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# INFERIOR MESENTERIC VEIN LEFT RENAL VEIN SHUNT IN PORTAL HYPERTENSION

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*No general consensus exists regarding the proper surgical management of recurrent variceal bleeding due to liver cirrhosis. The inherent small diameter of the inferior mesenteric vein can be used for shunting blood to systemic circulation, not diverting blood completely from the liver.*

*The study included 24 patients, 7 females and 17 males with age range between 21 to 45 years. All patients were class A and B according to Child classification and had prior episode of variceal bleeding duo to portal hypertension. Preoperative liver functions, upper GI endoscopy for variceal grading, and presence of gastropathy were compared with the postoperative results.*

*The outcome of this shunt revealed no rebleeding episodes, improvement of variceal gradings, no postoperative development of ascites or encephalopathy in all patients. There was improvement in liver functions and endoscopic degree of gastropathy. Only one patient developed portosystemic enchalopathy after 18 months of follow up. There was no improvement of blood picture and splenectomy had to be done in cases with hypersplenism. Early shunt patency rate was 19/24 (70.5%) and 14 shunts were found patent after 18 months of follow up.*

*In conclusion, Inferior mesenteric vein to left renal vein shunt is a simple procedure, with small stoma, durable shunt, effective in portal decompression, and can be used as a good alternative to major shunt procedures or trans-internal jugular portosystemic shunt (TIPS) before liver transplantation.*

*Keywords: Portal hypertension-Inferior mesenteric vein shunt-esophageal varices.*

## INTRODUCTION

Variceal bleeding is the leading cause of death in cirrhotic patients. Mortality following an episode of variceal hemorrhage without treatment is approximately 50% at three months and 66% at one year [1]. The incidence of rebleeding is 35% at six weeks after the initial bleeding episode and 75% at one year [2].

In this respect, various treatments have been proposed to prevent rebleeding episode in the hope of improving survival. Surgical portosystemic shunt (PSS) have been well established as a definitive therapy for bleeding esophageal varices with variceal rebleeding is extremely uncommon [3]. Moreover, these shunts may be used as a long-term bridge to liver transplantation [4]. However, this operation can be associated with substantial perioperative morbidity and mortality with accelerated risk of hepatic decompansation and neuropsychiatric deterioration [5].

Warren shunt is the preferred operation by some surgeons [6,7,8]. This operation is a difficult one due to extensive retroperitoneal dissection and difficulty in splenic vein dissection [9].

Now,the catheter directed portosystemic shunt,Trans-intrahepatic portasysemic shunt (TIPS) is a well established technique.It is known to provide the immediate advantage of PPS without major abdominal operation in chronically

decompansated patients [10]. Although it is life saving in end stage liver disease patients listed for liver transplantation [11,12], the cardinal shortcoming of TIPS is its well doccumented lack of durability. TIPS channel stenosis or thrombosis may occur in up to 50% in less than a year of installation. Repeated intervention is required to keep the shunt opened [13,14,15].

In order to overcome the difficulties encountered in Warren shunt, and take the advantage of small stoma of TIPS, and in the mean time having a good durable shunt not diverting the whole blood from the liver, This simple shunt of inferior mesenteric vein to left renal vein shunt is proposed and has been evaluated in this series of cirrhotic patients.

## PATIENTS AND METHODS

This study was conducted in Kasr AL Aini hospital between jan.2000 to Oct.2001. 24 patients were included in this study ; 7 females and 17 males with age range between 21 to 45 years. All patients had liver cirrhosis class A or B (according to Child Pugh classification) and had prior episode of variceal bleeding. Upper gastro-intestinal endoscopy was done for grading of esophageal varices and presence or absence of gastropathy as shown in (Table 1).

All patients were scheduled for portosystemic shunt using the inferior mesenteric vein to the left renal vein shunt.This technique consisted of exposure of the inferior mesenteric vein which is ligated distally, dilated and making the anastomosis with left renal vein, end to side anstomosisas. The detailed steps of the technique are shown in (Fig. 1,2,3,4).

Portal pressures were measured intraoperatively through the inferior mesenteric vein as shown in (Fig. 5) and the values were compared with that after shunt procedure as shown in (Table 2).

Some technical difficulties were faced during surgery. Malrotated left kidney was found in one case where the left renal vein was found in an abnormal position at the upper pole of the left kidney (Fig. 6).

In another case, the left kidney was absent and anastomosis was done to the inferior vena cava (Fig.7).

Outcome of the procedure included certain parameters for evaluation. Shunt patency shown by duplex scan (or angiography (Selective left renal vein angiography) in some cases), rebleeding episodes, liver functions changes, improvement of variceal grading, improvement of gastropathy,and the development of ascites and or clinical encphalopathy.

