INTRODUCTION
Extra-hepatic portal venous obstruction (EHPVO) is the commonest cause of non-cirrhotic portal hypertension in children in East with upper GI bleed and a big spleen or hypersplenism. Proximal lienorenal shunt (PLRS) end to side, is a safe, economic and effective treatment (Sahni et al., 1990). Doppler Sonography is a safe, effective and convenient diagnostic tool in EHPVO in children for pre-operative evaluation in EHPVO and for follow-up of shunt surgery to evaluate patency of shunt.

Keywords: Portal Hypertension, Extra-hepatic Portal Venous Obstruction, Shunt Surgery, PLRS, Doppler Sonography

CASES
Patient MS 14 years/Male; S/O RS, was admitted in Department of Surgery with complaints of abdominal pain, haematamasis and malaena since two days.

Past History: No diabetes mellitus/tuberculosis/hypertension.

Personal History: Nil, No drug allergy.

General Examination: GC average, Pallor was present, Pulse 82/minute, regular; BP 110/70 mm of Hg, temperature was normal.

Per abdomen examination revealed distended abdomen with ascites, gross splenomegaly, no hepatomegaly, no visible veins over abdomen and no signs of liver failure.

Respiratory System and CVS were found normal.

CNS revealed conscious and well oriented patient with no tremors.

Diagnosis of portal hypertension (EHPVO) with symptomatic bleeding was made and posted for splenectomy with shunt.

Pre-operative investigations revealed Haemoglobin 7.4 gm%, TRBC 2.5 millions/cubic cm, TLC 2300/cubic cm, platelet 74,000/cub cm, random blood sugar 77mg%, blood urea 32 md/dl, serum creatinine 0.8 mg/dl.

After 3 units of blood transfusion pre-operatively, haematology revealed Haemoglobin 9.3 gm%, TLC 18100/cub mm, N-85% L-10%, M-2%, E-3%, Basophils nil, TRBC 3.78 millions/cub mm; PCV 27.6 Platelet 1.94 million/cub mm; Blood urea 30mg/dl, serum creatinine 0.3mg/dl, random blood sugar 77 mg% Blood group A positive; Hbs AG –non-reactive.

Coagulation Test: Control 13 sec, test 15 sec, Ratio 1.15, ISI 1.0, INR 1.15.

Liver Function Test: Total bilirubin 1.0mg/dl, conjugated 0.30mg/dl, un-conjugated 0.7mg/dl, SGOT 46 IU, SGPT 29IU; total protein 6.1gm%; Alb 3.7gm%, Globulin 2-4gm%, AG Ratio 1.54, Serum alkaline phosphatase 213 u/l.

Urine Examination: Routine & microscopic: Normal.


Chemical Examination: Protein 0.96 gm/dl, Sugar 131 mg/dl

Microscopic Examination: Total cell count 100/cub mm, polymorphs 10% Lymphocytes- 90%

Bacteriological Examination: Gram staining revealed no micro-organism; Zn staining was negative for AFB.

X-ray Chest was found normal.
Abdominal Sonography: Massive splenomegaly 15.8 cm x 11.1 cm with dilated splenic vein and its branches in the splenic pulp was seen. Splenic vein was tortuous measuring 1 cm in diameter. Portal vein & its tributaries in liver were not visualised and there was no flow on Doppler interrogation. Ascites was present.

Colour Doppler Sonography
Post-operative colour Doppler study revealed splenic vein anastomosis to mid portion of left renal vein measuring 0.59 cm (6mm) in diameter with normal hepato-petal colour flow with phasic variation (Figure 1).

![Figure 1: Colour Flow in Shunt joining the left renal vein](image1.png)

![Figure 2: Doppler evaluation of shunt for patency and flow characteristics](image2.png)
Exploratory laparotomy with splenectomy with L-R shunt was done. One week after shunt surgery colour Doppler evaluation of L-R Shunt revealed patent shunt measuring 0.59 cm (about 6mm) joining the mid portion of left renal vein (Figure 1). The mean velocity measured 16.5 cm/second. Hepato-petal flow with phasic variation in the shunt anastomosis was noted (Figure 2).

