ELESTA
Beyond Laser

Case Studies of Laser Ablation for Liver Tumors

Dr Giovan Giuseppe Di Costanzo,
Head Physician, Department of Liver
Pathophysiology - Cardarelli Hospital, Naples

Case 1: HCC near vascular structures

A patient with a primary neoplastic lesion, located in the rear of the liver, partially exophytic, and positioned between a main branch of the portal vein and the vena cava, was subjected to Laser Ablation. The lesion is particularly difficult to treat for vascular elements that surround it.

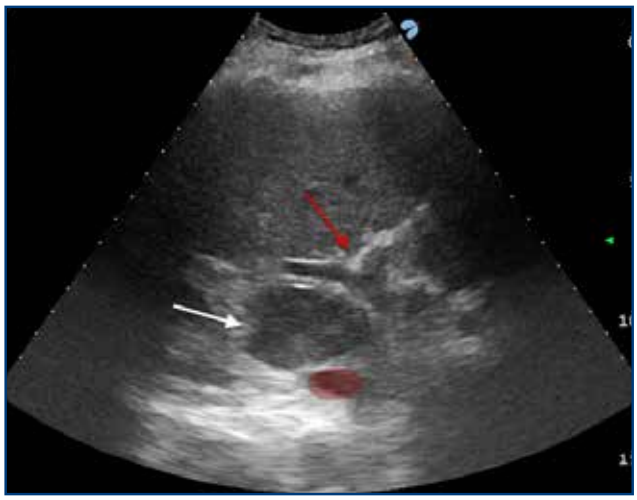


Fig.1: Us image before laser treatment

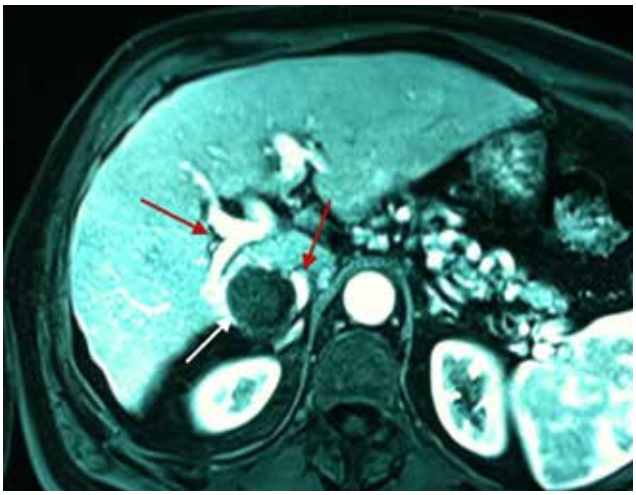


Fig.2: Post treatment RM image that shows a complete ablation

During the treatment, 4 fibres are positioned in the tumor: 2 in the upper side of the portal vein and two in the lower side. 1 month post treatment RM image shows a complete ablation of the lesion.

Case 2 : HCC close to GI and portal vein

A patient with an isoechoic 3cm hepatocellular carcinoma close to GI ad right portal vein was subjected to Laser Ablation. Immediately after the procedure the structure of nodular lesion has changed but the vessel is unaffected.

