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A Selective Approach to Bleeding Esophageal Varices†

Glyn G. Jamieson, MD,* Irwin B. Faris, MD,* and John Ludbrook, MD*

It is possible that the best results of treatment for bleeding esophageal varices will come when a selective approach is used. In patients bleeding acutely and in patients with poor liver function shunt operations should be avoided, and a direct attack on the varices with either sclerosant therapy,

percutaneous obliteration, or staple gun gastro-esophageal transection should be carried out. In patients who have stopped bleeding, or those in whom elective treatment is being undertaken, the best operation at present appears to be selective distal splenorenal shunt.

History of the Portacaval Shunt

In 1876 B.F. Lautenbach first suggested joining the portal venous system to the systemic venous system for the treatment of ascites. When an abstract of his report was published in Russia, Nicolai Vladimirovich Eck used it to carry out such an anastomosis (1), the first report in the literature.

Eck reported in the Military Medical Journal of Russia in 1877 that he had joined the end of the portal vein to the vena cava in eight dogs: "the animal recovers after such an operation, its nutritional status improves gradually, and remains in perfect health thereafter." Considering that of the eight dogs he operated on, seven were dead within a week afterwards, it would seem that the surgical trait of forgetting one's bad results did not originate in this century! The other dog lived for two and a half months and then escaped to an unknown fate on the Russian steppes. Eck himself was called up into active military service and faded into obscurity. However, Hahn, working in Pavlov's laboratory, continued this study and found that of the dogs which survived, many died later of what was called "meat intox-

ication" (since designated hepatic encephalopathy by Sheila Sherlock).

In the human, the first shunt between the portal and systemic systems was performed by the French surgeon Vidal and reported in 1902. He noted that unless protein was excluded from his patient's diet, the patient became severely intoxicated (2). Although Vidal's patient lived for several years, the problem of "meat intoxication" as well as the high mortality rate of the operation prevented the portacaval shunt from gaining widespread acceptance in the armamentarium of the surgeon. It was not established as a routine operation until the pioneering efforts of Allen Oldfather Whipple and his team at Columbia University in New York in the early 1940s.

Allen Whipple was encouraged to examine the possibility of portacaval shunting for several reasons. First, he was dissatisfied with the various devascularization operations used to control bleeding varices, as they had both a high mortality rate and a high rebleeding rate. Second, he was aware of the portacaval shunts that the unrelated George Whipple in Rochester New York had performed in dogs with relative impunity. The freedom from "meat intoxication" in these dogs was due at least in part to the fact that they were fed on meat-free extract. Indeed, this extract was used in a research program which led to the discovery of the role of vitamin B12 in pernicious anemia and to a Nobel Prize for George Whipple (3).

But with the work of Allen Whipple the modern era of shunting was born (4). It became obvious that the operation of joining the portal to the systemic circulation was extremely effective in attaining its primary aim, that is, to stop

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bleeding from gastro-esophageal varices. As a result, enthusiasm for the portacaval shunt in portal hypertension grew until the operation was being used not only to treat patients who had bled from their varices (therapeutic shunts), but also to treat patients who had varices and had not bled from them (prophylactic shunts). Furthermore, the operation was even being performed on patients with and without varices who had ascites. In the early 1960s the use of portacaval shunting reached an uncritical zenith, but ever since it has been on the decline.

For one thing, improved medical management meant that the operation was rarely indicated for ascites except when a block in the hepatic venous circulation occurred, a very uncommon situation. Also, when thoughtful clinicians began to look more carefully at the natural history of portal hypertension, it became clear that some patients never bled from their varices and therefore could only lose by having a major operation (5).

At this stage, several prospective, randomized trials were set up to study both prophylactic and therapeutic portacaval shunts. With the former, when it was apparent that patients who were shunted tended to have a poorer chance of survival than those who were not shunted, the procedure was abandoned as a prophylactic therapy for bleeding (6). With the latter, although trials in the U.S. have shown a trend in favor of shunted patients, there was a 7% statistical probability that the result was due to chance (7). However, the method of dying certainly differed in the two groups of patients. In the shunted group, the patients died more often of "meat intoxication", i.e., hepatic failure, while in the unshunted group they died of hemorrhage from their varices.

In an editorial in *Gastroenterology* in 1974, Harold Conn said that "we must learn either to select better who should be shunted or to shunt better those we select." (7).

"Selecting Better"

Hemodynamic studies

Hemodynamic studies have been carried out to try to achieve better selection of patients for surgery. Child's clinical classification of patients into Class A, B, and C, based on their liver function, has been quite useful in predicting operative mortality (8). But it was hoped that more accurately identifying the level of the obstruction to portal flow and the degree and quality of portal flow might have proved a better way to predict the outcome of surgery.