## RESULTS

There was no mortality in the study group nor major postoperative morbidity. Clinical results showed no rebleeding episodes except in three cases where endoscopic sclerotherapy was sufficient to stop the bleeding in the early postoperative period (30 days after the operation).

Liver functions showed improvement in one third of the cases Mainly, the albumin level and prothrombin time and concentration.These changes shifted 1/3 of the patients from Child B class to Child A postoperatively. The rest of the patients showed no change or deterioration of their liver functions. Follow up of the grades of varices and gastropathy by repeated endoscopy showed complete disappearance of varices in three cases and lower grade of varices in 15 cases as compared by the preoperative grades, and no change was found in the remaining 6 cases. Gastropathy either completely disappeared or showed lower grade than before surgery. This was shown endoscopically by decrease in gastric mucosal congestion and edema and healing of superficial gastric erosions. There was no clinical evidence of development of ascites or clinical encephalopathy except in two patients who developed postoperative clinical ascites and another one who developed clinical encephalopathy 18 months after the operation inspite of good liver functions. Medical measures were sufficient to control their conditions.

In patients who had associated hypersplenism (5 cases), there was no improvement of blood picture and splenectomy has to be done in all of them to correct hypersplenism.

Shunt patency was evaluated by duplex scanning and/ or angiography in the immediate postoperative period (Fig. 8,9). 19 out of 24 shunts were found patent in the early postoperative period (30 days). 5 shunts were found thrombosed. These were the cases who had splenectomy done for hypersplenism. 14 shunts were evaluated for 18 monthes , all were found patent by duplex scan.

Table (1): *Endoscopic findings before and after shunt procedure.*

| *Case number* | *Grade of varices (pre)* | *Grade of varices (post)* | *Gastropathy (pre)* | *Gastropathy (post)* |
|---|---|---|---|---|
| 1 | III-IV | I-II | +++ | + |
| 2 | IV | II | +++ | + |
| 3 | IV | III | +++ | ++ |
| 4 | II | ---- | -ve | -ve |
| 5 | II-III | II | ++ | + |
| 6 | III-IV | II-III | +++ | + |
| 7 | I-II | ---- | -ve | -ve |
| 8 | II-III | II-III | -ve | -ve |
| 9 | IV | II-III | +++ | + |
| 10 | III-IV | II-III | -ve | -ve |
| 11 | II-III | II | -ve | -ve |
| 12 | II | --- | -ve | -ve |
| 13 | IV | II-III | +++ | + |
| 14 | IV | III | ++ | + |
| 15 | II-III | II | -ve | -ve |
| 16 | III-IV | III | ++ | ++ |
| 17 | II-III | II-III | + | + |
| 18 | III | III | ++ | ++ |
| 19 | III-IV | II-III | +++ | + |
| 20 | II | II | + | + |
| 21 | IV | II-III | ++ | + |
| 22 | II-III | II-III | -ve | -ve |
| 23 | II-III | II-III | -ve | -ve |
| 24 | III-IV | II-III | ++ | + |

Table (2): *Portal pressure measurements in some cases before and after shunt procedure.*

| *Patient number* | *Portal pressure before* | *Portal pressure after* |
|---|---|---|
| 1 | 60 cm water | 43 cm water |
| 2 | 55 // | 37 // |
| 3 | 65 // | 42 // |
| 4 | 55 // | 40 // |
| 5 | 61 // | 47 // |
| 6 | 57 // | 40 // |
| 7 | 62 // | 45 // |
| 8 | 58 // | 41 // |
| 9 | 63 // | 47 // |

*Fig.(1): shunt technique: exposure of the inferior mesenteric vein and left renal vein*

*Fig.(2): shunt technique:dilatation of the inferior mesenteric vein and adjustment of the angle of anastomosis.*

*Fig.(3): shunt technique: anastomosis of the two veins end to side anastomosis. Posterior continous and anterior interrupted sutures by 6/0 proline.*

