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Anomalous Right Inferior Phrenic Artery: A Case Report and Its Clinical Significance

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Conflicts of Interest: Nil.

Abstract

Introduction: Anatomical literature including text books describes anatomy of inferior phrenic artery briefly. In addition to this, due to involvement of inferior phrenic arteries (IPAs) in the arterial supply and growth of hepatocellular carcinoma (HCC) and their importance in angiographic examinations for adrenal lesions, this anatomical region has drawn the interest of radiologists, surgeons, and anatomists.

Method: The present case was found during abdominal dissection in an adult human male cadaver in Anatomy Department, PGIMS Rohtak.

Result: Right inferior phrenic artery (RIPA) was seen arising from right renal artery. Left inferior phrenic artery (LIPA) was normal in its origin.

Conclusion: This case study thus may provide additional data and can be subject of interest for the researchers too.

Key Words: inferior phrenic artery, hepatocellular carcinoma, variation, origin.

Introduction

Inferior phrenic arteries- right and left are lateral aortic branches usually originating from abdominal aorta just above the level of coeliac trunk or from coeliac trunk itself. They may rarely arise from the renal, hepatic or left gastric artery [1].

The RIPA and LIPA diverge as they reach the crura of the diaphragm. Thereafter, these vessels run obliquely upwards and laterally along the inferior aspect of diaphragm [2]. They supply multiple organs such as diaphragm, adrenals, oesophagus, retro-peritoneum etc.[1].

Because of their clinical application in transcatheter embolization of HCC and in angiographic examinations for adrenal lesions, the phrenic arteries are of great importance [1, 3, 4].

Precise understanding of possible variations in the origin of inferior phrenic artery is useful for radiologists, surgeons and anatomists [5]. In view of paucity of anatomical literature regarding inferior phrenic arteries, the present case study seems necessary to be discussed for its clinical importance and embryological basis.

Case Report

Method

The present case was found during dissection of abdominal region in an adult male cadaver in the Department of Anatomy, PGIMS, Rohtak.

Results

It was observed that RIPA took its origin from right renal artery (RRA). It further gave branches to adrenal gland namely superior and middle adrenal arteries (RSAA & RMAA respectively). Further distribution was normal. Right inferior adrenal artery (RIAA) arose from RRA. LIPA was normal in origin i.e. from abdominal aorta. No other associated vascular anomaly was seen.

Discussion

Embryological Basis

Vascular variations of coeliac trunk and IPA may be resulted due to persistence of longitudinal channels between primitive 6th pair of ventral splanchnic vessels which undergo spanning and disappearance during embryological development [6]. Formation of IPA is attributed to persistent superior artery of rete arteriosus urogenitale i.e. irregular series of arterial vessels [7,8].

Numerous studies in the form of case reports and researches had been conducted to observe variations in the origin of IPA. Pulakunta et al reported IPA originating from RRA in 3.125% cases, from coeliac trunk in 6.25% cases and from left gastric arteries in 3.125% cases [9].

Chandrachari et al studied 50 cadavers for the anomalous origin of IPA and observed RIPA and LIPA arising from coeliac axis in 1 & 4 cadavers respectively. Both RIPA and LIPA originated as common trunk from abdominal aorta in 1 cadavers and from coeliac axis in 3 cadavers. RIPA was seen originating as a common trunk with RRA and with accessory renal artery from abdominal aorta in 1 cadaver each [10].

Kundu et al reported a case depicting RIPA originating from RRA [5]. Anupama et al also reported similar origin of IPA from RRA in one of the cases [2].

Though the percentage incidence is varying in different studies yet these studies support present case study in the context of vascular variation of origin of IPA.

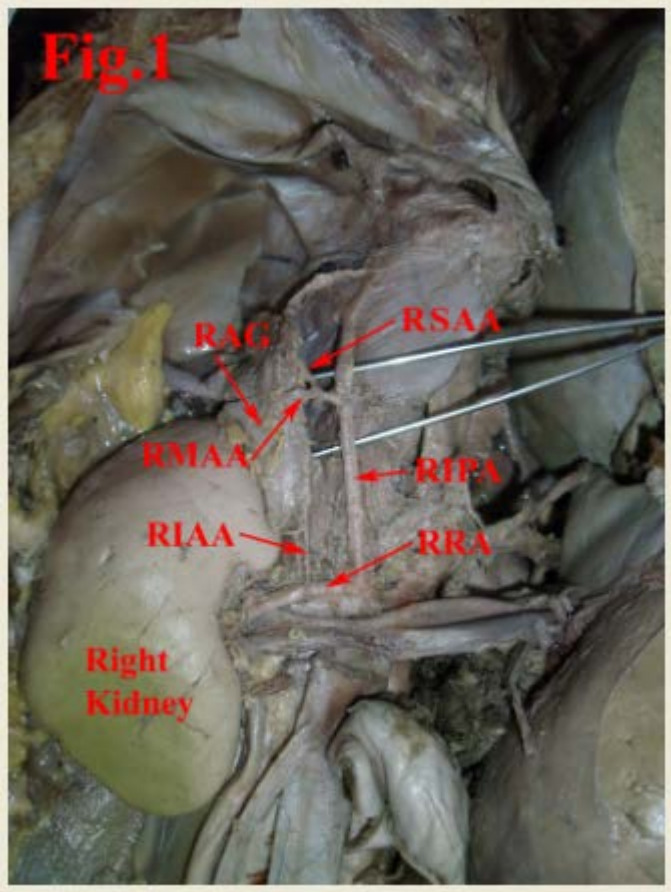
IPA is major arterial source to HCC, secondarily to hepatic artery. Such variations thus can be of great value in treatment of unresectable HCC i.e. transcatheter embolization of RIPA if involved [3,4] and in retroperitoneal surgeries too [2].

Conclusion

Keeping in view, the lack of existing anatomical literature concerning IPAs and their usefulness in HCC treatment, the possibility of anomalous origin of IPA from RRA including other sources as well, should not be overlooked. Thus, the present study is a step to highlight clinical, surgical and embryological significance of such possible variations.

Legends for Figure

Fig.1 Showing Right Adrenal Gland (RAG), Right Inferior Phrenic Artery (RIPA), Right Renal Artery (RRA), Right Superior Adrenal Artery (RSAA), Right Middle Adrenal Artery (RMAA), and Right Inferior Adrenal Artery (RIAA).



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