Hemodynamic studies have revealed that the flow of blood in the portal vein in portal hypertension may be hepatopetal, so that in spite of increased pressure, blood still flows

toward the liver through the portal vein. There may be very little flow in either direction in the portal vein, sometimes blood flowing toward the liver and sometimes away; and there may be hepatofugal blood flow in which the portal vein acts as an outflow tract from the liver and in fact decompresses hepatic sinusoids (9). Patients with no significant flow in either direction and no encephalopathy should do best with traditional end-to-side portacaval shunt. With this operation a shunt neither takes blood away from the liver nor stops blood flowing out from the liver. However, those patients with forward flow in the portal vein might be expected to develop hepatic encephalopathy since a vital source of blood supply to the liver has been removed. Lastly, those patients in whom the portal vein is acting as an outflow tract to the liver might be at risk of developing ascites after an end-to-side portacaval shunt, as the pressure in the liver would be increased when the outflow tract was interrupted. Unfortunately, the situation is probably more complex, as it has been shown that while there is some correlation of prognosis with hemodynamic staging, the correlation, in fact, is not as good as Child's classification, which has been used for over ten years. One of the difficulties has been to accurately determine pre-operatively the amount and direction of portal flow in the portal vein. One group's conclusion about hemodynamic studies is that at present they are costly, time-consuming, and unrewarding (10).

Poor risk groups

Several groups of patients with bleeding esophageal varices have a high mortality rate after operation. First, there are the patients who are acutely bleeding at the time of portacaval surgery. Operating in an emergency situation is always hazardous. Even when patients are carefully selected, the operative mortality rate is in the 30% range; and if one takes unselected patients, the mortality rate is much higher, usually in excess of 50% (11). For this reason, the mesocaval shunt operation was introduced and probably given its greatest boost by Theodore Drapanas. He reported on a group of poor risk patients who had an operative mortality of only 8% in 25 cases (12). But subsequent reports have not been so optimistic; a recent prospective study by Malt and his colleagues showed a 75% mortality rate for the mesocaval shunt used in the emergency situation (13). Several retrospective series have shown high mortality rates also. In other words, the figures look depressingly like those for portacaval shunt. Indeed, there seems little reason, hemodynamically, why the figures should be different. At present, it would appear that shunt operations are contraindicated in acutely bleeding gastro-esophageal varices. These patients should be treated by standard medical measures such as blood replacement, vasopressin infusions, either intravenously or intraar-

terially, and a Sengstaken-Blakemore tube. If bleeding continues, in spite of these measures, then three choices are available.

1. Sclerosant therapy

The direct injection of sclerosant agents into bleeding varices has been used in Europe for many years but is only now beginning to gain greater acceptance elsewhere. In Belfast, Rodgers and his group reported in a retrospective study that they stopped bleeding in 93% of patients, although there was an in-hospital mortality rate of 26% (14). Terblanche and his group in Cape Town recently published a prospective study that showed similar figures; they were able to stop bleeding in 92% of patients with a 25% mortality rate (15). While these mortality rates may still appear high, they must be compared with the mortality rates of shunt operations in unselected patients in similar circumstances.

2. Percutaneous transhepatic obliteration of varices

The placement of a catheter percutaneously through the liver into radicles of the portal vein is an attractive technique because it allows the radiologist to selectively obliterate the veins which are causing bleeding. Several substances have been used as obliterating material, among them, gelfoam and cyanoacrylate. Although initial enthusiasm for this technique has been tempered somewhat by the moderately high incidence of portal vein thrombosis following its use (16), nevertheless if sclerosant therapy fails or is not available it would seem a better alternative than a shunt operation in an acutely bleeding situation.

3. Staple gun gastro-esophageal transection

This is but a variant of the older operation of esophageal transection and/or under-running of varices. However, it is quicker than those operations and produces a better gastro-esophageal anastomosis. It can be accomplished with a reasonably low mortality, although it has not yet been properly assessed for acutely bleeding patients (17). If sclerosant therapy or percutaneous obliteration cannot be carried out, this operation may be the most conservative way to produce the desired result of stopping bleeding in the emergency situation.

Besides acutely bleeding patients, two other categories of patients do badly with shunt surgery: patients with alcoholic hepatitis and hyaline necrosis, and patients with Child's Class C liver function. If a patient falls into this latter group in spite of a nutritionally adequate diet and abstinence from alcohol, then again the operative mortality rate with shunt operations is prohibitively high (5). Since the life expectancy of such a patient is short, the same procedures as for emergency bleeding should be considered, that is,

sclerosant therapy, percutaneous transhepatic obliteration of varices, or staple gun gastro-esophageal transection. The same can be said for patients with acute alcoholic hepatitis with hyaline necrosis, who also have a high mortality rate with shunt operations (18).

