

INTRA HEPATIC PATTERN OF PORTAL VEIN IN DOG'S LIVER: A CORROSION CAST STUDY

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ABSTRACT

Introduction: The variations in the intrahepatic pattern of portal vein within liver are mandatory factors while dealing with hepatic surgery. The variations in the intrahepatic portal vein branching need to be recognized when contemplating for ligation of the vessel at the porta hepatis during partial hepatectomy.

Materials and Methods: This study was done in 50 dogs liver specimen by corrosion cast technique.

Results and Discussion: In this study in the entire cases bifurcation pattern was found and in all the cases left branch of portal vein extended transversely to the left and turned in the caudolateral direction and divided into transverse portion and oblique portion and right divided into superior and inferior branch. In 88% cases caudate process received branch from the right portal trunk while the papillary process received branch from the left portal trunk.

Conclusion: The knowledge of the portal vein and its intrahepatic branching is important to ensure surgical success pertaining to different surgical procedures.

KEY WORDS: Bifurcation, Hepatic Vein, Caudate Lobe, Portahepatis, Quadrate Lobe.

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INTRODUCTION

Portal vein is formed by union of superior mesenteric vein with the splenic vein. Portal vein is unique in that it starts and ends in capillaries [1]. It receives the radicles which drain venous blood from almost the whole of the subdiaphragmatic intestinal tract and its associated intrinsic and extrinsic glands and from the spleen: having approached the porta hepatis it divides and entering the substance of the liver, continually subdivides, ultimately

discharging its contained blood into the hepatic venous sinusoids [2]. In man resting blood flow to the liver is 25% of the cardiac output, almost 2/3rd is provided by portal blood flow and remaining 1/3rd by hepatic artery. The portal vein has no valves and the normal pressure in portal vein is 7-10 cm of saline. At the junction of hepatic vein and inferior vena cava it is zero [1]. So the study of portal vein is very important both for clinician as well as for the surgeons because portal venous pressure is increased causing

portal hypertension in diseases like cirrhosis of liver, banti's disease and thrombosis of portal vein. This increased pressure in portal vein leads to:

- A. Congestive splenomegaly
- B. Ascites
- C. Collateral circulations through the portal system communications like:
 1. Caput medusa
 2. Oesophageal varices
 3. Haemorrhoids

Portal vein enters the liver centrally and passes upto the porta hepatis, lying behind the bile duct and hepatic artery. The branching of the portal vein is simple. Portal vein has got right main branch which supplies splanchnic blood to the lobes of the right division of the liver. The larger left main branch of the portal vein divides to supply the central and left division of the liver. It also gives the small branch to the papillary process of the caudate lobe.

MATERIALS AND METHODS

The study was conducted in 50 dogs liver obtained from surgery and pharmacology department of SNMC Agra. The livers were removed along with duodenum. Portal vein was then dissected out and canulated with glass canula. After washing the interior of the portal vein with tap water 20 % solutions of Butyl Butyrate solution was injected into the portal vein. The injected specimens were then transferred to 10 % formal saline for one day to allow the Butyl Butyrate to set.

The specimens were then transferred in to the jar of concentrated hydrochloric acid for the corrosion of all the soft tissue. The specimens were then cleaned with running water and the macerated tissue was removed leaving behind the cast. The cast thus obtained was immersed in a solution of formalin and glycerin in equal amounts to keep the fungus away and to give the plastic an extra shine. Now photographs of the casts were taken and with the help of these photographs line diagram were drawn to study the pattern of portal vein.

OBSERVATIONS

The portal vein divides into right and left branch at portahepatis. This left branch is having two

parts, transverse portion and oblique portion while the right branch of portal vein is divided into superior and inferior branch in all the cases.

In the entire cases right medial lobe receives blood supply from the transverse portion of the left branch.

In 44 cases quadrate lobe receives single vein (figure 2) and in 6 cases it was double (Figure 3 and 4).

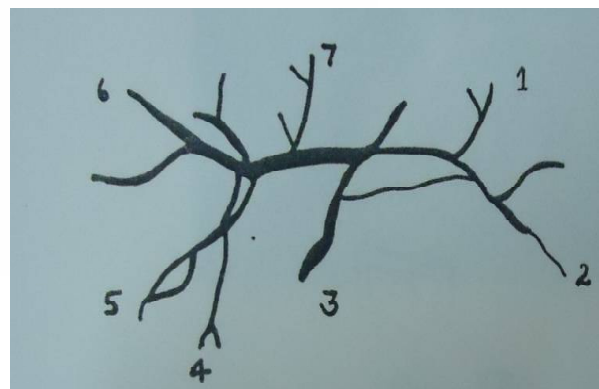
In 44 cases portal vein to the left medial lobe was single and was double in 2 cases (Figure 3).

