

MEETING ABSTRACT

Open Access

Perspectives of computer assisted resection planning and navigation for hepatic resections in the elderly

M Donati^{2*}, G A Stavrou¹, H O Peitgen³, KJ Oldhafer¹

From de Senectute: Age and Health Forum
Catanzaro, Italy. 5-7 December 2009

Background

Recent advances in image-based computer assistance in the last ten years allow computerized preoperative simulations, giving a lot of advantages in the preoperative surgical planning of resections¹. Preoperative simulation represents the prerequisite for navigated liver surgery. The aim of this study is to describe elementary technical aspects of a navigated approach to liver resections showing the advantages of navigation-system especially in the elderly.

Materials and methods

The preliminary condition in order to realize the navigation system in liver surgery is the simulation software previously developed. In fact, after the first step consisting in the planning of the surgical resection surface and direction (Figure 1) and the second step of the registration of the surgical planning directly on patient's anatomy by using an infrared optical localization-device positioned on a US-probe (Figure 2), there is the third phase performing the 3D-simulated liver resection directly on the patient driven by the navigation system. This information was in some resections also transferred to the liver surface using an image-guided stereotactically navigated ultrasound dissector (CUSA) (Figure 3).

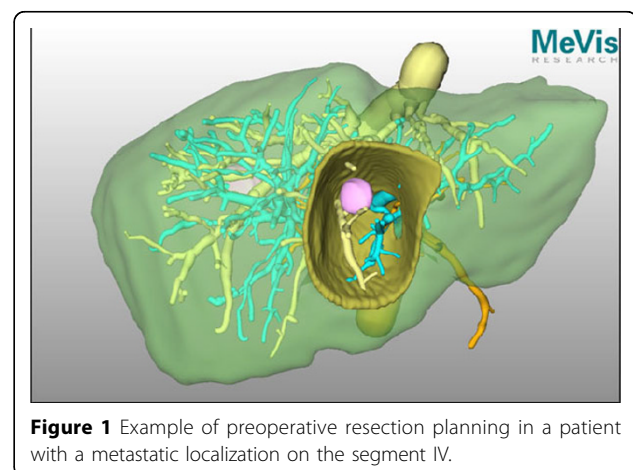
Results

The main advantages shown in old patients were: the possibility to extend major liver resections while calculating exactly the rest-volume of the liver, to give a more precise localization of vessels and biliary

structures, to allow the recognition of anatomical variants, to drive multiple resection sparing as more parenchyma as possible avoiding re-resection. The navigation system seems to be very useful and applicable in old patients, reducing the risk of liver failure [1] and allowing us to also operate on a tumour no more to be localized after neoadjuvant chemotherapy [2].

Conclusions

The navigation system allowed us to exactly reproduce in the operatory theatre, on the patient, the previously computer-planned operation. In selected cases, this information may have a considerable influence on operative planning [3], especially with regard to the extent of resection or the need for vascular reconstruction. This seems to be particularly important in extended left hepatectomies or in repeat hepatectomy when intrahepatic vascular anatomy may be altered.



²Department of Surgical Sciences, Organ Transplantations and New Technologies, O.U. General and Week Surgery, University Hospital of Catania, Italy

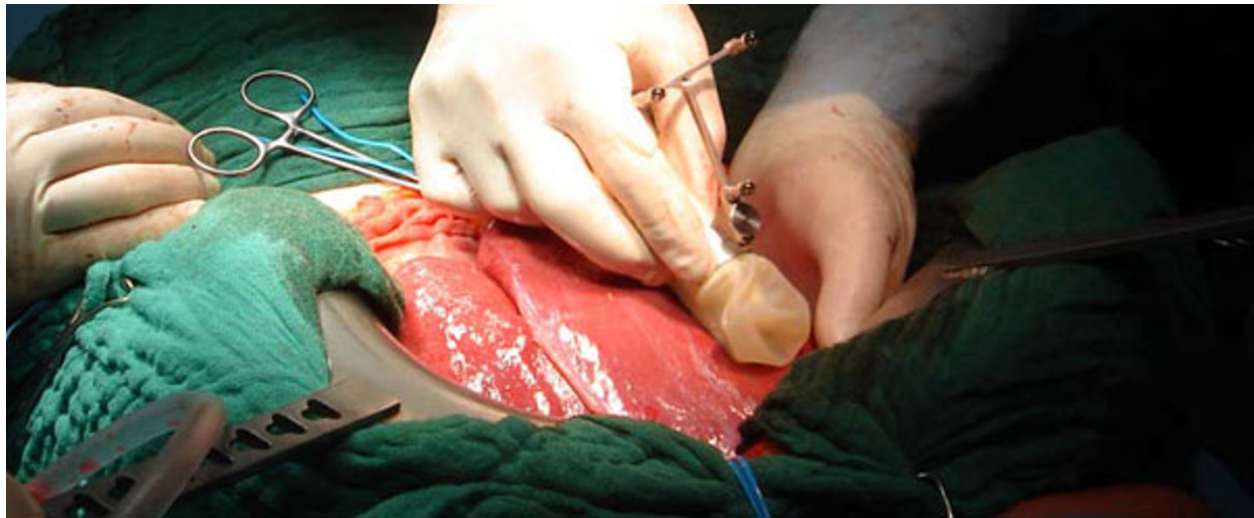


Figure 2 Step II, registration of the preoperative planning on real patient anatomy using infrared optical localization device positioned on US-probe.



Figure 3 CUSA® dissector modified by the positioning of an infrared optical device for the navigation during resection.

Author details

¹Department of General, Visceral and Thoracic Surgery, Celle General Hospital (AKH), Celle, Germany. ²Department of Surgical Sciences, Organ Transplantations and New Technologies, O.U. General and Week Surgery, University Hospital of Catania, Italy. ³Fraunhofer MEVIS, Institute for Medical Image Computing, Bremen, Germany.

Published: 19 May 2010

References

1. Lang H, Radtke A, Hindennach M, Schroeder T, Bourquain H, Schenk A, Oldhafer KJ, Prause G, Peitigen HO, Broelsch CE: **Virtuelle hepatobiliare Chirurgie-computer-unterstützte Resektionsplanung an der dreidimensional rekonstruierten Leber.** *Z.Gastroenterol.* 2007, **45**:965-70.
2. Oldhafer KJ, Stavrou GA, Prause G, Peitgen HO, Lueth TC, Weber S: **How to operate a liver tumor you cannot see.** *Langenbecks Arch Surg.* 2009, **394**(3):489-94.
3. Lang H, Radtke A, Liu C, Fruhauf NR, Peitgen HO, Broelsch CE: **Extended left hepatectomy— modified operation planning based on three-dimensional visualization of liver anatomy.** *Langenbecks Arch Surg* 2004, **389**:306-310.

doi:10.1186/1471-2318-10-S1-A7

Cite this article as: Donati et al.: Perspectives of computer assisted resection planning and navigation for hepatic resections in the elderly. *BMC Geriatrics* 2010 **10**(Suppl 1):A7.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

 **BioMed Central**