Avoiding shunt surgery altogether

Although direct operations on esophageal varices had been used for many years, it was because of his dissatisfaction with this approach that Allen Whipple initially performed portacaval shunts. Nevertheless, some groups have continued to use these operations and have recently reported good results with them. Thus, Sugiura reported that in the elective use of a thoraco-abdominal esophago-gastric devascularization, esophageal transection, splenectomy and selective vagotomy, and pyloroplasty, there was only a 2.6% mortality rate in 224 patients. In 52 patients who were bleeding acutely he reported an 11.5% mortality rate. Furthermore, the rebleeding rate was only 7% in his series (19). Yamamoto has carried out a similar operation from an abdominal approach. He performed an esophago-gastrectomy, splenectomy and truncal vagotomy and pyloroplasty electively in 64 patients with a mortality rate of 11% and a rebleeding rate of only 14% (20). While these figures are very impressive, the figures from the Chapel Hill group are not. They carried out a similar procedure on 60 patients, but reported a 35% operative mortality rate and a 50% rebleeding rate (21). The cause of the cirrhosis and patient selection methods may well explain some of the difference in these figures, but, nevertheless, the discrepancy is very large.

"Shunting Better"

At present, two operations are the main contenders for better shunts. Most people agree that if significant blood flows up the portal vein toward the liver, then that blood supply should not be removed. The first of the new operations attempts to keep blood flowing to the liver by arterializing the portal vein stump, while the second leaves intact the superior mesenteric vein flow to the portal vein.

Arterialization of the portal vein

Maillard has reported a standard portacaval shunt followed by an anastomosis of the splenic artery to the portal vein stump (22). Adamsons has also used this technique and recently reported on lower flow arterialization using microvascular techniques to anastomose the right gastro-epiploic artery to the portal vein stump (23). However, neither of these techniques has yet found widespread acceptance. The operation which has slowly gained acceptance is the selective distal splenorenal shunt.

Bleeding Esophageal Varices

Selective distal splenorenal shunt (Warren shunt)

In 1967 Warren, Zeppa, and Fomon (24) first described this operation in which the splenic vein is dissected from the bed of the pancreas, divided near its central end, turned down, and anastomosed end-to-side to the left renal vein. The left gastric (coronary) vein, the right gastro-epiploic vein, and any other venous connections between the portal system and the stomach are then divided so that the superior mesenteric vein flow to the liver remains intact. This operation has met with growing acceptance, as both retrospective and prospective studies have shown that the incidence of hepatic encephalopathy is indeed lower following the procedure when compared with other portacaval shunts. The rebleeding rate also remains acceptably low (25,26).

We have used this operation in a small group of 18 patients with three postoperative deaths: a Child's Class B patient who developed infected ascites and died of overwhelming sepsis; a Child's Class B patient who died of massive bleeding from varices on the 12th postoperative day in spite of a widely patent shunt revealed at autopsy; and a Child's Class C patient who developed progressive liver failure and died on the 27th postoperative day. Of the 15 remaining patients, one developed an early shunt thrombosis and had a mesocaval shunt constructed, while another died two years after the operation of liver failure due to continuing alcoholism. Thirteen patients are alive after 12-48 months, follow-up. They have had no recurrent hemorrhage, and one patient has had overt portal systemic encephalopathy of mild degree.

Although our experience is limited, we feel in a position to comment about the operation. For some conditions this

shunt should not be attempted, e.g., an absent left kidney, thrombosed renal vein, or thrombosed splenic vein. In the past, severe ascites was considered an absolute contraindication to the operation, but Warren now uses a peritoneovenous shunt in these patients after constructing a distal splenorenal shunt (personal communication, 1979).

There are other conditions in which the shunt may prove difficult or inappropriate; for example, severe chronic pancreatitis can make the splenic vein extremely difficult to dissect from the pancreas. A splenic vein with a large convexity cephalad requires a much longer dissection from the pancreas in order to get a section of vein long enough to bring it down to the renal vein. Finally, in a small number of patients who have an extremely small splenic vein, it would seem inappropriate to join such a vein to the left renal vein in order to decompress gastro-esophageal varices.

Although it has not yet been shown that patients live longer after this operation, we believe that its lower incidence of encephalopathy currently makes it the best operation in good risk patients.

Summary

We believe a selective approach to bleeding esophageal varices may produce improved results in the future. In the emergency situation and in patients with poor liver function, shunt operations should be avoided; and injection sclerotherapy or transhepatic obliteration of varices should be undertaken to stop bleeding. In elective surgery, with good risk patients, the Warren shunt currently appears to be the best operation to prevent bleeding from varices.

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