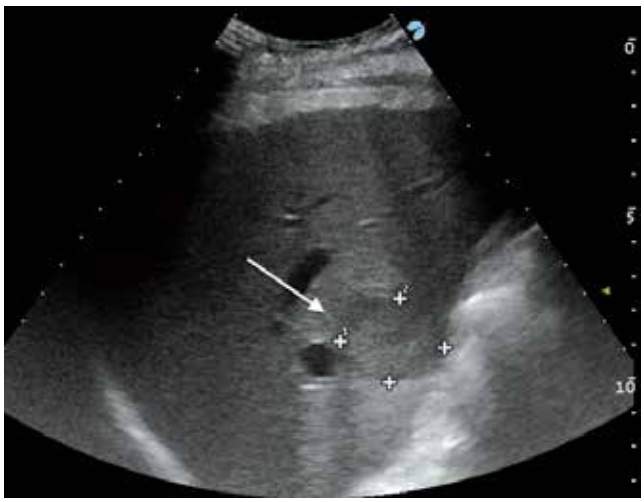


Fig.3: Us image before the treatment

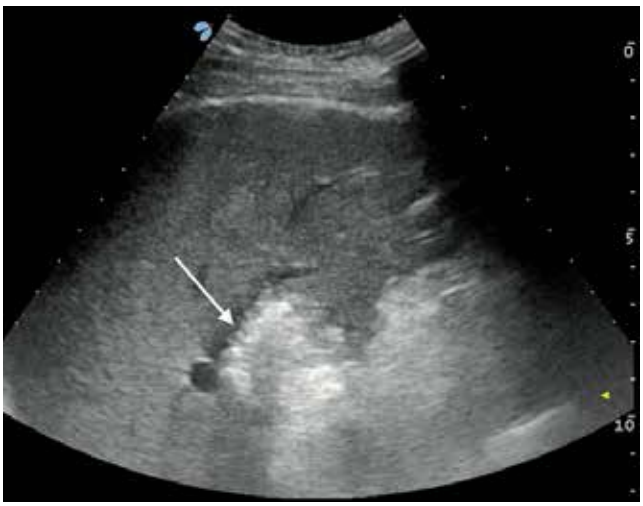
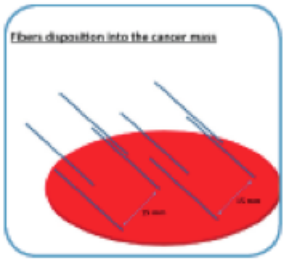


Fig.4: US image immediately after the treatment

Case 3: Large Hepatocellular Carcinoma

An obese 84 years old female affected by cirrhosis HCV-related, diabetes, and a 6 cm mass localized in the VI liver segment with esophytic growth underwent to Laser Ablation. Eight 21-gauge needles were inserted in the tumor in a parallel fashion and with tips arranged in a square configuration with a side-length of 1.5-1.8 cm.



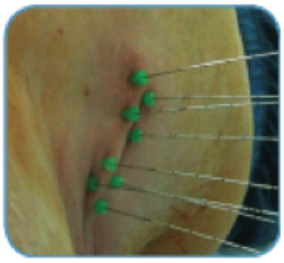


Fig. 5: Needles arrangement; Fig. 6: Needles arrangement on the patient's skin

Four illuminations were performed using the pull-back technique releasing overall 29,000 J and the treatment lasted 24 minutes. The procedure was well tolerated and the patient was discharged from the hospital 24 hours after the procedure.

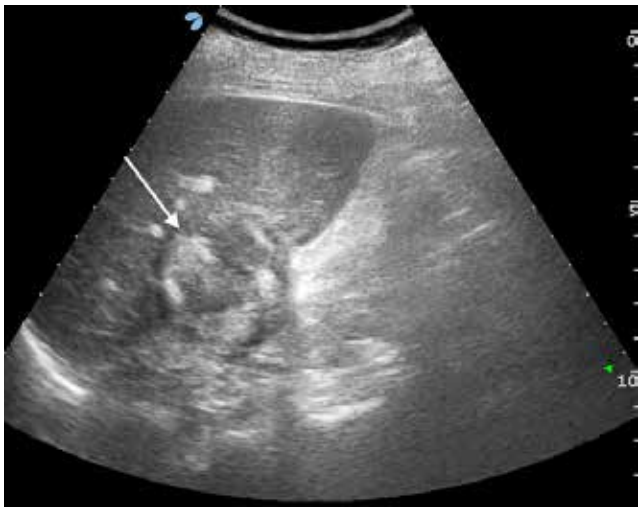


Fig. 7: US image during treatment

Fig. 8: CEUS image after the treatment

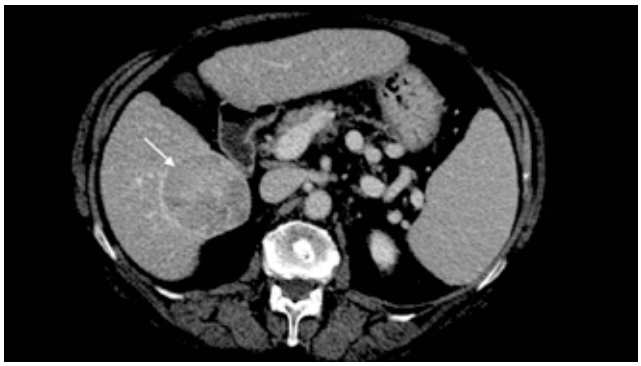


Fig. 9: CT scan before treatment

Fig. 10: CT scan 4 weeks after treatment

The only side-effects were mild pain and self-limiting fever lasting for 7 days. CT scan performed after 4 weeks showed complete necrosis of the tumor: the volume of necrosis was 87 ml.

