

Comprehensive solution for liver embolization



Cancer Institute Gustave-Roussy

The Institute Gustave-Roussy is a leading European cancer center. It brings together 2,500 men and women dedicated to treating patients suffering from cancer, conducting research, developing new therapies and passing on knowledge to the medical and scientific communities in France and worldwide.

The interventional radiology department, led by Dr. Thierry de Baère, performs approximately 2,000 oncology procedures per year, including radiofrequency ablation, transcatheter arterial chemoembolization (TACE), biopsies, cementoplasties and others.

FlightPlan for Liver clinical case

The clinical case submitted by Drs. Thierry de Baère and Frédéric Deschamps from the Institute Gustave Roussy illustrates ease of use and potential clinical interest of FlightPlan for Liver with Innova Vision as part of a comprehensive solution for embolization procedures.

Challenge of liver embolization

The liver arterial tree is a highly complex structure where 2D and 3D imaging can be challenging to determine tumor-feeding vessels and may delay the procedure.

FlightPlan for Liver helps interventionalists plan their liver embolization procedures.

FlightPlan for Liver automatically highlights vessels travelling from the catheter tip to the vicinity of a hypervascular lesion in three intuitive steps. The output can be used as a 3D roadmap with Innova Vision to help interventionalists guide their catheter into the arteries during liver embolizations. After the procedure, the interventionalist can use Integrated Registration to assess the result of the procedure.



Liver neuroendocrine tumor embolization

Drs. T. De Baère and F. Deschamps, IGR – Villejuif, France.

PATIENT HISTORY

This is the case of a 33 year-old-patient with a history of multiple neuroendocrine tumors.

A pre-procedural CT is presenting a 51 x 39 mm nodule on Segment V. The patient has been referred for a TACE.

PROCEDURE

An initial DSA acquisition shows the complex vasculature of the tumor (Fig. 1) followed by an Innova 3D acquisition at 40°/s. The 3D volume is automatically reconstructed on the Advantage Workstation (AW) and displayed in the operating room. FlightPlan for Liver is then launched to analyze the liver vasculature and automatically highlight the vessels traveling to the hypervascular lesion. The physician identifies two main feeders and two injection points to treat the patient (Fig. 2).

The two feeders are transferred to the Innova Vision software running on the AW. Innova Vision is used to help guide the micro-catheter to the injection point by superimposing FlightPlan for Liver 3D roadmap on the live fluoroscopic image. Note that there is an automatic synchronization between the gantry motion and the 3D model to reach the injection points. 100-300 µm of embolic agent and doxorubicin are then injected to treat the tumor through each of the feeders (Fig. 3 and Fig.4).

At the end of the procedure an Innova 3D at 40°/s is acquired to assess the embolization material uptake. Integrated Registration, GE's multi-modality image fusion solution and allows comparing fixation of the embolic material and tumor location as seen on the initial, pre-procedural Innova 3D. (Fig. 5). Integrated Registration enhances the value of multiple imaging modalities, especially for complex vascular anatomies, by allowing direct comparison with pretreatment images.

OUTCOME

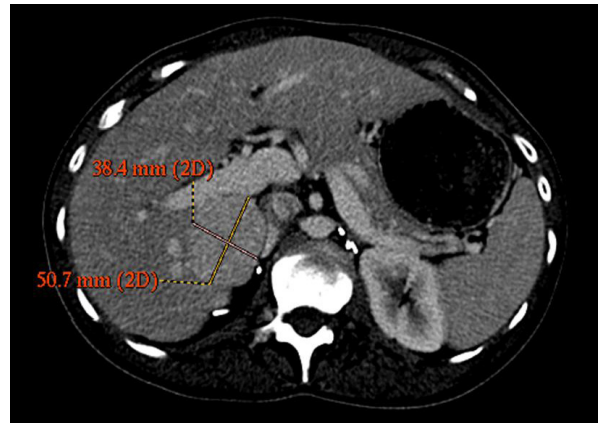
A one-month CT scan shows the necrosis area, note the correlation with Innova 3D just after the embolization (Fig. 6 c. and d.). Integrated Registration allows comparing tumor location, fixation of the embolic material and necrosis area.

CONCLUSION

Sub segmental feeder vessel analysis assists selective embolization to limit deleterious effects to nearby structures.

The integration of 3D images to guide complex procedures such as TACE brings more confidence during the interventions.

FlightPlan for Liver helps improve the overall procedure workflow and potentially reduces the amount of injected contrast media compared to multiple oblique DSA runs. Post-procedural assessment helps measure effectiveness, potential need for additional intervention and presence of an adverse result. Integrated Registration increases the benefits of multiple imaging modalities during a clinical procedure.



Pre-treatment CT showing the 51x39mm tumor location

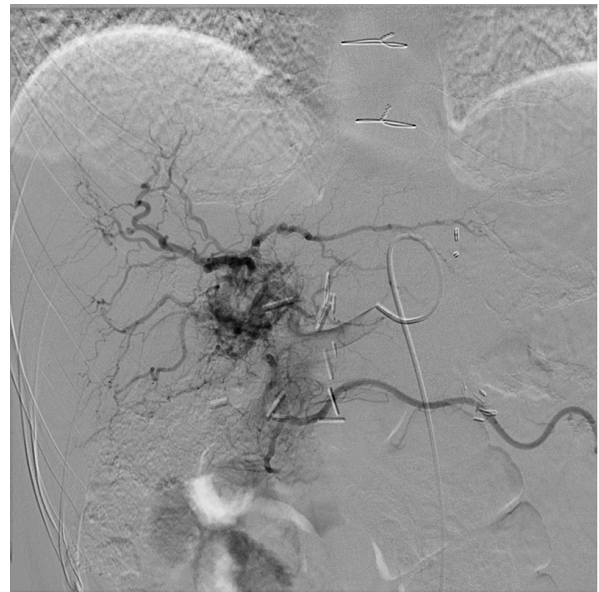


Fig.1 DSA - Complex vascularization of the tumor.

