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Editorial

Robotic abdominal wall surgery: Where is its most powerful potential?



Cirugía robótica de la pared abdominal: ¿dónde está su potencial más poderoso?

Robotic assisted laparoscopic hernia repair has seen a rapid adoption in the United States.¹ For many countries outside of the US access to a robotic platform is limited, and preference is given for urological or colorectal cancer surgery. The robotic platform has some technological advantages over conventional laparoscopic surgery. These include better visualisation, availability of wristed instruments and a more stable operating field. The question that arises is whether these advantages allow the hernia surgeon to deliver better patient care that would justify the higher cost of the robotic platform and the instruments.² The large majority of the studies are retrospective, and the outcomes of these individual studies are not homogeneous, thus decreasing the validity of their results.³

For groin hernias, only one randomised study has been published comparing robotic and laparoscopic repair, and there was no significant clinical benefit at 30-days postoperatively.⁴ We have calculated a mean excess instrumentation cost for the robotic approach of €649 in a retrospective series of 404 robotic groin hernia repairs, compared with 272 laparoscopic repairs.⁵ Most studies report longer operating times for robotic groin hernia repair compared with laparoscopic repair.^{3,4} The effect of the learning curve must be considered and we have demonstrated similar operating times between robotic and laparoscopic groin hernia repair following the learning curve.⁶ There does not seem to be any clear clinical benefit for in uncomplicated groin hernia repair to justify the higher procedural cost. We do feel that robotic groin hernia repair may provide benefits in patients with complex inguinal hernias due to the advantages of the robotic platform as described above.⁷ Moreover, we consider robotic groin hernia repair an important first procedure in the training of surgeons to treat abdominal wall hernias robotically and acquire skills from dissection, suturing, and mesh handling on the abdominal wall.

Concerning ventral hernias, a systematic review from 2018 on robotic assisted abdominal wall surgery concluded that for

ventral hernias that would normally require an open procedure, a robotic assisted repair may be a good option.³ For many years we have used mesh devices with a diameter of about 7 cm in the treatment of small to medium sized ventral hernias. Severe adverse events with such intra-peritoneal mesh devices have been described and the size of the mesh often does not allow a durable repair with sufficient overlap of the mesh beyond the hernia defect.^{8,9} Laparoscopic ventral hernia repair allows for placement of larger meshes and most often is performed with an intra-peritoneal mesh fixed with penetrating tacker fixation after closure of the hernia defect. The only randomised trial of robotic ventral hernia repair compared laparoscopic ventral hernia repair with tack fixation with an intra-peritoneal mesh fixed robotically to the abdominal wall with running sutures.¹⁰ No benefits in 90 day postoperative hospital days was noted, but the robotic approach took longer and was more costly. Several studies have been published from centres with a large expertise in laparoscopic ventral hernias repairs to warn against an increased morbidity related to subsequent abdominal surgery because of possible dense adhesions of the viscera to the intra-peritoneal meshes.^{11,12} This has led to a rationale to look for minimal invasive techniques of ventral hernia repair with a mesh augmentation in the extra-peritoneal mesh positioning rather than intra-peritoneal. A technique for laparoscopic retromuscular repair of ventral hernias was described in 2013, but this has technical challenges in a conventional laparoscopic setting.¹³ We have adopted the robotic platform to perform this approach using the advantages of the improved ergonomics and the facilitated suturing with the wristed instruments.¹⁴ This approach eliminates the need for penetrating fixation, and for coated intra-peritoneal meshes. This could lead to less postoperative pain and less cost. The robotic approach may be cost effective compared to the intra-peritoneal laparoscopic ventral hernia repair when the shorter hospital stay, use of less expensive mesh, and elimination of

laparoscopic fixation devices is considered. Importantly, this has the added advantage of decreasing the risk related to adhesions during subsequent abdominal surgery.

The biggest potential for improved patient outcome using the robotic platform likely lies with the patients who have *wide incisional hernias requiring a component separation technique*. Compared with open component separation techniques, a robotic assisted minimal invasive approach has demonstrated a remarkable decrease in hospital stay postoperatively.¹⁵ We have noted similar outcomes with our patients following robotic TAR procedures. If the posterior component separation has been successfully performed in a minimal invasive fashion with the robotic platform, the immediate postoperative recovery of these patients is improved significantly. Less postoperative pain results in earlier mobilisation and the lack of postoperative ileus, in earlier oral intake. Most patients can be discharge after 48 h even after retromuscular repairs with large meshes of 40 by 30 cm. We think this should be considered the driving incentive to adopt the robotic platform in the treatment of abdominal wall hernias. We are convinced that posterior component separation, which is currently predominantly performed open, can be performed in a minimally invasive fashion in most patients using the robotic platform. The cost savings associated with decreased hospital stay will improve the cost effectiveness of the robotic approach. Robotic assisted posterior component separation with transversus abdominus release or roboTAR, is a difficult procedure requiring extensive skills in using the robotic platform and knowledge of abdominal wall anatomy. Using a training pathway which includes robotic assisted groin hernia repairs and robotic repair of smaller ventral hernias, is a mandatory investment required prior to adopting robotic techniques for the wider and more complex abdominal wall repairs. We need a prospective high quality multicentre European trial to investigate and document the benefits of robotic complex ventral hernia repair compared with open repair. However, enough expertise must be acquired with the robotic platform by participating abdominal wall surgeons to avoid including patients in the learning curve of the surgeon to perform roboTAR.

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