Prof. Claudio Maurizio Pacella,
Ex Director of Dep. Of Diagnostic Images and Interventional Radiology - Regina Apostolorum Hospital, Albano Laziale

Case 4: liver lesion close to critical structures

A patient with a ≤2-cm-diameter lesion close to the gallbladder was treated with 2 fibres and a single application (without pull-back)

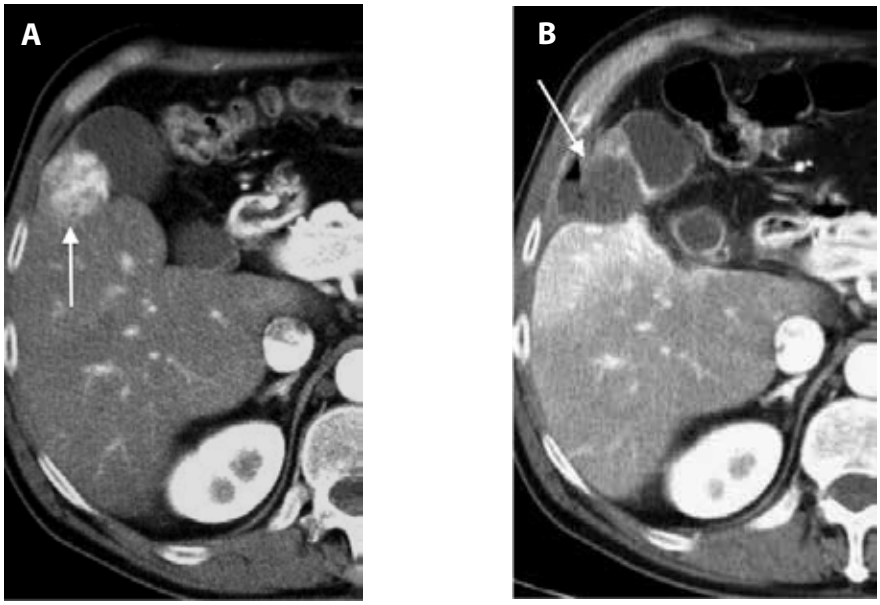


Fig.11: a) CT image before treatment; b) CT image post treatment that shows complete ablation

Case 5: Hepatocellular carcinoma close to the kidney

A patient with a hyperattenuating well-differentiated 4.8 cm diameter nodular lesion in segment 6 with exophitic growth close to right kidney was subject to Laser Ablation. Treated with four fibres, two pull-back and three applications.

Fig.12: CT image before the treatment

Transverse arterial phase contrast-enhanced CT scan obtained 24 hours after treatment (energy delivered 14,400 J) shows the entire heated region characterized by a homogeneous area of hypoattenuation, due to coagulation zone with complete ablation of tumor without damage of the contiguous right kidney.

