*Letter to the editor*

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# Telesurgical laparoscopic cholecystectomy

On March 3 1997, a telesurgical laparoscopic cholecystectomy was performed for the first time in history at the St. Blasius hospital in Dendermonde, Belgium. The device used was the ''Mona'' from Surgical Intuitive, Mountain View, California, USA.

After clearance from the local ethical committee and after informed consent had been obtained, the patient, a 72-year-old woman with a body mass index of 42 kg/m$^2$ was put under general anesthesia with endotracheal intubation. Four 10-mm and one 5-mm trocar cannulas were inserted according to Dubois' technique [1]. One 10-mm cannula harbored a straight-looking optical system connected to a three-dimensional camera system. Another 10-mm cannula was placed to the left of the umbilicus and used for clip placement only. The 5-mm trocar contained a probe for liver retraction. The two remaining ''active'' ports were connected to two fully mobile mechanical arms attached to the siderails of the operating table. They harbored two articulated tools (end effectors): a grasper and an electrocautery hook commanded by the surgeon sitting at a working console approximately 15 feet away from the patient.

As the surgeon watched the three-dimensional image of the operative field, he manipulated two handles that transmitted impulses to and from the end effectors via a computer interface. Sensory input and downscaling of the surgeon's motions 4 to 1 were secured. The procedure was successfully performed in 82 min, and the patient's recovery was uneventful.

The use of a computer interface between surgeon and patient has many more advantages than the ability to perform operations on a site remote from the patient.

The translation of virtual manipulations into commands to robot arms allows the surgeon to deal with the three most significant shortcomings of laparoscopic surgery: (a) the reduction in degrees of freedom, (b) the lack of tactile feedback, and (c) the impaired dexterity attributable to the use of long and rigid instruments introduced through a fixed point in the abdominal wall and manipulated in an often awkward position [2].

With the present master-slave system, seven degrees of freedom are acquired because the end effectors have an additional articulation (wrist) inside the abdominal cavity, perfectly mimicking all motions as they are performed by the surgeon. Moreover, the system is capable of reducing (downscaling) the ''virtual'' manipulations of the operator, hereby eliminating minor flaws such as physiologic tremor. This, combined with the ergonomically optimal position, the visual immersion, and the sensory feedback on the surgeon's part, allow for a more intuitive, nearly perfect surgical approach, hence more precision, and thus improved safety for the patient. More complex endoscopic operations such as microanastomosis in the cardiovascular field will now become feasible with the same accuracy as in the open chest procedure.

## References

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2. Wapler M (1995) Medical manipulators: a realistic concept? Minim Invasive Ther 4: 261–266

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