

## Case Report

# Suzuki classification : a useful adjunct to michel and hiatt hepatic arterial classification systems

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Multidetector Computed Tomography (MDCT) allows non-invasive and accurate preoperative evaluation of hepatobiliary anatomy. Clinician is well versed with relevant hepatobiliary anatomy and can meticulously plan treatment in conveyance with radiologist. We highlight importance of Suzuki classification as a useful adjunct to Michel and Hiatt hepatic arterial classification systems. Hepatic arterial classification was first given in 1955 by Michel NA. Mitchell classification covered almost all hepatic artery variations except few like hepatic artery arising directly from aorta. Second clinically significant contribution was by Hiatt JR and coworkers who modified Michel classification system in 1994 and defined 6 types of hepatic artery variations. Hiatt JR simplified hepatic arterial classification system and was easy to follow. A new classification system was proposed in 1971 by Suzuki T and coworkers. They defined three groups based on number of hepatic arteries at hilar region. Our case series of three cases highlights the complimentary role of three hepatic arterial classification systems given by Michel NA, Hiatt JR and coworkers and Suzuki T and coworkers. We conclude that introduction of Suzuki classification is useful for describing rare variants of hepatic arterial pattern not covered in already known hepatic arterial classification systems. It is our firm believe that Suzuki classification would act as an adjunct to already known classification systems by Michel and Hiatt and should not replace already known classification systems.

[J Indian Med Assoc 2018; 116: 34-6]

**Key words :** Multidetector, hepatobiliary, classification.

Multidetector Computed Tomography (MDCT) allows non-invasive and accurate preoperative evaluation of hepatobiliary anatomy<sup>1</sup>. Clinician is well versed with relevant hepatobiliary anatomy and can meticulously plan treatment in conveyance with radiologist. This helps in reducing complications by choosing best surgical approach. We highlight importance of Suzuki classification as a useful adjunct to Michel and Hiatt hepatic arterial classification systems.

### CASE REPORT

#### Case 1

Triple phase MDCT of abdomen was done in a 31 year male with Budd Chiari Syndrome. Arterial phase imaging revealed variation in hepatic arterial supply. Two separate celiac trunks were arising from abdominal aorta. Superior celiac trunk was branching into accessory right hepatic artery (RHA) and left gastric artery (LGA). Inferior celiac trunk was dividing into common hepatic artery (CHA) and splenic artery (SA). CHA was further branching into proper hepatic artery and gastroduodenal artery (Fig 1).

#### Case 2

Triple phase MDCT of abdomen was done in a 71 year male previously operated for carcinoma gallbladder. Arterial phase imaging revealed variation in hepatic arterial supply. Celiac trunk was



Fig 1 — Showing two separate celiac trunks. Superior celiac trunk is branching into accessory RHA and LGA and inferior celiac trunk is branching into CHA and SA

replaced by a small ventral anastomotic channel : Arc of Buehler with Superior mesenteric artery (SMA). Replaced RHA was arising from SMA and had long tortuous course posterior to portal vein and anterior to Inferior vena cava. SA was arising directly from aorta (Figs 2 & 3).

#### Case 3

Triple phase MDCT of abdomen was done in a 55 year female with carcinoma gallbladder. Arterial phase imaging revealed variation in hepatic arterial supply. Two separate celiac trunks were arising

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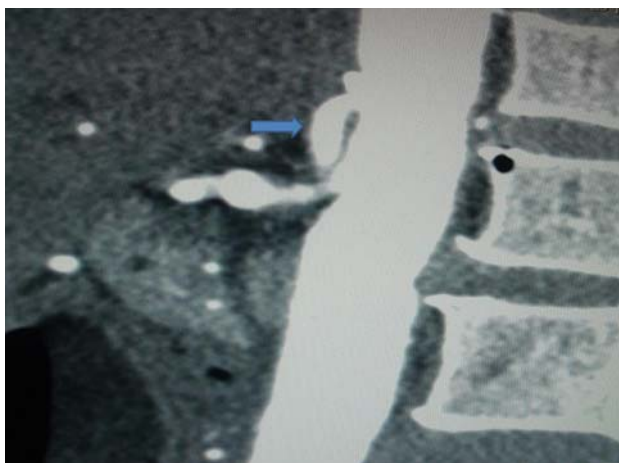


Fig 2 — Showing Celiac trunk replaced by a small ventral anastomotic channel : Arc of Buehler

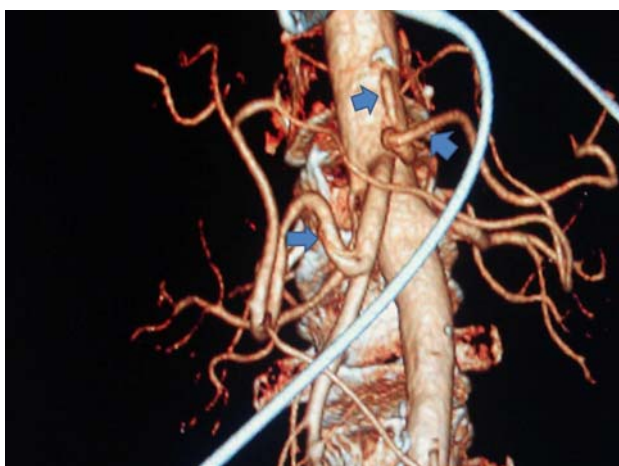


Fig 3 — Showing Arc of Buehler, replaced RHA was arising from SMA and SA arising directly from aorta

ing from abdominal aorta. Superior celiac trunk was branching into SA and LGA. CHA was arising directly from aorta (Fig 4).

