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Review Article

Cardiac and Hepatic Cancers with their Treatment Strategies

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Abstract

This review aims to sketch current scenario of cardiac and hepatic cancers, which deals with the treatment strategies of these two cancers.

Keywords: Cancer; Heart; Liver; Treatment Strategy

Introduction

The extremely rare form cancer is Heart Cancer (HC) or Cardiac Cancer (CC). HC is divided into primary and secondary tumors of the heart. Metastatic tumors occur twenty times more frequently that the primary HC [1]. HCs usually may develop from any part of the heart. Benign myxomas are the most common HC. Angiosarcomas is a common malignant HC in adults, develops in the right upper chamber of the heart (atrium). It actually originates from the cells that form the lining of blood vessels. Cardiac rhabdomyosarcoma (origin: muscle cells) is the second most common primary HC in adults, while first to the children. It can develop anywhere in the heart, but myocardium involvement is crucial. Few other less common types of primary HCs are cardiac angiosarcoma or cardiac sarcoma, mesotheliomas, fibrosarcomas, fibrous histiocytomas and schwannomas. Symptoms of HCs include - common: chest pain or pressure, cough (pink, frothy sputum), fatigue, fever, irregular heart rhythm (arrhythmia), shortness of breath, swelling in the feet and ankles, unexpected weight gain or loss, weakness (loss of strength), widening and thickening of the fingertips (clubbing) and serious: bluish coloration of the lips or fingernails, change in level of consciousness or alertness, change in mental status or sudden behavior change (such as confusion, delirium, lethargy, hallucinations and delusions), chest pain, chest tightness, chest pressure, palpitations, irregular heart rhythm, coughing-up blood (hemoptysis), less or even no urine production, paralysis or inability to move a body part, rapid heart rate (tachycardia), respiratory or breathing problems (e.g.- shortness of breath, difficulty breathing, labored breathing, wheezing, not breathing and choking).

Like other malignancies, HCs can spread to other distant organs. Otherwise, tumor fragments can break free and enter into the circulation. Those are responsible to cause stroke, oxygen deprivation (anti-angiogenic effect) to cells of vital organs and limbs, and premature death. Most frequent complications of HCs include: arrhythmias (abnormal heart rhythms), heart failure, cancer metastasize, stroke and tumor emboli.

A major site for drug metabolism and clearance, liver plays a vital role in drug disposition; consequently, alterations in liver function cause alterations in drug disposition. The liver plays a large role in first-pass metabolism because the small intestine, where most orally administered medications are absorbed, empties into the hepatic portal circulation [2]. Liver Cancer (LC) is also known as hepatic cancer. LC is the sixth most frequent cancer, and the second leading cause of cancer death. Cholangiocarcinoma is associated with sweating, jaundice, abdominal pain, weight loss and liver enlargement, while Hepatocellular Carcinoma (HCC) is associated with abdominal mass and pain, emesis, anemia, back pain, jaundice, itching, weight loss and fever. Most frequent cause of LC is cirrhosis due to hepatitis B, C and D, or alcohol. Genetic and epigenetic changes may take place by the hepatitis viruses. Viral infections and/or alcohol consumption are the leading causes of liver cirrhosis [3-5]. Aflatoxins cause LC, especially, HCC through genetic mutation of a gene required for the prevention of cancer via p53 [6]. Precancerous lesions, obesity (steatohepatitis), smoking and diabetes (HCC), primary sclerosing cholangitis and liver fluke (cholangiocarcinoma) are the most common causes of LCs in adults [7-11]. LCs in children, mainly causes by Beckwith-Wiedemann Syndrome, familial adenomatous polyposis, low birth weight and Trisomy 18 related hepatoblastoma, while progressive familial intrahepatic cholestasis is associated with HCC [12,13].

Medications that bind to plasma proteins can have an increased free plasma concentration in chronic liver disease [14]. However, drug metabolism and elimination depend on some factors such as intrinsic drug clearance, hepatic blood flow, and the drug extraction ratio [14-16]. Most of the antiepileptic drugs undergo metabolism through CYP2C9, CYP2C19, and CYP3A4 can cause significant alterations in the pharmacokinetics of these medications, thus affect liver functions [17-19]. Analgesics such as acetaminophen, alcohol, morphine and so on are evident to cause serious hepatotoxicity [20-23]. The sedatives, lorazepam, midazolam and dexmedetomidine also impair hepatic functions [24,25]. Moreover, drugs acting on CVS such as vassopressors, β-blockers and antiarrhythmics [26,27]; lung e. g. - sildenafil which undergoes metabolism via CYP3A4 and CYP2C9 may cause liver dysfunction [28,29]. Proton pump inhibitors [30], antiemetics [31], renal dysfunction, thromboembolism [32] and thrombocytopenia [33] are also linked to liver diseases. Infectious diseases, MDR pathogens and a number of antimicrobials are the leading causes of liver carcinomas [34].

The HCC accounts approximately 75% of all primary LCs. HCC occurs in liver cells known as hepatocytes. LCs can form within the liver, such as the bile duct (cholangiocarcinoma and cholangiocellular cystadenocarcinoma), blood vessels (angiosarcoma and hemangioendothelioma, embryonal sarcoma and fibrosarcoma), muscles (leiomyosarcoma and rhabdomyosarcoma) and immune cells. Carcinosarcomas, teratomas, yolk sac tumours, carcinoid tumours and lymphomas are known as some less common LCs [35,36].

Besides debate, the dynamic contrast-enhanced ultrasonography relative to DCE-CT, CT and MR imaging in liver lesion detection are still used by a number of countries [37-39]. Endoscopic Retrograde Cholangiopancreatography (ERCP) and Magnetic Resonance Cholangiopancreatography (MRCP) are also used in LCs detection [40]. The aim of this review is to note down current circumstances on heart and liver cancers.

Treatment Strategy of HC

Dietary counseling is the primary concern in healthy heart function. Surgery, physical therapy, heart transplantation, radiation therapy, chemotherapy and palliative care are the effective treatment in HCs. Additionally, complementary and/or alternative complementary treatments with traditional medical supplements and clinical medicines are also useful in HCs. However, extensive care should be taken for complementary treatments, especially in nutritional supplements or homeopathic (nonprescription) remedies. In this context, acupuncture, massage therapy, nutritional dietary supplements, herbal remedies, tea beverages, similar products and yoga may be well thought-out.

Treatment Strategy of LC

Vaccination against hepatitis and reducing alcohol abuse, aflatoxin exposure (e.g.- by chlorophyllin), obesity, and diabetes can reduce the rates of LCs. Diet control in hemochromatosis could decrease the risk of iron overload, decreasing the risk of cancer [41]. Cytotoxic drugs such as doxorubicin or cisplatin with lipiodol are used in a procedure known as transarterial chemoembolization in HCC. However, these are not effective treatment in HCC. Surgical resection and liver transplantation are often the treatment of choice for non-cirrhotic and HCC, respectively. Percutaneous ablation (ethanol or acetic acid, or producing extremes of temperature using radio frequency ablation, microwaves, lasers or cryotherapy) is the only non-surgical treatment that can offer a cure of LCs including HCC. However, the liver is not tolerated to ionizing radiations; therefore, radiotherapy is not a good idea in HCC [42-45]. Liver transplant, chemo- and/or radiation, radio frequency ablation, transarterial chemoembolization are frequently used in cholangiocarcinoma [13,46]. On the other hand, surgical resection or liver transplant and chemotherapy are the treatment in hepatoblastoma [47,48].

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