THE IMPACT OF MULTIDETECTOR CT HEPATIC ANGIOGRAPHY ON THE DIAGNOSIS AND MANAGEMENT OF HEPATOCELLULAR CARCINOMA

ESSAY

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Abstract

As a primary imaging modality, *CT angiography is used as a replacement for conventional angiography in such applications as preoperative planning for hepatic resection, preoperative evaluation and planning for liver transplantation (in both potential recipients and living related donors for both adult-child and adult-to-adult transplantation), pretreatment planning for patients considered for hepatic arterial infusion chemotherapy, and pretreatment evaluation of portal vein patency for a variety of reasons (eg, transjugular intrahepatic portosystemic shunt placement).* ***(Fishman et al.,2001)***

As a secondary imaging modality, *CT angiography can provide supplemental information in patients with cirrhosis, upper gastrointestinal tract bleeding due to varices, or primary extrahepatic neoplasms.* ***(Fishman et al.,2001)***

Key Words :

Inferior vena cava - Hepatic artery

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INTRODUCTION

Hepatocellular carcinoma (HCC) is the most common cancer worldwide (Africa and Japan). HCC is the most common primary hepatic tumor and usually fatal with fewer than 5% of patients surviving 5 years after diagnosis. ***(Jacobson., 2004).***

At the time of diagnosis, many patients have large or multiple tumors not amenable to surgical excision. Even patients with tumors that appear respectable may have severe co morbidities from chronic liver disease that preclude excision. Radiation therapy is limited by the radiosensivity of the liver and systemic chemotherapy has not been shown to improve survival. Transarterial chemoembolization has become the standard of care in many countries for treatment of unresectable hepatocellular carcinoma. ***(Sze et al.,2001).***

Transcatheter arterial chemoembolization (TACE) is a targeted therapy that combines the delivery of chemotherapy at higher local concentration to tumor cells (with minimization of systemic side effects) together with arterial embolization to induce ischeamic necrosis. The concept is based on the dual vascular supply of the liver with the hepatic artery contributing only 20% of the blood supply to normal liver parenchyma but more than 80% to an HCC. ***(Andy and Keeffe.,2003)***.

Cross sectional imaging modalities such as CT, MR imaging, and sonography are very sensitive for detection of large masses and in some cases, a definitive diagnosis can be made even without histological examination. However, sensitivity is inversely proportional to lesion size and malignancies smaller than a centimeter can be nearly impossible to detect with noninvasive means. ***(Hori M et al.,1998).***

Multidetector computed tomography represents an advance in CT technology that involves use of a multiple-row detector array instead of the traditional single-row detector array used in spiral CT. This innovation allows faster scanning and permits many new scanning techniques that were not possible with single-row helical CT. Multidetector CT also allows highly precise imaging during three (or more) distinct phases of hepatic enhancement. Optimal acquisition timing, in combination with thinner collimation, permits improved lesion detection and will also improve characterization of lesions. With the advances in rapid volume rendering and other three-dimensional techniques, a new era of CT-based three-dimensional imaging of the abdominal viscera is becoming a reality. (***Hoon Ji et al., 2001).***

Presurgical planning of vascular anastomosis is a key component of a variety of liver surgeries, including transplantation, tumor resection, laparoscopic hepatobiliary surgery, and transcatheter arterial embolization. Noninvasive computed tomographic CT angiography has begun to replace conventional catheter angiography for evaluation of the hepatic vascular anatomy. Mutlisection CT angiography permits comprehensive, accurate preoperative delineation of the hepatic vascular anatomy and evaluation of the parenchyma in patients undergoing liver surgery, thereby obviating multiple invasive studies including catheter angiography. ***(Sahani D et al.,2003).***

The objective of vascular imaging in patients with liver neoplasms is to provide a vascular road map for understanding the relationship of the tumor to adjacent vessels. Multiplanner reformation and 3D reconstruction are very helpful in demonstrating the relationship of liver tumors to the hepatic veins and IVC. Detection of vascular anomalies is important because it may influence surgical technique in patients in whom tumor excision is feasible. In addition, knowledge of vascular anatomy helps prevent inadvertent injury to aberrant hepatic vessels. The relationship of tumor to adjacent vasculature is critical for identifying the vasculature of the remnant liver and preserving it for functional reserve. ***(Sahani D et al.,2003).***

Dynamic multiple-phase enhanced CT is a useful tool in the diagnosis of hepatocellular carcinoma. Detailed 3D CT angiographic images of the hepatic artery can be obtained simultaneously from the arterial phase imaging data. These 3D CT angiographic images ***(Murakami T et al.,2001.)***

The recent development of the microcatheter system has enabled transcatheter arterial embolization into the hepatic segmental or subsegmental peripheral artery. Thus, transcatheter arterial embolization can be performed in more specific feeding arteries for the treatment of hepatic tumors. Three-dimensional CT angiographic images are expected to sufficiently depict at least the subsegmental hepatic branches for these purposes. ***(Tanikake M et al.,2002).***

AIM OF WORK

The aim of work is to evaluate the impact of multislice CT angiography on the diagnosis and treatment planning for patients with hepatocellular carcinoma.

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List of abbreviations

- IVC Inferior vena cava
- FCAT Federative Committee on Anatomical Terminology
- CBD Common bile duct
- CD Cystic duct
- CHD Common hepatic duct
- HA Hepatic artery
- LHA Left hepatic artery
- LHD Left hepatic duct
- LHV Left hepatic vein
- LPV Left portal vein,
- MHV Middle hepatic vein
- PV Portal vein
- RHA Right hepatic artery
- RHD Right hepatic duct
- RHV Right hepatic vein
- RPV Right portal vein
- CHA Common hepatic artery
- LGA Left gastric artery
- MHA Middle hepatic artery
- SMA Superior mesenteric artery
- MIP Maximum intensity projection
- SA Splenic artery
- RAPV Right anterior portal vein
- RPPV Right posterior portal vein
- SMV Superior mesenteric vein
- GDA Gastroduodenal artery
- PHA Proper hepatic artery
- RRA Right renal artery
- SV Splenic vein
- AO Aorta
- CA Celiac artery
- MRI Magnetic resonance imaging
- MDCT Multi-detector CT