approximation, except in cases of concomitant enteroatmospheric fistula.

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The meaning of surgeon’s comfort in robotic surgery

To the Editor:

In robotic surgery literature, no studies focus on the concept of surgeon’s comfort. This is likely because of the extreme difficulty in quantifying the parameter “comfort” with statistical or mathematical methods, thereby preventing its use as a favorable criterion for the adoption of this new technique.

We believe that the robot could carry all the advantages of minimally invasive surgery, such as reduction in post-operative pain, decreased length of hospital stay, rapid patient rehabilitation, and better cosmetic results, to all those patients for whom laparoscopy often is not an option.

This is the case, for instance, of hepatobiliary surgery in which the robot can increase safety, feasibility, and efficacy of minimally invasive surgery that has already been established with this approach for other surgical procedures.

In urological practice, the advantages of the robotic method have been widely demonstrated primarily in terms of nerve sparing and more accurate lymphadenectomy.1

Some resistance against the use of robotic assistance seems to persist in General Surgery, where the scarcity of prospective data in terms of patients’ benefits makes it difficult to justify the use of robotic assistance and to shun the opinion that it constitutes, at best, a waste of resources.

We would like to point out here that shorter hospital stay and swifter patient recovery represent a sizable decrease in medical cost, and this has to be taken into consideration when comparing the overall investment involved in the use of robotic assistance with the overall cost of more traditional surgery.2

In addition to this, robotic assistance provides non-negligible comfort to the surgeon, and this can have very favorable windfall profits on the chance of positive outcome of surgical interventions.

As a matter of fact, the various degrees of freedom of the robotic instruments allow the surgeon to replicate movements of the traditional open technique that the rigidity of the laparoscopic instruments does not allow. It also limit the consequences of the natural tremor of surgeon’s hands by converting movements into micro-movements, which are displayed by 3D stable optical images.

All these factors represent a valuable advantage also when compared to the long and complex laparoscopic surgical interventions that induce mental and physical stress and may well lead to a progressive decrease of the surgeon’s performance.

Furthermore, Ji et al3 tried to demonstrate that robotic surgery presents smaller rates of intraoperative bleeding and conversion to laparotomy than traditional laparoscopy.

All this could be the consequence of 3D visualization of the operative field and of the mechanics of the endowrist, which facilitates micro-suturing and a more efficient positioning of the clips.

The comfort comes also from the fact that robotic assistance help in decreasing the number of cases required to achieve competency for a given procedure, and enables surgeons with less extensive laparoscopic experience to undertake major surgical intervention.4,5

In centers with double console robot ensures an extraordinary educational advantage both for the teacher and his “students” in learning a new technique with direct and interactive supervision which could also be more effective and easier than the methods of teaching traditional surgery.

Robotic assistance facilitates complex interventions, particularly the ones considered being “too risky” to be undertaken in laparoscopy and for which an increased comfort with long-lasting precision of gesture offers paramount advantages for the outcome of the intervention (considering, above all, that still today no more than just 30% of colorectal surgery occurs in laparoscopy).6

Regarding liver surgery, many aspects highlight the gain derived from a robotic approach.

Casciola et al7 have already pointed out that the use of the robot allows surgeons to approach those lesions (whether CRLM or HCC) localized in the higher and posterior segments of the liver (1, 4a, 7, 8) ensuring the opportunity to provide that parenchymal savings, which is currently considered the therapeutic gold standard, and it is often technically not feasible with laparoscopy (with the need to perform major hepatectomies).

In this field, the chapter of nodes and sutures with minimally invasive technique is a crucial issue. Indeed, the

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robotic endowrist allows you to perform simple ligatures to control large blood vessels instead of using staplers, which can be cumbersome in small spaces.\textsuperscript{8}

For this reason, looking at some of the historical contraindications to laparoscopic approach in liver surgery (in particular size and location of the lesions), robotics could help to increase the number of patients treatable with a minimally invasive technique.\textsuperscript{9}

Even in a highly sensitive area such as the split-liver donation from living donors, the robot could be an option for a minimally invasive approach.\textsuperscript{10}

In recent years in the United States, thanks to the propagation of minimally invasive surgery, the number of living donors for kidney transplants turned out to exceed the number of cadaveric donors and the effectiveness and feasibility of different techniques have been analyzed.\textsuperscript{11}

It has been pointed out that robotic assistance helps restricting the usual exclusion criteria for donation such as the presence of vascular abnormalities, the use of right kidney, or the obesity of the patient.

Some robotic series have already highlighted a clear and progressive reduction in the duration of the intervention, the warm ischemia time and blood loss with increasing experience and training of surgeons.\textsuperscript{12}

With severely obese patients, robotic assistance to kidney transplantation resulted in remarkable reduction in postoperative wound infection and in the corresponding increase in graft survival.

In our center, for example, the surgeon who takes care of kidney donations from living donors has chosen to adopt the robot to approach this procedure.

The benefits demonstrated by the robot in terms of comfort and safety both for the surgeons and for the patients have been extremely relevant: as a matter of fact we have reached after 8 operations results comparable to the ones reported in the literature with other minimally invasive approaches in terms of intervention, duration, ischemia time and other intra and postoperative data.

Totally robotic nephrectomy has become the gold standard in our centre for living donors. From 2009, year of the beginning of the program, all donations have been performed with the da Vinci System without any conversion to laparoscopy or laparotomy, nor any major complications.

Looking in perspective, the further development of new technologies and more effective robotic instruments will take our actual concept of “comfort” to an even higher level.

This aspect, together with the reduction of costs that we will observe for sure when actual patents will expire and robotics products of different brands will appear on the market, will allow to overcome the current “blocks” on robotic surgery. That’s why we believe that surgeons of the future will certainly be operating with this technique.

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