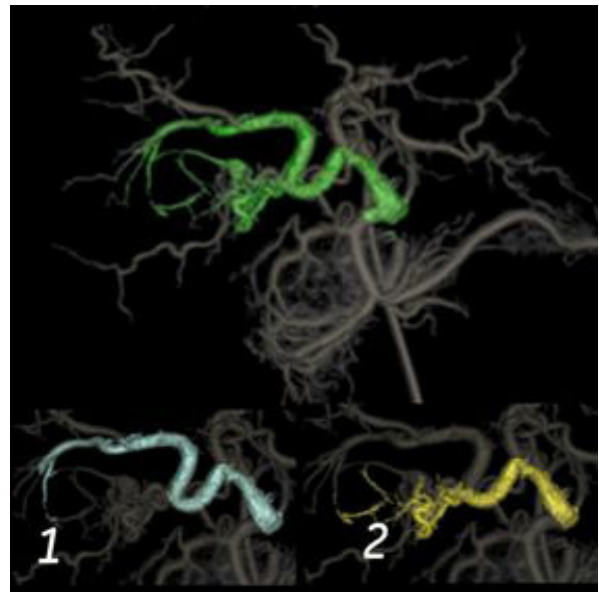
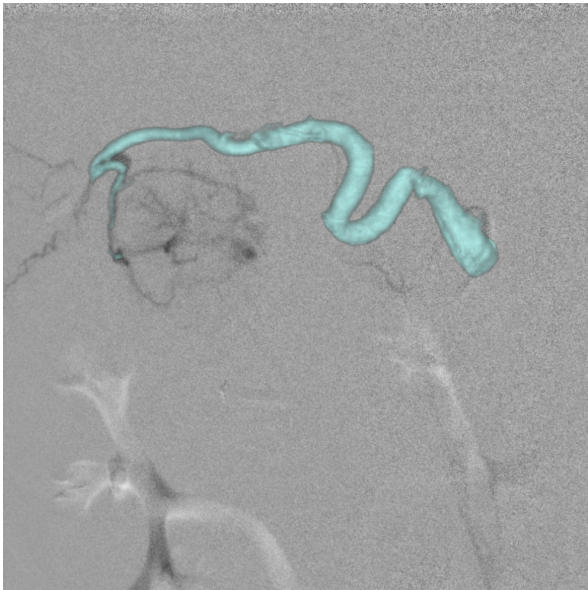


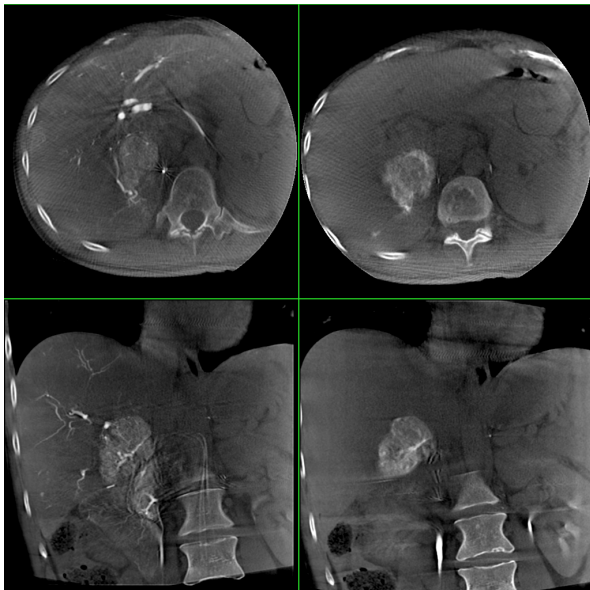
Fig. 2 FlightPlan for Liver output: The vessels in the vicinity of the hypervascular lesion are colored green; two identified feeders are colored blue and yellow.



Innova Vision displaying the first feeder 3D model on live fluoroscopy during the injection of the embolic agent.



Innova Vision overlaying the second feeder on a DSA sequence.



a. Pre-procedural Innova 3D, injected, axial view
 b. Post-procedural Innova 3D, non injected, axial view
 c. Pre-procedural Innova 3D, injected, coronal view
 d. Post-procedural Innova 3D, non injected, coronal view



a. Pre-op CT
 b. Pre-embolization Innova 3D,
 c. Post-embolization Innova 3D,
 d. Post-op CT, one month after intervention

“FlightPlan for Liver provides a great help to analyze complex tumor vascularization. And thus is a very important tool to plan my TACE procedures. For this case, I would have usually used extra DSA in order to identify the optimal injection points and angulations. Combined with Innova Vision, FlightPlan for Liver allows me to define the pathway and drive my devices in the most complex vascular beds in order to reach the optimal treatment position.” **Dr. Thierry de Baère**

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Data subject to change.

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