Laparoscopic computer-navigated ablation of liver metastases

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Objective

In order to benefit from the obvious advantages of minimally invasive liver surgery there is a need to develop high precision tools for intraoperative anatomical orientation, navigation and safety control. In a pilot study we adapted a newly developed system for computer-assisted liver surgery (CALS) in terms of accuracy and technical feasibility to the specific requirements of laparoscopy. Here, we present practical aspects related to laparoscopic computer assisted liver surgery (LCALS).

Methods

Our video relates to a patient presenting with 3 colorectal liver metastases in Seg. II, III and IVa who was selected in an appropriate oncological setting for LCALS using the CAScination system combined with 3D MEVIS reconstruction. After minimal laparoscopic mobilization of the liver, a 4-landmark registration method was applied to enable navigation. Placement of microwave needles was performed using the targeting module of the navigation system and correct needle positioning was confirmed by intraoperative sonography. Ablation of each lesion was carried out by application of microwave energy at 100 Watts for 1 minute.

Results

To acquire an accurate (less 0.5 cm) registration, 4 registration cycles were necessary. In total, seven minutes were required to accomplish precise registration. Successful ablation with complete response in all treated areas was assessed by intraoperative sonography and confirmed by postoperative CT scan.

Conclusions

This teaching video demonstrates the theoretical and practical key points of LCALS with a special emphasis on preoperative planning, intraoperative registration and accuracy testing by laparoscopic methodology. In contrast to mere ultrasound-guided ablation of liver lesions, LCALS offers a more dimensional targeting and higher safety control. This is currently also in routine use to treat vanishing lesions and other difficult to target focal lesions within the liver.