**DISCUSSION**

Extrahepatic portal obstruction is one of the most common entities wherein shunt surgery is performed with success. The aim of the surgical porto-systemic shunts is to reduce the portal venous pressure; maintain hepato-petal blood flow particularly portal blood flow and above all not to have a high incidence of the feared complication of encephalopathy.

EHPVO is usually found in patients from the lower socio-economic strata. These children mainly present with a massive upper gastro-intestinal (GI) bleed, a big spleen or hypersplenism (Pande et al., 1987). One must keep in mind that patients with EHPVO in India are young having normal liver function, tolerate episodes of variceal bleeding well and are generally expected to have a near normal life expectancy if bleeding does not occur (Pal, 2009).

In patients with normal liver and extra hepatic obstruction, shunt is the definitive treatment. In patients with stable liver function shunt can be performed with 100% short term and 92% long term results (Sahni et al., 1990).

In India, the expertise to provide effective endoscopic variceal obliteration is more widely available than that for shunt surgery. The choice of surgical procedure depends on the pathological process and its effect on the child. Even when indicated, all children cannot be subjected to shunt surgery. About 20% are unfit for a shunt surgery.

**Proximal Spleno-renal Shunt (Linton):** The splenic vein is divided close to the spleen and the mesenteric vein is sutured to the side of the left renal vein; so that all the blood from the SMV and IMV is shunted into the systemic circulation through the left renal vein (Sahni et al., 1990). It invariably includes splenectomy, hence it is a popular choice in India particularly for patients with EHPVO with large symptomatic splenomegaly and hypersplenism.

Sharma et al., (2000) in a series of 98 patients out of which 32 were between the age of 4 and 12 years (22 boys and 10 girls) performed splenectomy and proxymal end to side Lieno-renal (Linton’s) shunt provided the splenic vein available was >4mm in diameter and the liver function was not deranged. A wedge and needle biopsy of the liver was done only if there was any gross evidence of nodularity of liver at operation.

Ultrasoundographic examination of the spleno-portal axis, in 90% of children reveals a block at the formation of the portal vein. In the remaining, either the entire spleno-portal axis is thrombosed or the block lies in the hilum of the spleen, giving rise to left sided or “segmental” portal hypertension.

Doppler sonography (Meisher et al., 2002) is the best method for determining shunt patency during follow-up of such patients. Prior to development of Dopplar system shunt patency was documented by selective angiography studies. The newer diagnostic tools such as CECT, DSA and MRI have reduced the impact of angiography. However, the high costs, skilled technicians and back-up team required to handle these sophisticated gadgets may not be available in all hospitals even in urban areas. Doppler sonography is an excellent tool for routine follow-up of post-operative patients of porto-systemic shunts.

The shunt anatomy i.e. site, size and function is very well demonstrated on ultrasonography and obviates the need for any invasive studies. Patterns of thrombosis and flow direction vary unpredictably from patient to patient; however, shunt patency should not be inferred without direct visualisation of the shunt (Meisher et al., 2002).

Patriquin et al., (1987) compared Colour Doppler Study (CDS) with clinical, angiographic and surgical findings in children with porto-systemic shunts. The presence and direction of flow in the splanchnic venous system were determined in all children obviating the need for further angiographic studies.

**Conclusion**
Considering the socio-economics of India, splenectomy and Lieno-renal shunt is a safe and effective one-time treatment in children with EHPVO which deals with both GI bleeds and hypersplenism. Re-bleeding even after shunt blockage is rare. Doppler sonography is a safe & convenient tool to evaluate patients of EHPVO prior to surgery and to confirm shunt patency following surgery in Extra-hepatic portal venous obstruction, (EHPVO) and should be used as the primary modality for follow-up of such patients.

REFERENCES