#### DISCUSSION

Hepatic arterial classification was first given in 1955 by Michel NA<sup>2</sup>. He defined 10 anatomic variations of the hepatic artery based on results of dissection of 200 cadavers.

- Type I : RHA, Middle hepatic artery (MHA), and LHA arise from the CHA
- Type II : RHA, MHA, and LHA arise from the CHA; replaced LHA from the LGA
- Type III : RHA and MHA arise from the CHA; replaced RHA from the SMA
- Type IV : Replaced RHA and LHA
- Type V : RHA, MHA and LHA arise from the CHA; accessory LHA from the LGA
- Type VI : RHA, MHA and LHA arise from the CHA; accessory RHA
- Type VII : Accessory RHA and LHA
- Type VIII : Replaced RHA and accessory LHA or Replaced LHA and accessory RHA
- Type IX : Entire Hepatic trunk arises from the SMA

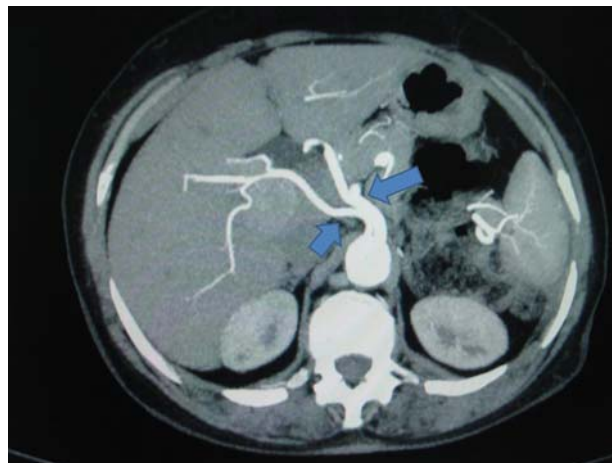


Fig 4 — Showing two separate celiac trunks. Superior celiac trunk is branching into LGA and SA. CHA is arising directly from aorta

- Type X : Entire Hepatic trunk arises from the LGA
- Mitchell classification covered almost all hepatic artery variations except few like hepatic artery arising directly from aorta.
- Second clinically significant contribution was by Hiatt JR and coworkers who modified Michel classification system in 1994 and defined 6 types of hepatic artery variations<sup>3</sup>.
- Type I : RHA, MHA and LHA arise from the CHA
  - Type II : Replaced or accessory RHA
  - Type III : Replaced or accessory RHA
  - Type IV : Replaced or accessory RHA plus replaced or accessory LHA
  - Type V : CHA from SMA
  - Type VI : CHA from aorta

Hiatt JR simplified hepatic arterial classification system and was easy to follow.

A new classification system was proposed in 1971 by Suzuki T and coworkers<sup>4</sup>. They defined three groups based on number of hepatic arteries at hilar region. If hepatic artery origin was from celiac trunk (including its branches), then it was referred to as celiac type. If hepatic artery origin was from SMA (including its branches), then it was referred to as mesenteric type. If origin of hepatic arteries was from both celiac trunk and SMA, it was referred to as mixed type.

- Group I : One hepatic artery (proper hepatic artery)
- Group II : Two independent hepatic arteries
- Group III : Three or more hepatic arteries entering the liver at the hilar region

Our first case had presence of two separate celiac trunks from abdominal aorta. This pattern of hepatic arterial origin has not been described by Mitchell and Hiatt classification systems. Superior celiac trunk was branching into accessory RHA and LGA and inferior celiac trunk was dividing into CHA and SA. So our first case was classified according to hepatic arterial classification system as Suzuki group II, celiac type. Our case highlights the importance of Suzuki classification system and is in agreement with study by Chang KH, *et al*<sup>5</sup>.

The Arc of Buehler is a remnant of a ventral anastomosis that interconnects embryonic ventral segmental arteries. Partial regression of this anastomotic channel may cause the formation of hepatomesenteric trunk – that is CHA arising from the SMA<sup>6,7</sup>. Our

second case had presence of Arc of Buehler with presence of hepaticomesentric trunk, a rare variant. SA was also arising directly from aorta. So our second case was classified as Michel type IX, Hiatt type V and Suzuki group I, mesenteric type.

Our third case had presence of two separate celiac trunks from abdominal aorta. Superior celiac trunk was branching into LGA and SA. CHA was arising directly from aorta. So our third case was classified as Hiatt type VI and Suzuki group I, celiac type.

Our case series of three cases highlights the complimentary role of three hepatic arterial classification systems given by Michel NA, Hiatt JR and coworkers and Suzuki T and coworkers. We conclude that introduction of Suzuki classification is useful for describing rare variants of hepatic arterial pattern not covered in already known hepatic arterial classification systems. Suzuki classification would act as an adjunct to already known classification systems by Michel and Hiatt and should not replace already known classification systems.

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