

## TRANSUMBILICAL PORTAL DECOMPRESSION\*

P. D. SEAWARD, M.B., B.CH. (RAND), F.C.S. (S.A.) AND C. D. W. MORRIS, M.B., B.CH. (RAND), *From the Departments of Medicine and Surgery, University of the Witwatersrand and Johannesburg Hospital*

Massive gastro-intestinal haemorrhage resulting from portal hypertension is a serious condition associated with a high mortality and morbidity, particularly following the usual methods of emergency portal-systemic shunt surgery. Such patients are frequently submitted to surgery when conservative methods have failed to control the bleeding, and have to face a lengthy intra-abdominal procedure in the presence of a low or falling haemoglobin level, often with grossly impaired liver function, a low prothrombin time and low plasma proteins. It is therefore not surprising that the success rate of such procedures leaves much to be desired. Therefore, many patients with bleeding varices due to alcoholic cirrhosis are regarded by many surgeons as not worth an attempt at salvage by operative means.

Following upon an article by Piccone *et al.*,<sup>1</sup> who demonstrated the feasibility of transumbilical portal-systemic shunting from experimental work on cadavers and clinical material, we were prompted to employ this method in a female patient, who presented with massive gastro-intestinal haemorrhage, ascites and advanced liver damage as a result of alcoholic cirrhosis of the liver.

### CASE REPORT

The patient, a 45-year-old housewife, and a known alcoholic, presented on 13 January 1968 with a haematemesis of 24 hours' duration. She had passed 3 large melaena stools just before admission.

On examination, she was mentally well orientated. She had a hepatomegaly extending 2 in. below the umbilicus. The liver was firm, non-tender and smooth. There was a 3-finger firm splenomegaly. Minimal ascites was present. She was mildly jaundiced, and had palmar erythema, normal hair growth and no spider naevi. Her blood pressure was 110/60 mm.Hg, and her pulse rate 120/min.

The relevant investigations at this stage showed haemoglobin of 10.1 G/100 ml.; WBC 4,900/cu.mm.; prothrombin index 73%; urea 58 mg./100 ml.; K 3.2, Na 143, CO<sub>2</sub> 28 and Cl 92 mEq./litre; bilirubin 2.4 mg./100 ml., total protein 6.6 G/100 ml., albumin 3.87 G/100 ml. A barium swallow demonstrated the presence of marked oesophageal varices.

She was transfused with 6 pints of blood. Despite this, her haemoglobin remained at 10 G/100 ml. and she continued to vomit fresh blood over the next 24 hours. It

was decided that, in view of the fact that she was continuing to bleed, a portal decompression procedure should be attempted in order to control the haemorrhage, and possibly thereafter a permanent umbilical-vein-to-saphenous-vein shunt should be constructed.

### Operative Procedure

The patient was submitted to operation on the night of 13 January 1968. Under a light general anaesthetic, using a short supra-umbilical midline incision, the obliterated umbilical vein was identified extraperitoneally, lying in the free margin of the ligamentum teres. With very little difficulty, it was possible to identify the obliterated lumen and to serially dilate this with Bakes dilators up to a size 9. As pointed out by Piccone *et al.*,<sup>1</sup> a definite resistance was encountered where the umbilical vein met the left portal vein, similar to that encountered in traversing the sphincter of Oddi. Dilatation was followed by a gush of blood under high pressure. Portal pressure readings were taken via a soft rubber catheter inserted along the umbilical vein. The maximum pressure recorded immediately after cannulation of the vein was 21.33 mm.Hg (290 mm. H<sub>2</sub>O). It was possible, using the same catheter, to perform a portogram via the umbilical vein, thus verifying the anatomical patency of the vein and its wide communication with the left branch of the portal vein.

The right long saphenous vein was carefully dissected from its bed in the subcutaneous tissues of the thigh via an incision centred over the fossa ovalis, and extending as far distally as the lower one-third of the thigh. All communicating branches were carefully ligated and the system tested for leaks with heparinized saline. A subcutaneous tunnel was created in the anterior abdominal wall and the liberated saphenous vein brought up through it, still attached distally to the right femoral vein. Unfortunately insufficient length of vein had been mobilized due to underestimation of the distance from the fossa ovalis to the umbilicus. Allowance had not been made for the curvature of the anterior abdominal wall as a result of the gross hepatomegaly. To overcome this problem, the left long saphenous vein had to be partially mobilized, removed and anastomosed, with its proximal end attached to the distal end of the already inverted right long saphenous vein. The final anastomosis was performed by joining the distal (now proximal) end of the left saphenous segment to the dilated umbilical vein. Both anastomoses were made with a 60 Tevdek continuous everting suture.

