

The impact of the presence of the aberrant right hepatic artery in pancreatoduodenectomy for pancreatic head cancer

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ABSTRACT

An aberrant right hepatic artery usually originates from the superior mesenteric artery, it has an ascendent trajectory through the head of the pancreas or behind it and represents a technical challenge in pancreatic head tumors due to the fact that it needs to be carefully dissected and preserved in order to maintain an adequate blood supply for the right hemi-liver. Meanwhile, this dissection should be performed in an oncological manner in order to obtain the premises of a radical resection with negative margins.

The aim of the current paper is to discuss about the influence of this anatomical arterial particularity and the possibility of obtaining a resection with curative intent in pancreatic head adenocarcinoma.

Keywords: pancreatic head adenocarcinoma, aberrant right hepatic artery, curative resection

INTRODUCTION

One of the most important characteristics of the hepato-bilio-pancreatic anatomy is represented by the great diversity of the structures, all of these variants being considered as alternatives of the normal anatomy [1-3]. Although they represent normal conditions, all these anatomical variants are mandatory to be known preoperatively in order to plan the surgical procedure [4,5].

The presence of an aberrant right hepatic artery originating from the superior mesenteric artery has been reported in up to 25% of the population, this anatomical condition being mandatory to be known preoperatively [4,6]. In cases in which this aberrant situation is encountered, the right hepatic artery has a particular trajectory, through the pancreatic head or behind it; therefore, in cases presenting a tumoral lesion at this level the existence of the anatomical particularity must be known preoperatively and, in

most cases, must be preserved in order not to affect the vascularization of the liver or of the common biliary duct [4,7].

THE IMPACT OF THE PRESENCE OF AN ABERRANT RIGHT HEPATIC ARTERY ON THE RADICALITY OF PANCREATODUODENECTOMY

Initially it has been thought that the presence of an aberrant right hepatic artery increases the risk of arterial invasion and therefore it decreases the chances for obtaining a radical surgical procedure. Later on it has been demonstrated that not the invasion of the aberrant right hepatic artery per se represents a criterion for unresectable disease, but rather does the local extent of the disease – such as the invasion of the superior mesenteric artery or the presence of distant metastases [8]. An interesting study which aimed to investigate the impact of the presence of an aberrant right hepatic artery on

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the radicality of a pancreatoduodenectomy was conducted by Kim et al. and published in 2014; the study included 289 patients submitted to surgery for pancreatic head adenocarcinoma. Among these patients resection was possible in 249 cases, an aberrant right hepatic artery being found in 37 cases; in the remaining 40 cases a palliative procedure was performed, in three cases an aberrant right hepatic artery being found. The authors underlined the fact that there was no statistically significant difference in terms of age, sex ratio, estimated blood loss, length of surgical procedure or need for portal vein resection between the two subgroups of patients submitted to pancreatoduodenectomy. Meanwhile, when it came to the radicality of the surgical procedure, there was no significant difference between the rates of R1 resection between patients submitted to standard pancreatoduodenectomy and those submitted to resection in the context of an aberrant arterial distribution [8].

THE IMPACT OF THE PRESENCE OF AN ABERRANT RIGHT HEPATIC ARTERY ON THE OVERALL SURVIVAL IN PATIENTS WITH PANCREATIC HEAD CANCER

Although traditionally it has been stated that the presence of this kind of anatomical variant is associated by default with a poorer outcome, it seems that a poorer outcome is to be expected only in cases presenting malignant involvement of the vascular structure, fortunately this condition being rarely encountered [9].

Moreover, in selected cases presenting locally advanced pancreatic head tumors in association with aberrant vascular anatomy neoadjuvant chemotherapy followed by surgery might be proposed in order to increase the chances of achieving a radical resection. An intraoperative aspect of a such case is presented in Figure 1

