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Editorial

Robotic Surgery. A Present and Future Technological Advance☆

Cirugía robótica. Un avance tecnológico de presente y futuro

Robotic surgery is an emerging and sophisticated technology, acting as one of the most attractive and exciting fields for today's surgeons. This is evidenced by the fact that in Spain, in addition to several private centres that are already capacitated for this technology, the last two years have seen a major increase in the robotic devices installed in public health institutions, some of which are exclusively dedicated to training and teaching.Currently, the only robot accepted by the FDA for performing abdominal surgery is the da Vinci system (Intuitive Surgical, Sunnyvale, CA, USA), which solves some of the important limitations to conventional laparoscopic surgery; it provides a tridimensional field of view, articulated instruments, a fixed camera platform, and an ergonomic position for the surgeon to work in.[1–3] These benefits combine to develop the potential for laparoscopic techniques far above the currently defined limits. In addition to the obvious advantages of an absence of shaking and the sensation of immersion in the surgical field, this technique provides perfect visualisation and instrument manipulation within extremely difficult operating fields.[1–3]

After a few purely anecdotal publications that appeared in the first part of the last decade,[4,5] more recent studies have been published in the medical literature in the fields of urology,[6] gynaecology,[7] and colorectal surgery,[2,3,8,9] as well as others focusing on cardiovascular, paediatric, and even oral surgery. These reports have started to indicate the benefits that these systems have for specific and general surgical results in minimally-invasive procedures. However, as in many other surgical methods, the absence of well-designed systematic studies with a proper number of patients limits us at this time to only assert that the use of robotic devices can obtain similar results and complication rates to conventional techniques.[8,9] However, it does provide the option of a minimally-invasive technique that facilitates an easier surgical procedure with greater manoeuvrability.

The developments in the health sector in Spain do not differ much from other countries, possibly due to the early conclusions drawn by the administrators of both public and private health sectors.[10] Perhaps the community of Andalucía has provided the clearest support for this technology since its inception, with the installation of three robots in Seville, Malaga, and Granada, whose first results were published in the National Coloproctology Conference in Badajoz, 2010. *The initial experience from the surgical team at the Virgen del Rocio Hospital during their first year is summarised in a randomised, prospective study that shows how the robotic approach was a safe and effective technique whose clinical results measured up to those using a conventional laparoscopic technique.*[11]

Currently, in Spain, the majority of surgical groups are in the evaluation and validation phase of this technique, with special emphasis on colorectal surgery. However, little by little it has expanded into other sub-specialties of general surgery, such as pancreatic, adrenal, and oesophagogastric surgery.[12,13]

Perhaps the area of rectal cancer is where robotic techniques have acquired one of their most important roles,[14,15] such that after the appearance of the first results in published studies, more ambitious multi-centre projects have been started. The worldwide ROLARR study (Robotic versus Laparoscopic Resection for Rectal Cancer) was designed in order to prospectively compare robotic surgery with conventional laparoscopic surgery for rectal cancer in centres with the greatest level of experience, including at least two public Spanish hospitals.

One of the most highly debated aspects of the use of this technology has been the significant economic investment implied in the acquisition, installation, and maintenance of

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the robotic devices, as well as the costs inherent to each procedure. Economic feasibility studies have been carried out for robotic techniques that found no significant differences between these and conventional laparoscopic techniques, although these studies did not take into account the initial investment for acquiring the devices.[16] Without a doubt, similar discussions were held regarding laparoscopic surgery when it was first introduced, which time and results have since dispelled. Even so, certain changes would be needed in the policies regarding the commercialisation, industrial competition, and alternative financial support methods of these techniques in order to solve the issue, especially in the economic times we currently face.

The education, training, and adoption of practical quality programmes is another important question to discuss when a new technology starts to be implemented. In this sense, it is essential to have access to training in these techniques using devices specifically designated for this use.

We believe that the current da Vinci robot, in spite of its exceptional engineering, is a transitional model that is limited by its size and mobility.[8,9] Even so, it provides a fabulous collaborator for surgery in which the surgeon always uses this device preferentially over any conventional laparoscopic device or open surgery. We currently need more compact and lighter models that provide greater mobility and touch and tension sensors, and that can work through single ports, thus simplifying the difficulties we face with the currently used laparoscopic techniques.

Without a doubt, robotic technology will have more concrete indications in the very near future, providing effective teaching tools for new surgeons that are accessible to a greater number of institutions than now. It is clear that, at the moment, its use should be focused on procedures in which conventional laparoscopic surgery has limited vision or limited instrument capacities, which leaves a good deal of new pathways open for the development of modern surgery.

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