



# Endovascular placement of iodine-125 seed strand and stent combined with chemoembolization for treatment of hepatocellular carcinoma with portal vein tumor thrombus

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**Abstract:** A 59-year-old man was admitted to the hospital because of fatigue and marasmus for over 1 month. Computed tomography (CT) examination implied huge primary hepatocellular carcinoma (PHC) with tumor thrombus in the main portal vein (MPV). It also observed the mild expansion of intrahepatic bile ducts in the left lobe of the liver and lymph node metastasis to retroperitoneum, clearance between liver and stomach and porta hepatis. This video was conducted to show portal vein stenting (PVS) and transcatheter arterial chemoembolization (TACE) combined with endovascular implantation of iodine-125 (<sup>125</sup>I) seeds for treating the patient with Hepatocellular carcinoma (HCC) with portal vein tumor thrombus (PVTT).

**Keywords:** Portal vein stenting (PVS); iodine-125 seed strand (<sup>125</sup>I seed strand); transcatheter arterial chemoembolization (TACE)

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## Introduction

Hepatocellular carcinoma (HCC) is one of the most common malignant tumors worldwide. Portal venous invasion is reported in 12.5–39.7% of patients with advanced HCC (1). When the main portal vein (MPV) was involved by tumor thrombus, the patient's prognosis was extremely poor (2). For these patients, there is no effective treatment and the optimal treatment remains controversial. Most HCCs with portal vein tumor thrombus (PVTT) are technically unresectable and they are not suitable for curative therapies. As a palliative treatment, transcatheter arterial chemoembolization (TACE) treatment for HCC with PVTT is safe and effective when there is sufficient collateral circulation. However, PVTT limits the effect of TACE on HCC and has a strong negative impact on the therapeutic effect (3). Therefore, opening the occlusion of the portal vein caused by PVTT and reperusing the portal vein could improve the success of TACE, and this could be achieved using portal vein stenting (PVS). PVS combined with TACE has been successfully used in the treatment

of HCC with PVTT. However, PVS effectively removes the portal vein obstruction but do not treat the thrombus per se, and stent restenosis may happen. Radioactive seed implantation is used in a variety of solid tumors. Iodine-125 (<sup>125</sup>I) seed implantation was attempted to treat HCC with PVTT and achieved excellent therapeutic efficacy (4) with a good safety profile (*Figure 1*).

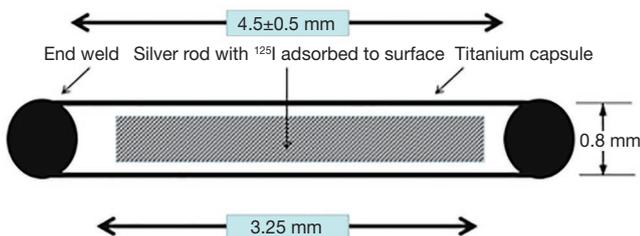
## Operative techniques

- (I) Perform percutaneous transhepatic portal 6F vagina vasorum implantation and CTAP by 5F pigtail catheter. It shows that the filling defect at main portal vein in the size of approximately 8 mm × 5 cm;
- (II) Remove pigtail catheter, bring in the super smooth guide wire and small wire adopted in percutaneous transhepatic cholangiography drainage), remove vasorum and then place it by super smooth guide wire. By replacement of the vasorum, long super smooth guide wire is inside the vasorum while the short one outside;



**Figure 1** Endovascular placement of iodine-125 seed strand and stent combined with chemoembolization for treatment of hepatocellular carcinoma with tumor thrombus in main portal vein (5).

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**Figure 2**  $^{125}\text{I}$  seed. Radioactivity of each Iodine-125 seed is 25.9 MBq with a half-life of 59.4 days.

- (III) Preparation of seed strand: radioactivity of each  $^{125}\text{I}$  seed is 25.9 MBq with a half-life of 59.4 days. The number of  $^{125}\text{I}$  seeds planned to be implanted was calculated by the following formula: length of obstructed MPV (mm)/4.5+2 (Figure 2);
- (IV) Release ev3 stent with the size of 14 mm × 8 cm by smooth guide wire, guide it into the vagina vasorum of PTCd by small wires, remove small wires, and then push prepared  $^{125}\text{I}$  seed strand;
- (V) Angiography shows that portal vein is smooth with stent in the right place and  $^{125}\text{I}$  seed strand is in a good condition;
- (VI) When the sheath is slowly withdrawing to liver parenchyma, use four coiling in the size of 3 mm × 3 cm to seal the puncture path;
- (VII) Perform percutaneous puncture from right femoral artery to sheath, and then guide 5F RH tube to super selective hepatic artery. Angiography shows the staining of giant tumor in right lobe of liver, which

is significant in three feeding arteries. Prescribe such drugs for embolization as Pirarubicin 30 mg + Oxaliplatin 50 mg + Iodinated Oil 25 mL + PVA (500–700  $\mu\text{m}$ ).

## Comments

- (I) TACE cannot be directly performed on the patients with primary hepatocellular carcinoma (PHC) and PVT. The combination of portal vein stent and endovascular implantation of  $^{125}\text{I}$  seed strand can open the portal vein and conduct radiation therapy on PVT by radioactive seeds strand;
- (II) After opening the portal vein, TACE can be performed and the focus in portal vein or liver can be treated;
- (III) Due to the huge tumor, complete embolization at one time may cause damage on liver function and severe postoperative reactions, so fractionated embolization should be adopted.

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## Footnote

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/tcr.2018.07.23>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Declaration of Helsinki (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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