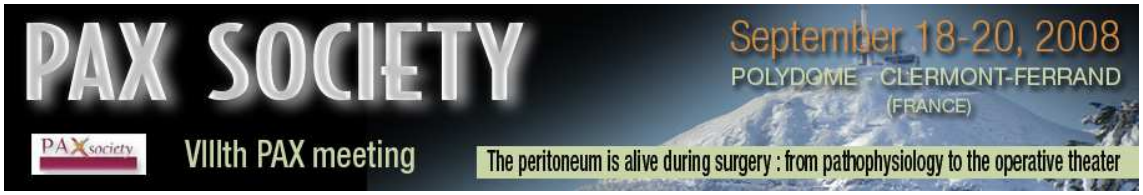

Botchorishvili R, Canis M, Rabischong B, Jardon K, Pouly JL, Mage G.

CHU Clermont-Ferrand, Department of Obstetrics Gynecology and Reproductive Medicine Polyclinique de l'Hôtel Dieu, Clermont-Ferrand, France

INSTRUMENTED HAND IN LAPAROSCOPY : IS EVOLUTION STILL POSSIBLE ?

Minimally invasive surgical procedures (MIS) using instrumented hand have profoundly influenced modern surgery. However, surgical procedures using long tools inserted through small ports on the body deprive surgeons of the depth perception, dexterity, sense of touch, and straightforward hand-eye coordination that they are accustomed to in open procedures. In conventional procedures, it is the synergistic effect of haptic and visual feedback that enables optimal surgical outcomes. Despite the many advantages of MIS, the lack of the sense of touch, or haptic, has created a serious challenge for surgeons. Although visual feedback has provided surgeons with some information that has promoted the quality of endoscopic surgery to its present level, restoring the lost tactile information could play an important role in the advancement of MIS to the next level of sophistication.

Although most surgeons believe that laparoscopic surgery eliminates tactile sensation, many data idicates that laparoscopic instruments in fact provide surgeon with some haptic feedback. The force feedback, though limited in laparoscopic procedures, is completely lost in robotically assisted procedures.

Defining the role of haptic feedback for laparoscopic surgery is also one important issue in the design of laparoscopic simulators which are likely to be an integral part of MIS training in the near future. Many data from literature confirmes that force feedback added to vision feedback leads to improvement in tissu characterization than using only vision feedback for MIS. Force feedback instrumented hand is able to partially restore the sense of touch in MIS. This restored ability may thus potentially result in more efficient operations with improved diagnostic capabilities and fewer complications during MIS.

On the other hand, the importance of haptic data in relation to laparoscopic gestures is a matter for discussion. The haptic sensations perceived by operator results from diverse and multiple interactions with the surgical environment involving trocars, abdominal wall, and organs and the sensation is accompanied by a very unfavorable « signal-noise » ratio with the distorsion and alteration of the haptic sensation.

In any way, improvement and evolution of conventional laparoscopic tools, not only instruments but also trocars, seems to be necessary and possible. Development of haptics-integrated systems requires close collaboration between surgeons and technologists. Integrating the current level of technology into laparoscopic instrument design may enable surgeons to overcome the haptic limitations imposed by current laparoscopic instruments and to improve the quality of surgery.