

UPDATE IN RADIOLOGY

# The keys to successful TIPS in patients with portal vein thrombosis and cavernous transformation<sup>☆</sup>



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**Abstract** Portal vein thrombosis is a common complication in patients with cirrhosis. Anticoagulation involves a high risk of bleeding secondary to portal hypertension, so placing transjugular intrahepatic portosystemic shunts (TIPS) has become an alternative treatment for portal vein thrombosis. Three strategies for TIPS placement have been reported: (1) portal recanalization and conventional implantation of the TIPS through the jugular vein; (2) portal recanalization through percutaneous transhepatic/transsplenic access; and (3) insertion of the TIPS between the suprahepatic vein and a periportal collateral vessel without portal recanalization. We describe different materials that can be used as fluoroscopic targets for the TIPS needle and for portal recanalization.

This article aims to show the success of TIPS implantation using different combinations of the techniques listed above, which is a good treatment alternative in these patients whose clinical condition makes them difficult to manage, and to show that portal vein thrombosis/cavernous transformation should not be considered a contraindication for TIPS.

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## PALABRAS CLAVE

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TIPS

## Trombosis y cavernomatosis portal: las claves para el éxito de un TIPS

**Resumen** La trombosis venosa portal (TVP) es una complicación frecuente en pacientes cirróticos. Una alternativa al tratamiento anticoagulante, dado el alto riesgo de hemorragia secundaria a hipertensión portal, es la inserción de un *shunt* portosistémico transyugular intrahepático (TIPS). Se han descrito tres estrategias para la inserción del TIPS: 1) recanalización portal e implantación convencional del TIPS por vía yugular; 2) recanalización portal mediante

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acceso percutáneo (transhepático/transesplénico), y 3) inserción del TIPS entre una vena suprahepática y una colateral periportal, sin recanalización portal. Describimos varios materiales útiles como diana fluoroscópica para la aguja del TIPS y para la recanalización portal.

El objetivo de este artículo es dar a conocer el éxito en la implantación de TIPS usando las diferentes técnicas descritas combinadas, lo que representa una buena alternativa terapéutica para esos pacientes difíciles de manejar debido a su deficiente condición clínica. Por tanto, la TVP/cavernomatosis no debe considerarse como una contraindicación para TIPS.

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## Introduction

Portal vein thrombosis (PVT) is a common complication of cirrhotic patients without hepatocellular carcinoma. Its incidence ranges from 0.6% to 16%. It seems that a reduced portal flow is the most important local factor involved in the thrombosis.<sup>1</sup>

The PVT is characterized by the formation of a thrombus in the main portal vein and in the intrahepatic portal vein branches. The clinical evolution of PVT is based on the degree of thrombosis (partial thrombosis, complete thrombosis, or fibrotic cord), the stage of the thrombus (acute thrombus, chronic thrombus, or portal cavernous transformation), and the extension of the thrombus (only the portal vein is damaged, or there is also thrombus extension toward the splenic vein, the superior mesenteric vein, or both).<sup>2</sup>

The cavernous transformation of the portal vein is defined as a conglomerate of numerous collateral blood vessels located in the hepatic hilum as a result of an occluded extrahepatic portal vein. In the clinical guidelines from the American Association for the Study of Liver Diseases,<sup>3</sup> and in the Baveno V consensus workshop<sup>4</sup> on the management of portal cavernous transformation no algorithm for therapeutic management has been established yet for these cases due to the scarcity of data.<sup>5</sup>

The clinical guidelines from the European Association for the Study of the Liver (EASL)<sup>6</sup> establish that, in cases of hepatic vascular disease, anticoagulation at therapeutic doses of, at least, six months after the addition of an adequate gastrointestinal bleeding prophylaxis, is the optimal treatment in cases of PVT in cirrhotic patients. Also, in patients eligible for hepatic transplants in whom the PVT has progressed and does not respond to anticoagulation, treatment through the placement of one transjugular intrahepatic portosystemic shunt (TIPS) should be considered. Also, there can be patients with PVT in whom, due to the thrombus extension, the transplant could be contraindicated. However, this indication would probably need additional confirmation due to the lack of clarity on the prognostic role of portal thrombosis in the natural history of cirrhosis.<sup>7</sup>

As numerous studies say, one alternative to anticoagulation in the management of PVT is TIPS.<sup>1,8</sup> The anticoagulant therapy may not be necessary in certain patients with PVT because the placement of TIPS per se may reach higher patency rates.<sup>9</sup> Unlike anticoagulation, the TIPS corrects the physiopathology of the PVT formation by increasing the velocity of portal flow; also, it should not affect the hepatic function since the portal perfusion is reduced or abolished

before the TIPS is placed and is compensated by increasing the arterial perfusion: this mechanism is known as "hepatic arterial buffer response".<sup>10</sup>

A 75–100% success has been reported in the placement of TIPS in cirrhotic patients with PVT,<sup>11</sup> and it has proven very effective in the prevention and management of PVT through portal recanalization in 67–100% of the cases, based on the number of patients with cavernous transformation, since in these patients the main portal vein is usually replaced by hepatopetal collaterals.<sup>10</sup>

Table 1 includes series already published with a minimum of 14 patients describing the most important authors, number of patients included in each study, type of portal thrombosis, different PVT access techniques used for the placement of TIPS, and technical success of this device.<sup>8,12–23</sup>

Different indications have been proposed for the placement of TIPS<sup>10</sup>:

- Patients with symptomatic portal hypertension: the placement of TIPS seems to be justified in patients with bleeding due to varices or tense ascites prior to the use of anticoagulants.
- Patients with asymptomatic portal hypertension: the TIPS should be indicated when thrombosis is extensive and complete, and anticoagulation is not effective.
- Patients waiting for a transplant: in cases of extensive PVT that does not respond soon to anticoagulation, TIPS seem to be indicated in these candidates both to resolve the PVT and prevent its extension or cavernous transformation (that could contraindicate it).

Therefore, the goal of this study is to expose how successful the placement of TIPS really is in cases of portal thrombosis and cavernous transformation through the use of combined techniques that, until recently, were considered contraindications for the use of TIPS.

## Techniques of portal recanalization

### General procedure

Initially before starting the procedure we should assess the portal venous system through one angio-CT scan in order to evaluate the extension and stage of the thrombus, the presence of cavernous transformation, and eventually to plan the procedure as good as possible.

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