\*Date received: 20 March 1968.

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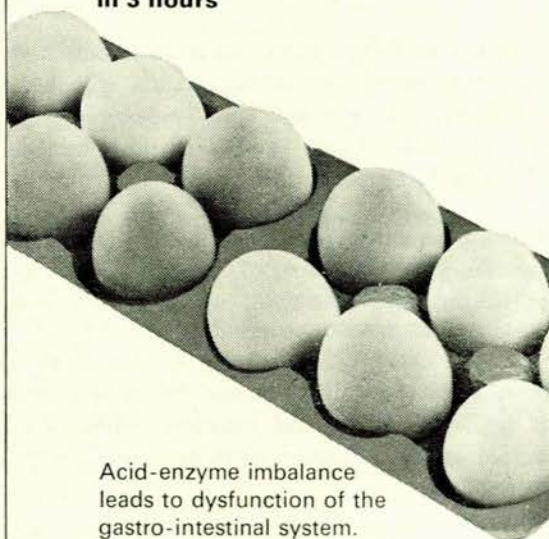
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### Postoperative Progress

Postoperatively no further active bleeding has occurred. The patient has had a smooth and uneventful course. Her haemoglobin level has remained relatively constant since operation, at between 11.0 and 11.6 G/100 ml. Liver function has shown an improvement in the flocculation tests, with a lowering of her mucoprotein level (previously elevated) to within normal limits.

Wound healing has occurred without complications or delay. The shunt itself dilated up progressively until it could be observed as a linear ridge running across the anterior abdominal wall. It was possible to determine the direction of venous flow across the shunt by means of digital pressure. A fluid thrill could be elicited across the shunt at an early stage. A considerable reduction in abdominal girth has occurred since the operation, due to a reduction in ascites and gaseous distension. Splenic pulp pressure measured 4 weeks postoperatively showed a drop of 32% in the portal pressure compared with the level measured at operation. The portal pressure had fallen from 21.33 mm.Hg (290 mm.H<sub>2</sub>O) to 14.5 mm.Hg (197.2 mm.H<sub>2</sub>O). The normal venous portal pressure lies between 120 and 150 mm.H<sub>2</sub>O.

The patient's general condition has improved considerably since operation, without evidence of mental impairment. She has been discharged from hospital, and will be followed up as an outpatient. It has not been possible, as yet, to demonstrate radiological proof of the patency of her shunt, but on clinical palpation, 5 weeks postoperatively, occlusion of her shunt would seem to have occurred.

### DISCUSSION

This case demonstrates the relative ease with which the obliterated umbilical vein may be dilated and cannulated, for the emergency control of massive bleeding from oesophageal varices, where the patient's general condition does not permit a definitive intra-abdominal shunt operation. Although the construction of a definitive shunt, utilizing the obliterated umbilical vein and the long saphenous vein, was performed in this case (and as far as we can ascertain, is only the 3rd definitive shunt of this nature to be reported in the English literature), it is not the purpose of this report to emphasize this aspect of the procedure. This method of portal decompression has been used by other workers, without constructing a permanent shunt, for the emergency control of haemorrhage.

Several authors<sup>1-3</sup> have recently demonstrated the feasibility of transumbilical vein cannulation, based on anatomical studies utilizing cadavers. As the vein is an extra-peritoneal structure, it may be cannulated under local anaesthesia and results in a minimal disturbance to the patient. Alternatively, it may be isolated through a limited upper midline laparotomy as suggested by Christopherson and Jackson.<sup>3</sup>

From a technical point of view, our experience remains very limited, and we are only able to add one or two small pointers which may be of assistance to future workers in this field.

A careful pre-operative check for the presence of any previous upper abdominal surgery should be carried out. This is obviously important, as the whole success of the procedure depends on an intact ligamentum teres.

The size of the liver may alter the direction of the ligamentum teres and may cause mechanical obstruction by external pressure of an enlarged right lobe encroaching on the portal fissure.

We do not feel that accidental or deliberate opening of the peritoneal cavity in any way detracts from the simplicity of the procedure, and would agree with Christopherson and Jackson that deliberate opening of the peritoneal cavity might facilitate isolation of the vein in a difficult case.