In 44 cases caudate process received its blood supply from right portal system (Figure 4) and in 6 cases from the right portal vein along with the vein to the right medial lobe (Figure 5).

In 47 cases right lateral lobe supplied by right portal vein and in 3 cases it received small 2 or 3 twigs from the common portal trunk (Figure 1 and 4).

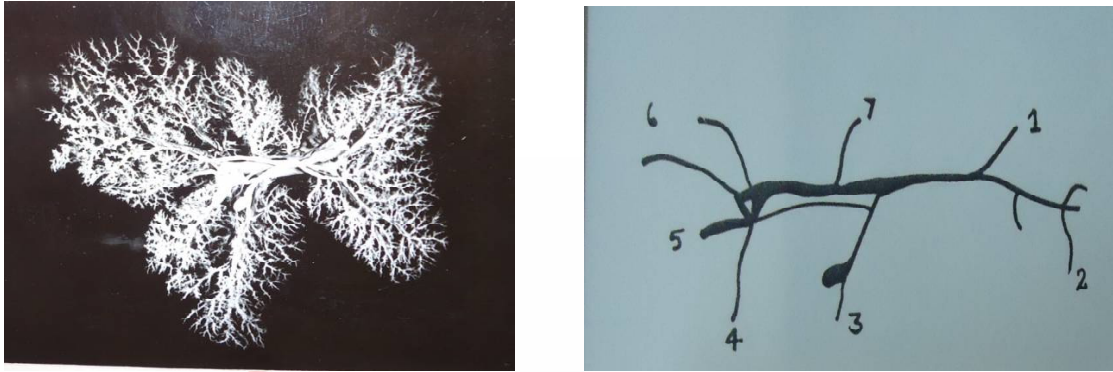
Left lateral lobe in 45 cases received its blood supply from the left portal vein which is usually single but in 5 cases it was double (Figure 4).

Fig. 1: Showing branching pattern of portal vein.



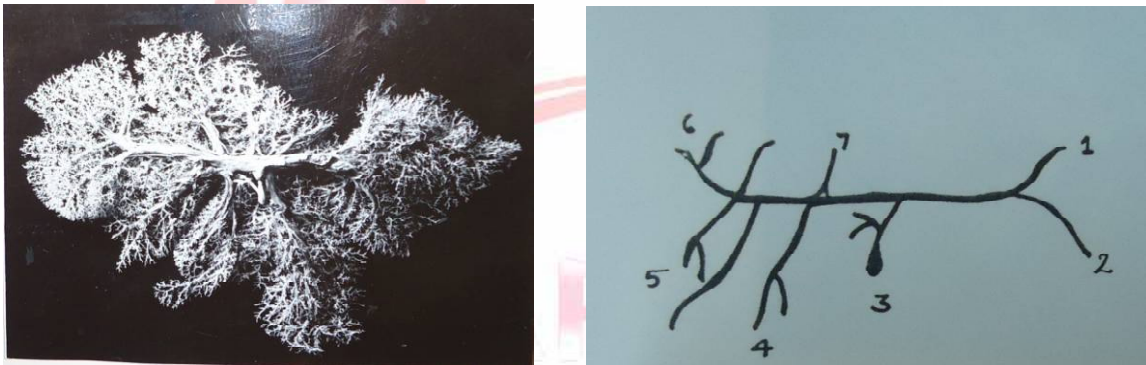
1. Right lateral lobe, 2. Caudate process, 3. Right medial lobe, 4. Quadrate lobe, 5. Left medial lobe, 6. Left lateral lobe, 7. Papillary process.

Fig. 2: Showing branching pattern of portal vein.