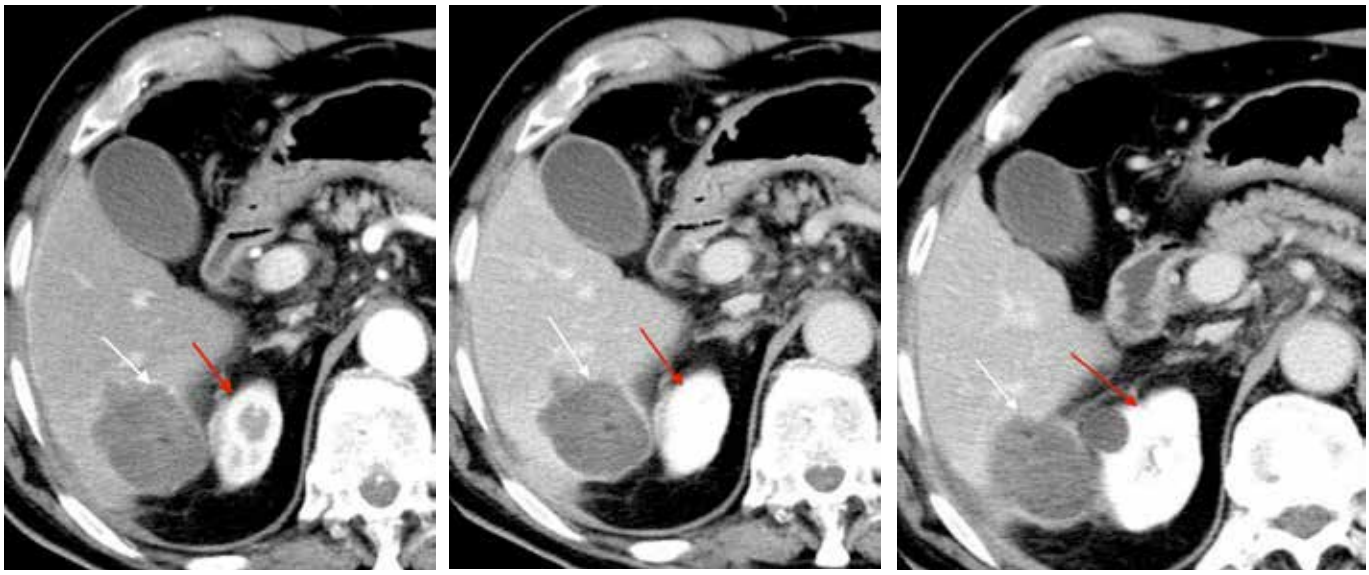


Fig.13: CT images after the treatment

Case 6: Hepatic metastasis from colocarcinoma

A patient with an hepatic metastasis from colocarcinoma of 2.0 cm diameter was treated with 2 fibres (1,800 J per fibre in 360 sec) and a single application (without pull-back). Total energy applied 3,600 J and application time equally to 360 sec. CT image shows a complete ablation with large safety margin.

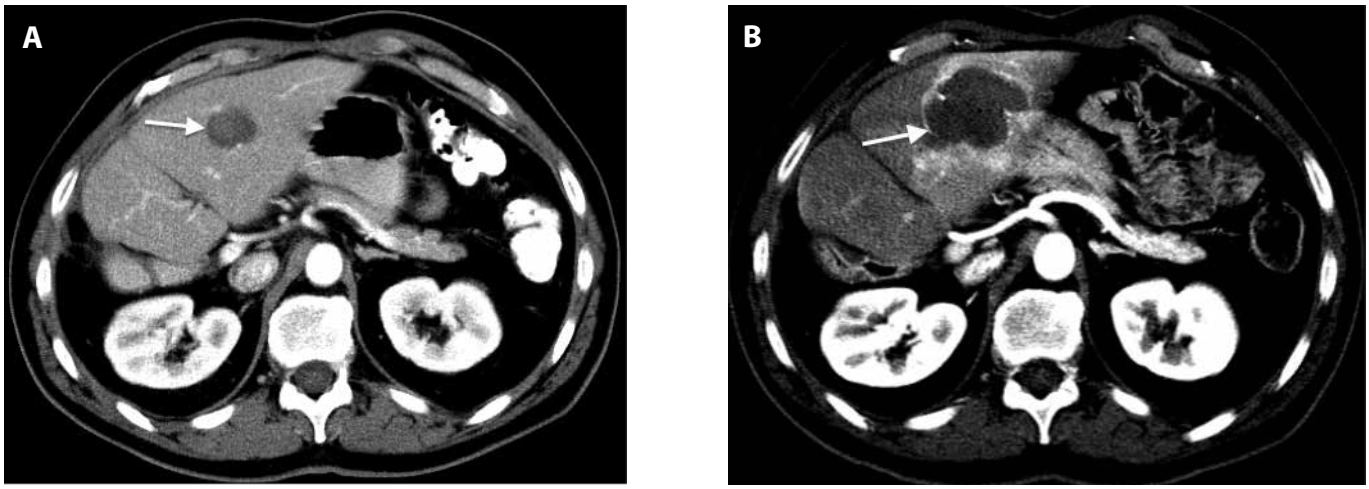


Fig.14: a) CT image before treatment; b) CT image after the treatment that shows a complete ablation

Dr Daniela Paccagnella,
Director of Operating Hepatolgy Sant'Antonio Hospital, Padua, Italy

Case 7: Breast tumor Liver metastases

A patient with a breast cancer diagnosed in 2010, was treated with chemotherapy. Three liver metastases was unresponsive to chemotherapy localized to the II-III -IV segment with a diameter of 1.3,1.8 and 1.6 cm.

Fig.15: US images of lesions before the treatment a) in the II segment; b) in the III segment; c) In the IV segment

Patient was treated with Laser ablation. CT images show complete necrosis.