*Fig.(4): shunt technique: shunt appearance after declamping.*

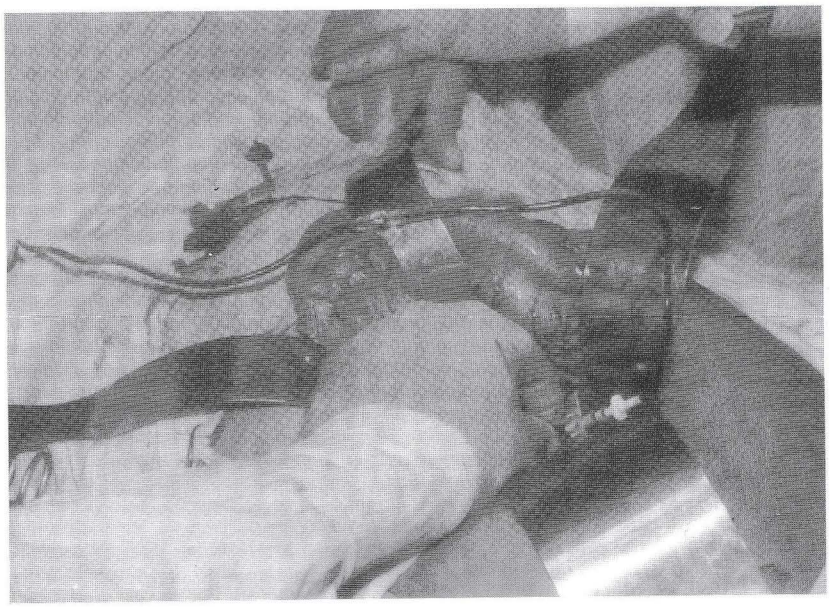
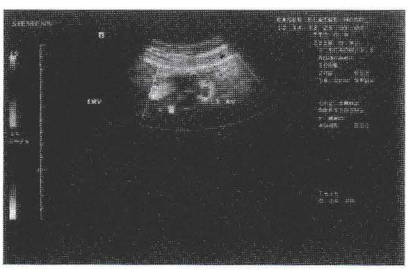


*Fig.(5): Measurement of the portal pressure during the procedure from the inferior mesenteric vein.*

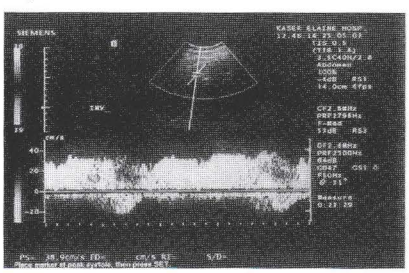
*Fig.(6): Malrotated left kidney with the left renal vein exposed at the upper pole of the left kidney.*

*Fig.(7): Anastomosis of the inferior mesenteric vein to the inferior vena cava( an ulternative to left renal vein if the left kidney is absent).*

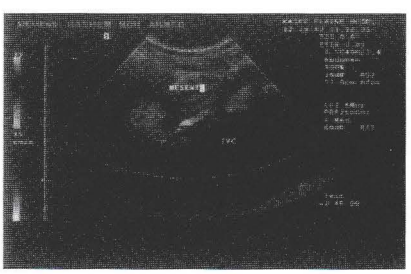


*(a)*

*(b)*



*(c)*



*(d)*

*Fig.(8): Duplex scanning of the shunt confirmed its patency in the postoperative period.*

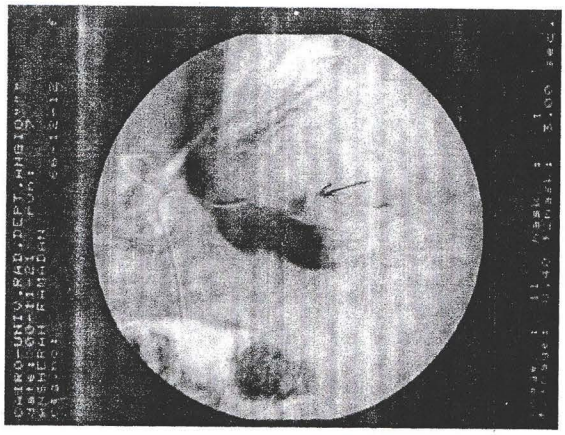


*Fig.(9): Selective left renal vein angiography to show the shunt retrgradely as the other methods as splenoportography failed to show the shunt.*

## DISCUSSION

Esophageal varices develop in approximately 70% of patients with cirrhosis and bleeding esophageal varices is the major complication of portal hypertension[16].Gastric mucosal lesions known to occur in such patients, have been termed congestive gastropathy or portal hypertensive gastropathy (PHG).These lesions can sometimes cause lethal hemorrhage resistant to therapy[17] .The pathophysiologic mechanisms leading to decrease in esophageal varices and improve portal hypertensive gastropathy will have an impotent theraputic implications.

As there is no general consensus for the proper management of portal hypertension. The relative advantage of surgical shunts can not be denied as compared to liver transplantation and TIPS. The advantages of surgical shunts over liver transplantation are obvious and include a lesser risk of operative mortality, a lack of need for immunosuppression and its complications, a lower cost, and no dependence on the scarce resorces of donner livers. On the other hand, the relative advantages of a surgical shunt over TIPS is principally the prospect of long term shunt patency without the need for additional intervention[18].