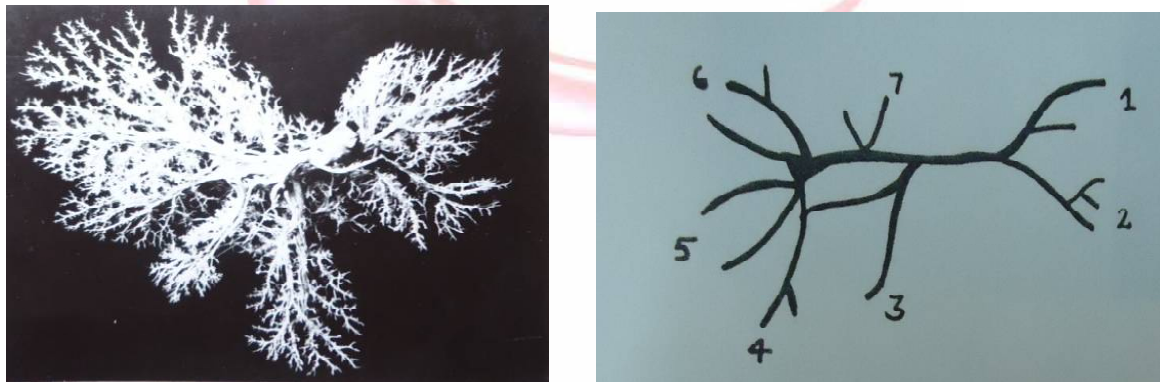
1. Right lateral lobe, 2. Caudate process, 3. Right medial lobe, 4. Quadrate lobe, 5. Left medial lobe, 6. Left lateral lobe, 7. Papillary process.

Fig. 3: Showing branching pattern of portal vein.



1. Right lateral lobe, 2. Caudate process, 3. Right medial lobe, 4. Quadrate lobe, 5. Left medial lobe, 6. Left lateral lobe, 7. Papillary process.

Fig. 4: Showing branching pattern of portal vein.



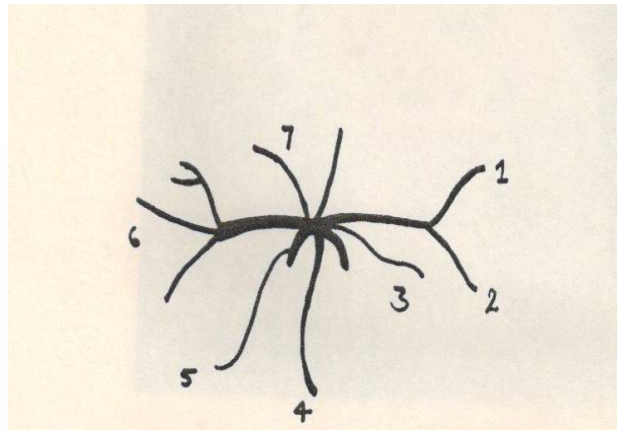
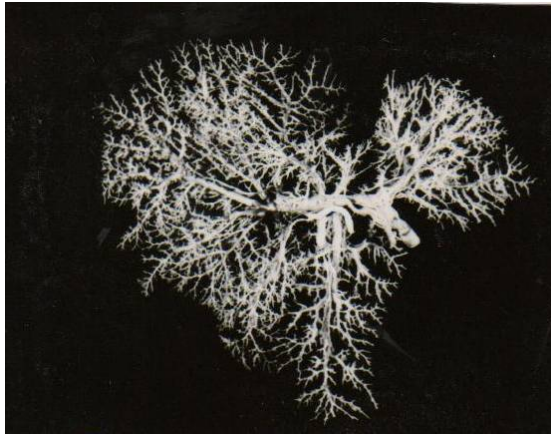
1. Right lateral lobe, 2. Caudate process, 3. Right medial lobe, 4. Quadrate lobe, 5. Left medial lobe, 6. Left lateral lobe, 7. Papillary process.

Fig. 5: Showing branching pattern of portal vein.



1. Right lateral lobe, 2. Caudate process, 3. Right medial lobe, 4. Quadrate lobe, 5. Left medial lobe, 6. Left lateral lobe, 7. Papillary process.

Fig. 6: showing branching pattern of portal vein.



1. Right lateral lobe, 2. Caudate process, 3. Right medial lobe, 4. Quadrate lobe, 5. Left medial lobe, 6. Left lateral lobe, 7. Papillary process

Table 1: Portal vein supply to the left medial lobe.

Serial number	Site of origin	Number of cases	Percentage
1	From the left side of oblique portion	2	4
2	From the apex of oblique portion with the vein to the quadrate lobe	2	4
3	From the external aspect of kink between the transverse and oblique portion	2	4
4	From the apex of oblique portion of the left portal vein from its left side	44	88

Table 2: Portal vein supply to the right lateral lobe.

