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SURGICAL TECHNIQUE

Lymphadenectomy of the hepatic pedicle during hepato-pancreato-biliary surgery

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Summary Nodal involvement of the hepatic pedicle is variable and depends on the underlying hepato-bilio-pancreatic pathology. Although its value for ultimate prognosis has not been demonstrated, lymphadenectomy is usually performed to determine tumor stage and to inform the decision about eventual adjuvant treatment. Lymph node dissection of the hepatic pedicle requires a thorough understanding of the anatomy of hepatic lymphatic drainage as well as accurate analysis of pre-operative imaging in order to identify and locate abnormal lymph and to rule out anatomical variations that might complicate the surgical procedure.

Introduction

Lymph node metastasis to the hepatic pedicle, the retro-pancreato-duodenal block, along the celiac trunk (CT) and the superior mesenteric artery (SMA) depends on the underlying liver, biliary or pancreatic tumor pathology. The risk of nodal metastasis varies from 5% to 40% depending on the primary tumor pathology. While the prognostic value of nodal dissection has not been demonstrated, it is usually recommended in order to correctly stage the patient and to inform the decision about eventual adjuvant therapy [1,2].

Performance of hepatic pedicle nodal dissection requires a thorough knowledge of the anatomy of its component structures as well as of the lymphatic drainage of the liver [3]. It also requires accurate analysis of pre-operative imaging studies to localize pathologic lymph nodes and to identify anatomical variants of the hepatic pedicular structures that might complicate the nodal dissection.

The surgical approach may be either by laparotomy or laparoscopy depending on the approach employed for the tumor resection.

Nodal dissection of the hepatic pedicle is performed in a counter-clockwise direction from left to right, with either *en bloc* or separate resection of the nodal groups.

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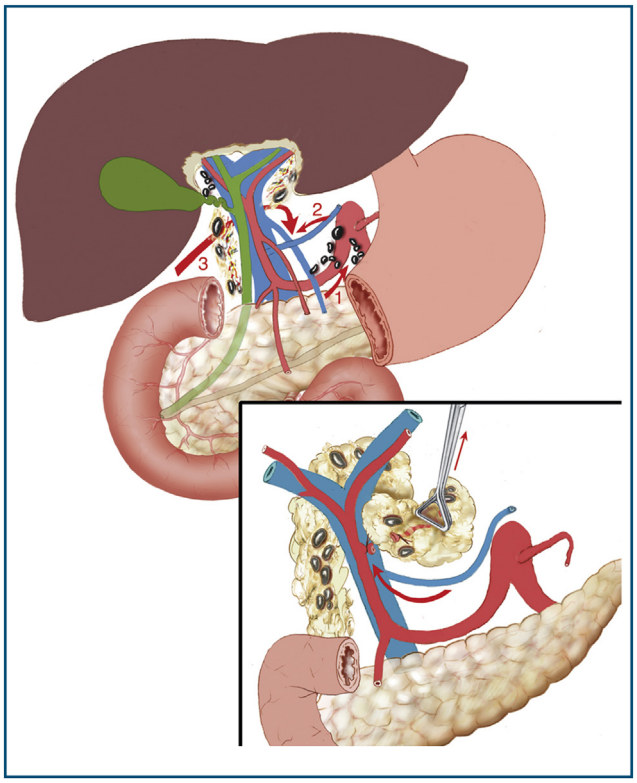
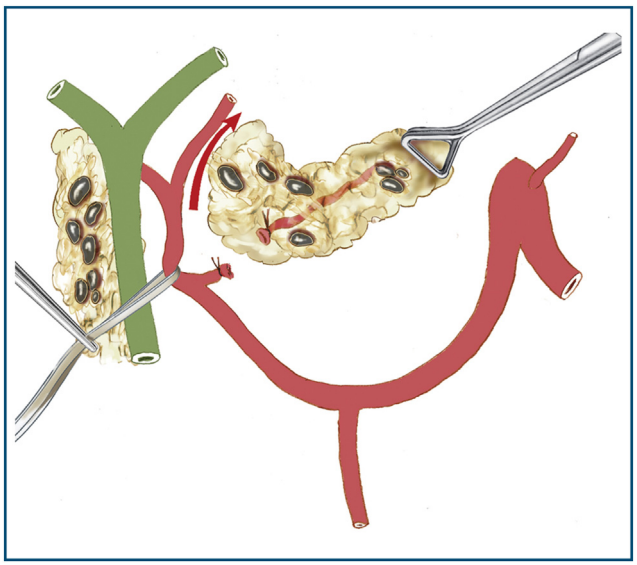
1 Step 1: dissection of the common hepatic artery



Nodal dissection begins on the left side of the hepatic pedicle where the lesser omentum is opened to allow encirclement and control of the entire mass of the pedicle (so-called Pringle maneuver) (arrow 3).
Next, the peritoneum overlying the antero-superior border of the pancreas is incised and elevated to expose the common hepatic artery (CHA). The dissection removes all fatty and nodal tissue along the anterior and superior edges of the CHA and is pursued along the entire length of the CHA back to its origin from the celiac trunk (CT). Dissection of the origin of the splenic artery and left gastric artery is performed if a celiac nodal dissection is envisioned. The left gastric vein is the limiting border for so-called ''limited'' hepatic pedicle lymphadenectomy, i.e., when there is not an associated celiac trunk dissection (arrow 1). This step sometimes necessitates division of several arterial branches issuing from the CHA and, if necessary, ligation of the left gastric vein to facilitate celiac lymphadenectomy. Lymph nodes may be removed individually or in groups, or may be left in place in order to perform the resection *en bloc*.
Nodal dissection is then pursued toward the hilum of the liver following along the CHA with identification and preservation of the gastroduodenal artery, then isolation and ligation of the right gastric artery (or pyloric artery) as it arises from the proper hepatic artery (PHA) (arrow 2). Ligation of the right gastric artery facilitates nodal dissection along the right border of the PHA and provides access to the anterior surface of the portal vein (PV).
Grasping the dissected tissues with a fine atraumatic clamp allows application of slight traction to aid in exposure (inset).

2 Second step: dissection of the branches of the proper hepatic artery (PHA) toward the inferior border of the liver



Pedicular dissection continues with skeletonization of the PHA toward the hepatic hilum resecting all the fatty and nodal tissue along the right and left branches of the hepatic artery. The PHA is totally dissected up to its mid portion and encircled with a vessel loop to allow traction for exposure. Upward traction facilitates exposure of the posterior and right borders of the PHA as well as the anterior and left borders of the portal vein (PV). Control of small collateral arterial branches is often necessary to avoid hematoma in the hepatic pedicle and subsequent arterial thrombosis.
Dissection along the left and posterior borders of the PHA toward the hepatic hilum removes the retro-pedicular lymph node (situated on the posterior aspect of the left hepatic artery branching off the PHA), which represents the superior limit of the nodal dissection. Since the right branch of the PHA usually passes posterior to the common bile duct (CBD), skeletonization of the PHA stops there but will be pursued in the next step of the pedicular dissection.
Rightward traction on the PHA with a vessel loop allows completion of the dissection along the left edge of the PHA and the PV and its left portal branch, joining up the first two fields of the dissection. One must take care when dissecting near the hepatic hilum to avoid damage to an arterial branch serving hepatic segment 4.

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