THE IMPACT OF THE PRESENCE OF AN ABERRANT RIGHT HEPATIC ARTERY ON THE RISK OF DEVELOPING LIVER METASTASES

Due to this particular anatomical condition, it has been considered that a particular disposition of the lympho-vascular structures is to be expected. Therefore, certain authors underlined the fact that a direct pathway of spread at the level of the liver might develop, increasing therefore the risk of developing hepatic recurrence even after curative resection [10]. An interesting study which has been conducted on this issue was published by Mangieri et al. in 2022; the study included 207 cases submitted to pancreatoduodenectomy between 2012 and 2020, an aberrant right hepatic artery being reported in 36 cases. The authors came to demonstrate that the presence of this anatomical particularity was associated with an increased risk of hepatic recurrence as well as with a significantly lower rate of three year disease free and overall survival [10]. However, when analysing the effect of neoadjuvant or adjuvant chemotherapy in such cases, the authors came to underline the fact that the negative influence of the presence of an aberrant right hepatic artery can be decreased by administrating this type of systemic therapy [10]. Moreover, certain authors consider that the presence of an aberrant right hepatic artery should be considered as a criterion for neoadjuvant systemic chemotherapy [11]. Meanwhile, administration of hepatic intra-arterial infusion seems to diminish the risk of developing liver metastases [12].

When it comes to the importance of preserving of the aberrant right hepatic artery, as expected the most important purpose is related to the maintenance of an adequate liver perfusion. Another important issue regards the vascularization of the common bile duct. In cases in which this artery is damaged, an important complication which might occur is repre-

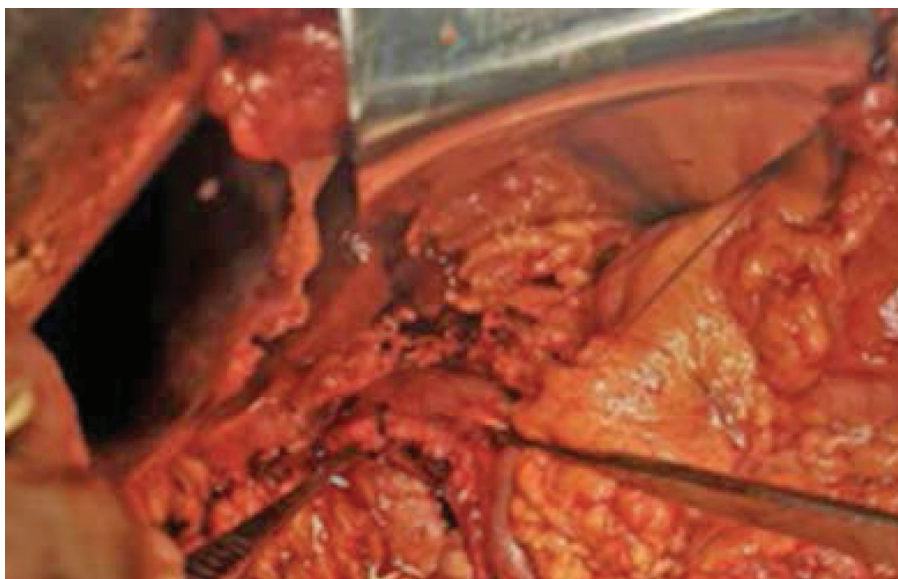


FIGURE 1. The final aspect after pancreatoduodenectomy in a patient presenting an aberrant right hepatic artery from the superior mesenteric artery. The final aspect after resection – the forceps is pointing the arterial variant

sented by the ischemic breakdown of the bilioenteric anastomosis, resulting further into a biliary leak [13].

OTHER POSSIBLE ORIGINS OF AN ABERRANT RIGHT HEPATIC ARTERY

An aberrant right hepatic artery can also have other origins than the superior mesenteric artery; therefore, another commonly encountered anatomical variant is represented by the origin of the right hepatic artery from the gastroduodenal artery, this possibility posing significant issues in achieving a radical resection due to the inadvertent ligation of the gastroduodenal artery if a close origin from the common hepatic artery is encountered [14].

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CONCLUSIONS

An adequate knowledge of the local anatomical variants regarding the arterial blood supply of this region is mandatory in order to have a better planification of the surgical procedure. Although traditionally it has been considered that an aberrant right hepatic artery can be associated with lower rates of radical resection, this myth has been destroyed, similar rates of complete resection and long-term survival being reported. However, a significant issue which should be taken into consideration is represented by the risk of developing further liver metastases, in this respect neoadjuvant chemotherapy or intrahepatic arterial infusion being proposed.

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