Serial number	Site of origin	Number of cases	Percentage
1	From the right portal vein	47	94
2	As 2 or 3 small twigs near its origin from the common portal vein	3	6

Table 3: Portal vein supply to the caudate process.

Serial number	Site of origin	Number of cases	Percentage
1	From the inferior branch of right portal vein (Fig 5)	5	10
2	From the right portal vein	35	70
3	From the site of bifurcation of right portal vein (Fig 4)	4	8
4	From the inferior branch of the right portal vein along with the vein to the right medial lobe (Fig-6)	6	12

DISCUSSION

Majority of the previous studies were done by corrosion cast technique. The bifurcation pattern was reported by [3-8]. In the present study in all the cases (50 cases-100%), total vein divided into 2 main divisions:

1. Right branch of portal vein
2. Left branch of portal vein

Rex [3] termed these divisions as "Rechter & linker Hauptast". Hjorsjo [9] named right branch and left branch as VPramusPrincipalis dexter sinister. Elias and petty [4] described them as "truncus dexter Venae portae and truncus sinister venae portae". While Yamada and Nakamura [6] also named the right branch and the left branch as "truncus dexter and truncus sinister". In a study Slight and Thomford [10] while working of intrahepatic patterns of various hollow channel in dog's liver, they observed the variations in the patterns of hepatic artery and hepatic duct without reporting the variation in the intrahepatic pattern of portal vein.

In present study in all the cases left branch of portal vein is divided into transverse and oblique portion. Yamada and Nakamura [6] termed the oblique portion as "Pars Umbilicalis" and the transverse portion as "Transversus dextrex". The length of transverse portion in our study varied from 18 to 55 mm and the length of oblique portion varied from 2 to 10 mm.

In all the cases vein to the right medial lobe rose from the transverse portion of the left branch of portal vein. Rex [3] termed it as R,cysticus and Elias and Petty(4) termed it as R-centralis. In 44

cases vein to the left medial lobe was single and in 2 cases it was double. Right lateral lobe in 44 cases received its blood supply from the right portal vein and in 3 cases by 2 or 3 small twigs near its origin from the common portal vein. Yamada and Nakamura [6] mentioned its supply from the truncus sinister. Left lateral lobe in all the cases received its blood supply from the left portal vein which arises either from the oblique portion of the left portal vein in 37 cases(74%) or from the vein to the quadrate lobe and left medial from the oblique portion of the left portal vein. In 5 cases it was double or triple.

CONCLUSION

From our study we concluded the portal vein divides extrahepatically into right and left branch. Right branch divides into superior and inferior branch while the left branch divides into transverse and oblique portion. In 88% cases caudate process received branch from the right portal trunk while the papillary process received branch from the left portal trunk. Knowledge about this pattern of division is helpful for a clinician and surgeons.

Conflicts of Interests: None

REFERENCES

- [1]. Lee McGregor's: synopsis of surgical anatomy 12th edition (1986) pp-81.
- [2]. Henry Gray : Gray's Anatomy 36th edition (1984) pp-736.
- [3]. Rex, Hugo. Beitrage Zur Morphologie der Saugerleber. Morph. Jahrb. 1880;14: 517-616.
- [4]. Elias H. and Petty D. Gross anatomy of the blood vessels and ducts within the human liver Am.J.Anat 1952;90:59-109.
- [5]. Healy,J.E.Jr. Clinical anatomic aspects of radical hepatic surgery. Journal of the international college of surgeon 1954;22(5);542-550.
- [6]. Yamada H. and Nakamura Y. Study of hepatic surgery in dogs. Journal of the Japan Veterinary Medical Association. 1969;22:341-246.
- [7]. Gupta C.D. and Gupta S.C. Intrahepatic pattern of the biliary ducts and their major variations. Indian J Med Res 1977;63:1130.
- [8]. Elias H: and Popper. H. Venous distribution liver A.M.A archives path. 1955;59: 332-340.
- [9]. Hjortsjo C-H. Die Anatomic der Intraheptischen Gallengange beim Menschen; Mittles Rontgen-und Injection Technik stadiert lunds Univ.Arsk N.F.Ard. 1948;2(52):1-30.
- [10]. Sleight D.R. and Thomford N.R. Gross anatomy and blood supply of canine liver. Anat., Rec. 1970;166:153-154.

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