The advent of transjugular intrahepatic portosystemic shunt (TIPS) by Rosch et al in 1969[19] provided a new thrust to the management of portal hypertension and its complications. Unfortunately the initial enthusiasm about the applicability of TIPS in the management of portal hypertension and its complications has gradually started to fade away because of its complications. The incidence of encephalopathy is high and shunt thrombosis rate is 50% in less than a year[20].

The criteria of a proper shunt are those with a small stoma, lowering the portal venous pressure, not depriving the whole blood from the liver, has no difficulty in the technique, durable, and with low morbidity and mortality. Here by comes the idea of use of inferior mesenteric vein anastomosis to the left renal vein as a portosystemic shunt procdure for patients with portal hypertension [21].

Technically,the procedure is very simple with minimal dissection and easy exposure of the two veins involved in the anastomosis. Being away from the liver, it will help avoiding scarring in the portahepatis area that might complicate liver transplantation[22,23]. Inspite of the difficulties sometimes met with the left renal vein, anastomosis can be easily done with the inferior vena cava.

Child status progressivly improved and is paralleled by improvement of patient survival after shunt surgery [24]. The good liver function patients may expect excellent medium term and long term outcome from selective and nonselective shunts after fialure of sclerotherapy and TIPS [24].

These previous results have been shown in our patients as one third showed improvement of liver function and were shifted postoperatively from Child B to Child A class. The rest of the patients showed no deterioration of their liver function. This could be explained either by the preoperative good liver function or the shunt does not divert the whole blood away from the liver.

Lowering the portal pressure has its effect on the rate of rebleeding episodes and the endoscopic findings. There was only three patients who developed early bleeding episode that was controlled by sclerotherapy. Moreover, complete disappearance of varices in three patients and lower grades were found than the preshunt grades.

It is not known why patients with portal hypertensive gastropathy improved after inferior mesenteric -left renal vein shunt. Decongestion of the stomach and gastric mucosa and improved arterial blood supply may be the underlying mechanism as previously explained [25]. However this improvement could mimic the short- term results of TIPS. Longterm follow up is recommended with better grading of the gastropathy before reaching a final conclusion concerning this observation.

Early postoperative ascites developed in two patients resolved by medical treatment. Clinical encephalopathy was diagnosed in only one patient 18 months after the operation.His liver function was good and his shunt was patent with high flow rate 35ml/sec detected by duplex study .Although medical measures controlled his condition, further follow up is indicated for the possibility of shunt closure. In fact, it is recommended that These patients must be evaluated by estimating amonia level pre and post shunt and during the follow up. This will not only help early detection of encephalopathy but also predict the flow rate of the shunt.

In patients who had hypersplensim, there was no improvement of blood picture. Splenectomy had to be done in 5 cases. This observation indicates that the shunt has no role in decongestion of the spleen or correction of hypersplenism.

Shunt patency was examined by duplex scanning and or angiography .All shunts were found patent except five in the early postoperative period. Late shunt patency was followed in 14 patients and all were found patent after 18 months. These findings indicate durability of the shunt and long term patency at least better than in TIPS. It was noticed that all thrombosed shunts were found in cases with hypersplenism who had splenectomy done. It is not known whether splenectomy has any role with shunt thrombosis or the improvement of platelet count and coagulability after splenectomy is the underlying mechanism.

From our results we could conclude that inferior mesenteric to left renal vein shunt is a simple coastless procedure suitable for cirrhotic patients Child class A and B. It has the proper criteria for portosystemic shunt with small stoma, easy technique, not depriving the liver from the whole blood and with minimal rates of morbidity and mortality.

Its effects were noticed in improvement of liver function, lowering grade of varices and gastropathy and a minimal rate of rebleeding episodes. Short and long term patency are good and is superior to that of TIPS. Encephalopathy may be a late complication being a nonselective shunt.

Finally inferior mesenteric to left renal vein shunt could have a place in shunt operations for portal hypertension.It could be an alternative simple shunt to major shunt procedures with their high rates of morbidity and mortality.

## REFERENCES


1. Smith J.L, Graham DY: Variceal haemorrhage. A critical evaluation of suvival analysis. Gastroentrology,1982;82:962-73.

2. Graham,D Y, Smith JL:The course of patients after variceal hemorrahge.Gastroentrology,1981;80:800-9.

3. Orloff MJ, BellRH: Long-term survival after emergancy shunting for bleeding varices in patients with alcoholic cirrhosis .Am J Surg; .151:176-83.

