

## Neue Operationsmethoden

### **Robotic Assistance: Current Available Method and its Evolution in Visceral Surgery**

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#### **Roboterassistenz, gegenwärtige Methoden und ihre Revolution in der Visceralchirurgie**

Laparoscopic surgery brings a benefit to the patient yet poses challenges to the surgeon. The axe of vision is not the same than the axe of working. The surgeon needs to manipulate long and sharp instruments through a fix opening under the control of a bidimensional screen and without any tactile sensation.

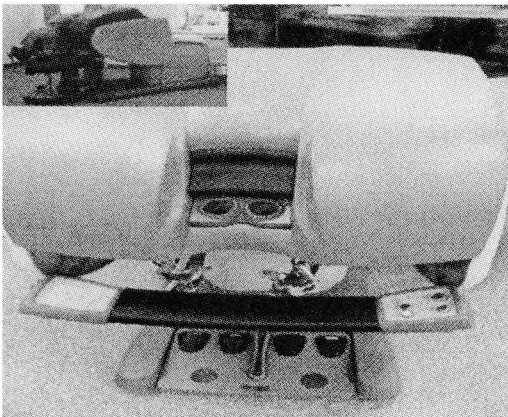
The body cavity is penetrated by cannulas which cannot be interchanged.

Therefore the surgeon needs to move around the patient in order to reach the best position for every step of the procedure.

A computer interface in command of a mechanical system (robot) allows:

1. to recuperate several lost degrees of freedom, thanks to intra-abominal articulations.
2. to obtain better visual control of instrument manipulation thanks to three-dimensional vision
3. to modulate the amplitude of surgical motions by downscaling and stabilisation
4. to work at a distance from the patient.

These features allow improved quality of surgical tasks, not the least thanks to substantially better ergonomics.



**Fig. 1**

The robot (Da Vinci system, Intuitive Surgical, Mountain View, Ca) consists of a console and a surgical cart which supports three articulated robot arms. The surgeon is sitting at the console. He manipulates joystick like handles while observing the operative field through binoculars that provide a three-dimensional image. This computer is capable of modulating data by eliminating physiologic tremor and by downscaling the amplitude of motions by a factor 5 or 3 to one (Fig. 1-4).

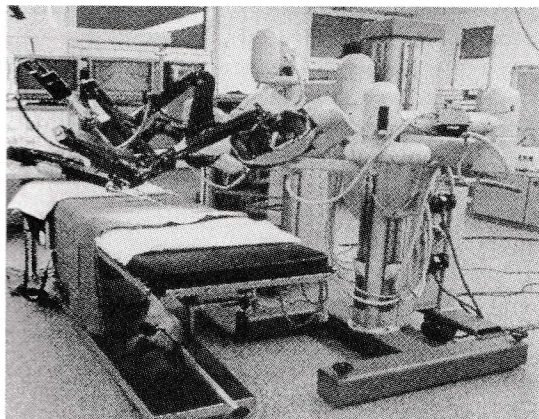


Fig. 2

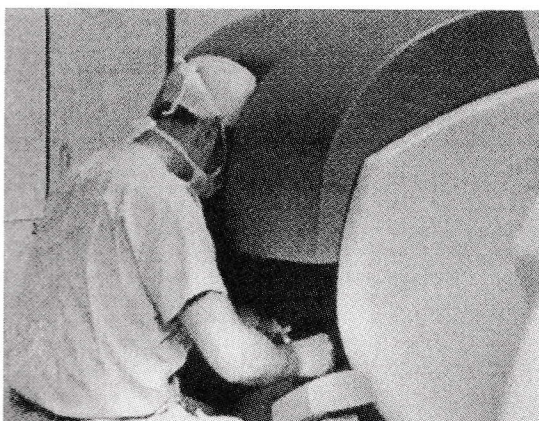


Fig. 3

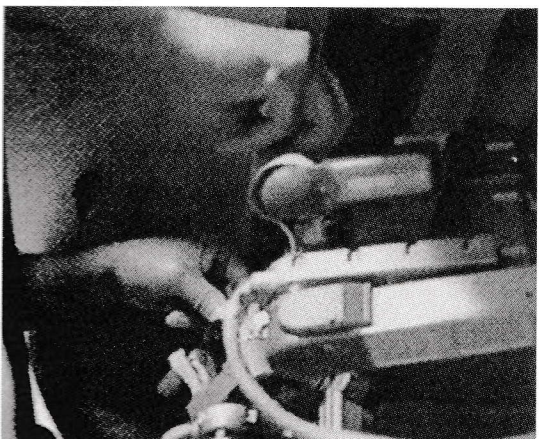


Fig. 4

The first robot assisted procedure in a man was performed in March 1997 by our team. Since this time 130 patients underwent robot assisted laparoscopic surgery including anti-reflux procedures, cholecystectomies, tubal reanastomosis, gastroplasties for obesity, inguinal hernias, intra-rectal procedures ...

1. This study has demonstrated the feasibility for telesurgery on humans in different procedures, without specific morbidity, and in acceptable operative times.
2. In its present embodiment, the system seems most efficient when involving micro-suturing within the abdomen or in very confined spaces.
3. improved ergonomic conditions and improved instrument mobility at the distal articulation level seem beneficial in usual abdominal procedures. More research is needed for further improvement in tool shape and optics for this type of approach.
4. The robotic approach implies new operative strategies, including a specific trocar placement.

Literatur beim Verfasser.