Neovascularisation develops around the HCC and malignant tumours of liver in basket form. This leads to an increase in blood supply via the hepatic artery. We have tried to do quantification of hepatic artery, basket vessels and feeding vessels wherever it is found. We have accumulated data of liver tumours (malignant) from 2013 to September 2017 from our colour Doppler centre. Our centre is located in Punjab province of Pakistan. Here the prevalence of hepatitis C is 6.5% which is very high [1]. China has the highest burden of HCV infection cases. Pakistan has the second highest burden of HCV positive cases [2]. This is a retrospective study.

**Introduction**

Neovascularisation develops around the HCC and malignant tumours of liver in basket form. This leads to an increase in blood supply via the hepatic artery. We have tried to do quantification of hepatic artery, basket vessels and feeding vessels wherever it is found. We have accumulated data of liver tumours (malignant) from 2013 to September 2017 from our colour Doppler centre. Our centre is located in Punjab province of Pakistan. Here the prevalence of hepatitis C is 6.5% which is very high [1]. China has the highest burden of HCV infection cases. Pakistan has the second highest burden of HCV positive cases [2]. This is a retrospective study.

**Background**

Malignant tumours grow in an uncontrolled fashion with the propensity to spread into the surrounding tissues. Both these critical features are closely dependent on the tumour vascular network [3,4], the development of new formed vessels is essential for the tumour growth. Tumoural vascularization shows some peculiar biological and morphological features. Firstly, it is not self-limited and tends to grow indefinitely according to the biological behavior of the tumour. Secondly, it develops as a complex, chaotic network at the growing edge of the tumour with irregular and winding branches penetrating the nodule with a radial shape. The number of vessels within the tumour is often, but not always, increased, so that hypervascularity is a common feature. Anastomoses between adjacent arteries and veins, mainly at the periphery of the nodule, are frequently observed [10-12].

Taylor et al. [5] reported that high-velocity Doppler signal was detected in hepatocellular carcinoma tumors when pulsed wave Doppler sonography was used; they suggested that this signal was associated with large pressure gradients due to arteriovenous shunting. In our study, we also observed a fast pulsating blood flow of 70-90cm/sec in maximal velocity in feeding arteries entering the tumor, which form part of the basket pattern [6]. Furthermore, in addition to the pulsating wave, a constant wave could be detected in the periphery in hepatocellular carcinoma. Comparing the blood flows shown on the color image with angiographic findings, we found that the blood flow that creates the basket pattern is the portal vein displaced around mass lesions and feeding arteries surrounding tumor nodules [7]. Also, the blood flow within the tumor displayed by color imaging is the pulsating tumor vessel running within the tumor. 

**Equipment**

B-scan, colour Doppler and duplex evaluation was done on sonoscope S20 [8]. The insonating frequency of 3-5Hz was used for grey scale image & for colour Doppler frequency of 2.4 was used, PRF of Doppler was 4, increased to 6 a few times to 8 were Doppler aliasing occurs (Figure 1).
Subject & Method

Study comprises of 25 patients with almost equal females & males of age 40 to 70 years Doppler signal of circumferential artery around the mass wherever it was present. In patients with to more than one mass in liver, only the mass with the highest PSV was considered and analysed with colour and spectral Doppler [9] (Figure 2). Therefore for purpose of data analysis only one lesion was considered. All patients present themselves for ultrasound examination after appointment verbal consent was taken to include in this study.

Figure 2: Basket pattern.
Objective

It has been studied in past qualitatively but not quantitatively. In this study quantification is made of PSV of circumferential tumoural arteries (basket vessels) and feeding vessels wherever it is found [10].

Results

A. HCC is a specific tumour in which basket pattern vessels or circumferential vessels around the big HCC show more velocity than hepatic artery and this rise even upto 311 cms/sec. in our study,

B. Average 159 Minimum PSV of basket pattern around HCC 90 cms/sec, maximum being 311 cms/sec.

C. Feeding or penetrating vessels show pulsatile flow and this sometimes reach 160 cms/sec, minimum 33 cms and average of 83 cms/sec and this is often below the baseline.

Feeding arteries

A. It’s open for future researchers to further explore this topic of increased blood supply and its various indices

B. HCC is a specific tumour in which basket pattern vessels or circumferential vessels around the big HCC show more velocity than hepatic artery and this rise even upto 235 cms/sec. in our study,

C. Feeding or penetrating vessels show pulsatile flow and this sometimes reach more than basket pattern vessels and this is often below the baseline.

References

9. Myron AP, MD, University of Wisconsin.