feasibility, safety and applicability of the UMI.

Results: From September 2006 to September 2010, this incision was used successfully in 308 consecutive liver resections in all patients with tumours measuring ≤ 5 cm and all living donors without any extension of the incision. The median length of the incision was 16.4 cm (range: 12–20 cm).The median operating time was 189 min (range: 54–305 min). The median postoperative hospital stay was 8 days (range: 6–17 days). One patient died in the postoperative period from heart failure. All other patients fully recovered and returned to their previous level of activity. Over a median follow-up of 31 months (range: 20–68 months), 25 complications (8.1%) developed. Seven wound infections (2.3%) occurred with no incisional hernia.

Conclusions: The UMI can be used safely and effectively in conventional open surgery in various liver resections and should therefore be given priority as the first-line technique in living liver donors and patients with tumours measuring ≤ 5 cm.

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Correspondence

Seoung Hoon Kim, Centre for Liver Cancer, National Cancer Centre, 111 Jungbalsan-ro, Ilsandong-gu, Goyang-si, Gyeonggi-do 410-769, South Korea. Tel: + 82 31 920 1647. Fax: + 82 31 920 2798/1138. E-mail: kshlj@hanmail.net; kshlj@ncc.re.kr

Introduction

Liver resection to remove tumours or to source grafts from living donors is nowadays performed worldwide. The incisions most commonly used have included a bilateral rooftop incision with or without a vertical extension, a J-shaped incision and a reverse L-shaped incision with or without a left extension.[1,2] The type of incision selected depends on the circumstances. In the presence of a large tumour or when bleeding near the inferior vena cava requires to be controlled, thoracic extension may be necessary. The importance of extending the incision without hesitation in order to increase safety and obtain a radical resection cannot be overemphasized. However, as long as safety and the completeness of resection are secured, a shorter length of incision will facilitate better patient recovery.

A laparoscopic approach to hepatectomy in living donors and patients with hepatic tumours has been shown to decrease morbidity and the invasiveness of liver resection.[3–6] However, this approach remains feasible only in selected patients and donors, and is complex and expensive because it requires the surgeon to be conversant with both hepatectomy and laparoscopic surgery.

Initial experiences in the use of an upper midline incision (UMI) in living donor right hepatectomy and liver resection combined with laparoscopy-assisted colorectal resection have shown the UMI to be feasible, safe and effective.[7,8] Subsequently, at this institution, the UMI has been successfully applied in various types of liver resection in all patients with tumours measuring ≤ 5 cm and in all living donors consecutively, without any laparoscopic assistance.

Figure 1 Operative wounds after right hepatectomy using (a) an upper midline incision and (b) a reverse L incision

This paper reports on a single surgeon's experience of using the UMI above the umbilicus in various liver resections in conventional open surgery.

Materials and methods

A retrospective study based on a prospectively collected database of 328 liver resections performed by a single attending surgeon (SHK) at the National Cancer Centre, South Korea, from September 2006 to September 2010, was performed to evaluate the feasibility and safety of the UMI above the umbilicus. During a median follow-up of 31 months (range: 20–68 months), all complications were recorded prospectively and stratified according to Clavien's system of classification. Postoperative mortality was defined as death within 90 days of surgery.[9]

Subjects

The criteria indicating the use of a UMI in liver resection were a tumour size of ≤ 5 cm and living-donor donation (Fig. 1a). Cirrhosis, previous abdominal surgery, the presence of multiple tumours and a high body mass index (BMI) of > 30 kg/m^2 were not considered as exclusion criteria. However, 20 patients were excluded from this study because they demonstrated tumours of > 5 cm in size or tumour invasion of the diaphragm; in these patients, a reverse L incision with or without a left extension was used in order to avoid iatrogenic tumour rupture during liver mobilization and to circumvent the difficulty of extracting resected liver through a smaller-than-usual incision (Fig. 1b).

Postoperative i.v. analgesia with fentanyl and morphine was administered to all donors and patients using a patient-controlled pump.

Surgical techniques

A detailed technical description of liver resection under a short UMI in living donors and patients with liver metastasis of colorectal cancer has been described previously.[7,8]

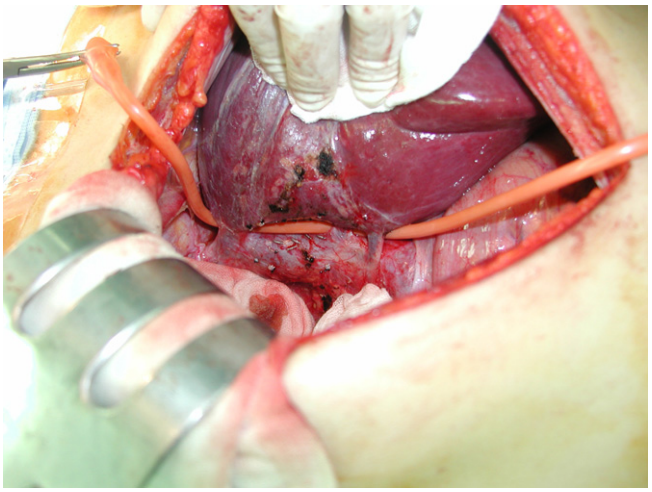

Figure 2 After right liver mobilization saving two sizable right inferior hepatic veins, a Nelaton catheter for the hanging manoeuvre is placed along the anteromedian surface of the inferior vena cava with its upper end between the right and middle hepatic veins and its lower end on the left side of the two right inferior hepatic veins

Briefly, this incision extended from the lower end of the xiphoid process to above the umbilicus. The vertical midline laparotomy was performed before a Kent retractor frame (Takasago Medical Industry Co., Tokyo, Japan) was installed to keep the operative field wide open. To mobilize the right liver, which is the key and difficult part of this technique, the left retractor blade was fastened a little higher than the right blade and the upper and lateral ligaments were dissected before the lower ligaments so that the right liver could be easily displaced into the left upper quadrant of the abdomen (Fig. 2).

Other than the incision, the remaining components of the surgery (Fig. 3) were performed in line with the conventional