4. Rikkers LF and Jin G: Surgical management of acute variceal hemorrahge.World Journal of Surgery;1994,18(2):193-7.

5. Cello JP, Grenell JH, Grass RA:Endoscopic sclerotherapy versus portasystemic shunt in patients with severe cirrhosis and variceal hemorrahge. New Engl. J.Med,1984, 311:1589-94.

6. Warren WD,Millikan WJ,Henderson JM:Splenopancreatic disconnection improved selectivity of distal splenorenal shunt.Annals of surgery,1986;204:346

7. Henderson JM , Warren WD,Millikan WJ :Distal splenorenal shunt with splenopancreatic disconnection:A 4 year assessment.Annals of surgery,1989;210:332.

8. Henderson JM.:The role of distal splenorenal shunt for long term management of variceal bleeding.World Journal of surgery,1994;Mercado MA, Linares JCM,Garcia JG,Mendez18:205.

9. MercadoMA,Linares JCM,Garcia JG,Mendez TJMG,Chan C,Orozco H: Distal splenorenal versus 10mm low diameter mesocaval shunt for variceal hemorrahge.Am J.Surg 1996;171:591-595.

10. Lberge JM,Somberge KE ,Lack GR, Gordon RL:Two year outcome following transjugular intrahepatic portosystemic shunt for variceal bleeding: results in 90 patients.Gastroenterology,1995;108:1143-1151.

11. Cbrera J, Maynar M, Granados R:Transjugular intrahepatic portosystemic shunt versus sclerotherapy in the elective treatment of variceal hemorrahge.Gastroenterology,1996;110:832

12. Jalan R,Forrest EH,Stanly AJ : A ranadmized trial comparing transjugular intrahepatic portosystemic shunt with variceal band ligation in the prevention of rebleeding from esophageal varices.Hepatology1997;26:1115

13. Sanyal AJ,Freedman AM,Luketic VA. Transjugular intrahepatic portosystemic shunts compared with endoscopic

sclerotherapy for the prevention of reccurent variceal hemorrahge.A randomized controlled trial .Ann. Intern.Med;1997;126:849.

14. Luketic VA, Sanyal AJ:Esophageal variceas.II.Transjugular intrahepatic portosystemic shunt and surgical therapy.GI Clic North AM.,2000;29(2):387-421.

15. Pomier-Layrargues G,Villeneuve JP,Deschenes M.Transjugular intrahepatic portosystemic shunt (TIPS)versus endoscopic variceal ligation in the prevention of variceal rebleeding in patients with cirrhosis:A randamized trial .Gut,2001;48:390-396.

16. Martleb M,Boldys H,Rudzki K,Nowak S. Portal shunting in inferior mesenteric vein in cirrhosis:Correlation with hemorrahge from esophageal variceas.A J G,1994;89(6) :863-867.

17. Shinichi M, Hisato H,Hidetoshi O, Eiichi M,Tadashi D, Koji M, Koichi T,Takehiro K,Tsutomu S,Yoshiro N: Effect of transjugular intrahepatic portosystemic shunt formation on portal hypertensive gastropathy and gastric circulation.A J G,2001;96(4): 1155-1159.

18. Stuart J. Knechtle, Anthony D'Alessandro, Michael J.Armbrust, Alexandru Musat, Munci Kalayoglu:Surgical portosystemic shunts for treatment of portal hypertensive bleeding:Outcome and effect on liver function.Surgery1999;126:708-13.

19. Rosch J, Hanifee WN,SnowH: Transjugular intrahepatic portosystemic shunt:An experimental work.Am J Surg 1971;121:588-592.

20. W Scott Helton, Rayn Maves, Kay Wicks,Koj Johnsen:Transintrahepatic portosystemic shunt vs surgical shunt in good -risk cirrhotic patients.Arch. Surg.2001,136:17-20.

21. Narayan Deshmukh, Juan Ayerdi, Rodrigo C, Roldan Sayre: Surgical technique for inferior mesenteric vein to left renal vein shunt in portal hypertension.Am J Surg.1999;178:55-56.

22. Knechtle SJ,Sproat IA: Portal hypertension:Surgical management in 1990s.Suregery,1994;116:687-95.

23. Shaked A,Busuttil RW:Liver transplantation with portal vein thrombosis and centeral portacaval shunts.Ann Surg 1991;214:696-702.

24. Rikkers LF: The changing spectrum of treatment for variceal bleeding. Ann Surg,1998;228:536-46.

25. Orloff MJ,Orloff SL: Treatment of bleeding from portal hypertensive gastropathy by portocaval shunt.Hepatology1995;21:1011-7.