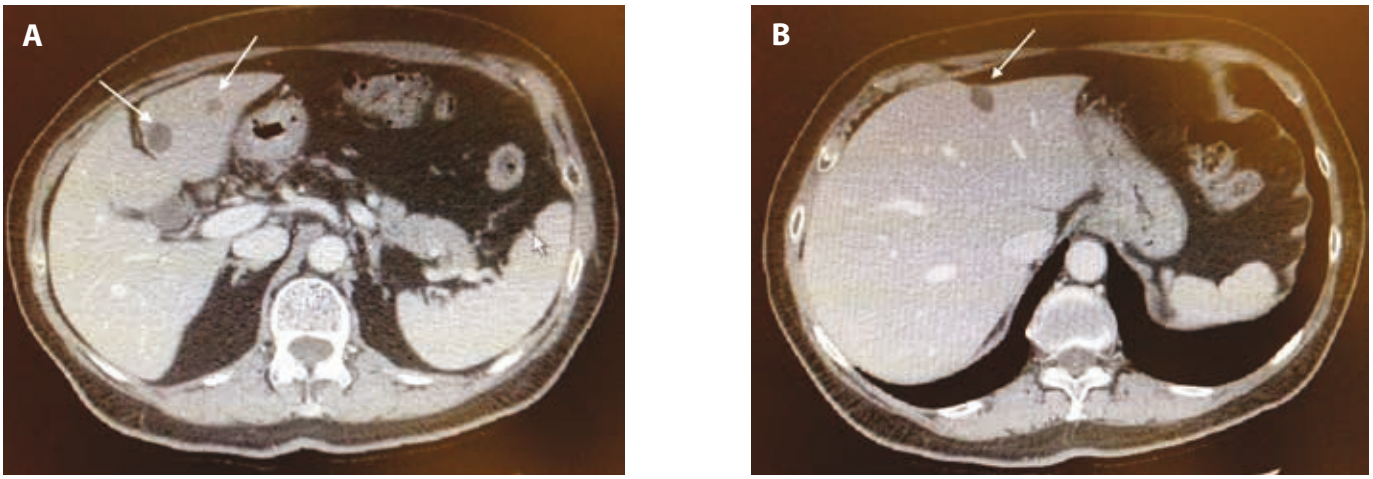


Fig.16: Ct images of lesions after the treatment a) in the II and III segments; b) in the IV segment

Dr Sergio Sartori,
Section of Interventional
Ultrasound - St. Anna Hospital,
Ferrara, Italy

Case 8: Multiple Neuroendocrine tumor Liver metastases

In November 2007, a 26-year-old woman underwent complete pancreas resection for insulin-secreting neuroendocrine tumor (NET). Contrast-enhanced CT (CECT) showed multiple (at least 20) liver metastases (LM), ranging from 0.7 cm to 1.4 cm in size. In January 2008 the patient started medical therapy with somastatin analogues (octreotide and successively pasireotide); in January 2010 she underwent transarterial chemoembolization. In January 2011, restaging CECT showed stable disease; given the indolent course of the disease, US-guided percutaneous laser thermal ablation (LA) was planned to remove LM as far as possible. LA was preferred to other ablation techniques because of the high number of LM and their small size, to balance the need of obtaining a good safety margin with the need of sparing normal liver parenchyma.

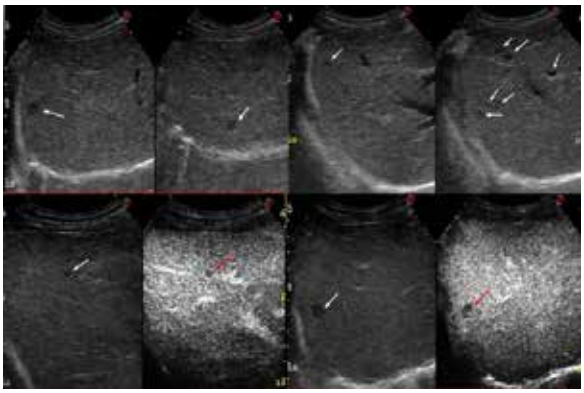


Fig.17: US images of lesions before the treatment

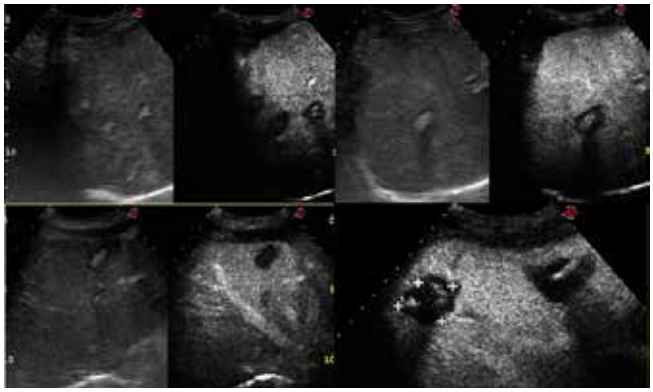


Fig.18: US images after treatment

From one to three bare tip laser fibres were used according to the lesions size, and 1,800J in six minutes were delivered for each fibre; the pull-back technique was used when the anteroposterior diameter of LM exceeded 1.2 cm. On the whole, three sessions were performed in 2011, and 21 LM were ablated. Technical success, assessed by CECT or contrast-enhanced US performed one month after the procedures, was 100%.

ELESTA

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ELESTA s.r.l.
Via Baldanzese, 17 - 50041 Calenzano - Florence - Italy
Phone +39 055 88 26 807 - Fax +39 055 77 66 698
info@elesta-echolaser.com