Once dilated, the vein may readily be utilized for diagnostic procedures such as manometry, portal radiology and direct sampling of portal blood for biochemical studies.

The possible uses of umbilical vein cannulation have been listed by Lavoie *et al.*:<sup>2</sup>

1. Parenteral alimentation via the natural channel from intestines to liver.
2. Emergency control of haemorrhage from oesophageal varices.
3. Conservative, by injection of portal hypotensive drugs.
4. Definitive, by transumbilical to saphenous vein shunting.
5. Infusion chemotherapy in pyogenic or neoplastic liver disease, although some authorities<sup>4</sup> regard intra-arterial chemotherapy for liver neoplasia as superior to the transumbilical route.

Once the umbilical vein has been suitably dilated and cannulated, and the presence of portal hypertension confirmed, various methods are available for the emergency reduction of portal pressure and control of haemorrhage. The vein may be connected to a sterile container via a heparinized tube, and portal blood allowed to gravitate into this container until a suitable drop in portal pressure has occurred, as evidenced by intermittent manometry. This blood may be retransfused into the patient at a later period.

Alternatively, a temporary extracorporeal portal-systemic shunt,<sup>1,4,5</sup> with or without an intervening rotary hand pump, may be constructed between the cannulated umbilical vein and a suitable systemic vein, e.g. the long saphenous or external jugular vein. Blood may be allowed to flow from the portal to systemic circulations unaided if the portal pressure is markedly elevated. If a lesser pressure exists within the portal system, and inadequate flow-rates are observed within the shunt, the use of a manual rotary pump incorporated within the circuit may be used to assist decompression. The pressure within the portal system should not be reduced too rapidly, for fear of causing a total collapse of the veins within the system; Piccone *et al.* have suggested a minimum period of 1 hour.

With regard to the emergency control of haemorrhage from bleeding varices, utilizing this method of portal decompression, there are certain distinct advantages over more conventional methods. Even the most moribund patient can be subjected to this operation, as fitness for a protracted procedure under general anaesthesia is not the most overriding consideration, and the use of a local anaesthetic is eminently suitable in such cases. The seriously ill patient is spared the hazard of protracted intra-abdominal or intrathoracic surgery with all their

associated postoperative dangers, in exchange for a short, relatively minor procedure.

Optimistic caution is essential for the long-term assessment of definitive shunts of this kind, in postalcoholic cirrhosis complicated by bleeding varices. We feel that this method of treatment offers some hope to a group of patients often not fit for standard types of surgery due to reluctance to intervene actively during a massive bleed. Certainly the method may be used to check bleeding temporarily, thus allowing an opportunity for further surgery at a later, more optimal occasion.

#### SUMMARY

The successful control of massive haemorrhage in a case with postethanolic cirrhosis plus portal hypertension is described, utilizing the technique of dilatation of the obliterated umbilical vein. A definitive umbilical to saphenous portal-systemic shunt was performed in this patient, with evidence of continuing decompression in the immediate postoperative phase.

The advantages of this method over alternative techniques in the severely ill patient are briefly discussed. A significant reduction in portal pressure occurred as a result of this procedure. The portal pressure dropped from 290 mm.H<sub>2</sub>O at operation to 197 mm.H<sub>2</sub>O 5 weeks postoperatively, representing a fall of 32% from the original level. Late postoperative occlusion of the shunt has occurred at 5 weeks.

We wish to thank Dr. H. van Wyk, Medical Superintendent of Johannesburg Hospital, for permission to publish this case

report; Dr. G. E. Gale for permission to use this procedure, and for his kind assistance in the postoperative splenic-pulp pressure measurements; Dr. E. Epstein and the radiographers of the Department of Radiology, for their assistance; and Prof. D. J. du Plessis, Head of the Department of Surgery at Johannesburg Hospital and the University of the Witwatersrand, for his helpful criticisms in the preparation of this manuscript.

#### ADDENDUM

The patient was readmitted subsequently in April 1968 with a further haematemesis, and moderate ascites. An emergency porto-azygos disconnection was performed by a surgeon, in the unit to which she had been admitted, through a left thoraco-abdominal incision. A considerable amount of ascitic fluid was removed from the peritoneal cavity at operation, with marked reduction in her abdominal girth. This was followed by obvious refunctioning of the umbilical- to- saphenous-vein shunt, which had presumably become occluded by the increasing abdominal girth and increased intra-abdominal pressure as the result of our failure to control the patient's ascites adequately in the initial postoperative phase.

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