Hernia (2019) 23:521–522
https://doi.org/10.1007/s10029-019-01984-y

INVITED COMMENTARY

Comment on robotic inguinal hernia repair: is technology taking over?

James G. Bittner[1,2,3]

Received: 10 May 2019 / Accepted: 16 May 2019 / Published online: 25 May 2019

The authors conducted a systematic review and meta-analysis of studies reporting on robotic-assisted transabdominal preperitoneal (R-TAPP) inguinal hernia repair (IHR) to determine risk-to-benefit ratios and assist with clinical decision-making [1]. Following Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines, the authors compiled publications written in English detailing R-TAPP IHR outcomes. Excluded articles had unclear description of methodology and/or operative technique, fewer than 20 patients, and included patients who underwent concomitant procedures.

Twelve studies representing 1645 patients published between 2015 and 2019 were identified. All cohort studies (11 observational, 1 propensity-matched) were considered fair quality with moderate or serious bias. Overall, 1635 patients underwent R-TAPP IHR, but only 10 and 11 studies reported the type of mesh and method of fixation, respectively. Four patients suffered major operative complications including vascular injury ($n=3$) and sigmoid colon enterostomy ($n=1$), while 9 patients (estimated pooled prevalence 0.14%) required conversion to an open approach for various technical and pathology-related issues. Estimated short-term pooled prevalence rates were seroma/hematoma (4.1%), urinary retention (3.5%), inguinodynia (0.73%), surgical site infection (0.22%), operation-related readmission (0.75%), and hernia recurrence (0.18%). The authors concluded that R-TAPP IHR is feasible, safe, and effective based on low pooled prevalence rates of conversion and complications that seem comparable to published results [1].

Of the 12 studies analyzed, only six (50%) reported on all basic yet necessary aspects of hernia-related studies [1]. Specifically, one study failed to mention the type of robotic surgical platform, two did not specify the type of mesh used, one failed to describe mesh fixation or lack thereof, and four studies did not detail the suture and/or technique for peritoneal flap closure [1]. Most studies failed to grade complications using a valid classification system. These easily reportable details should be included by authors of hernia-related studies, and must be assessed by reviewers and editors to facilitate more consistent data reporting, comparative analysis, and interpretation.

A recent observational cohort study included patients with primary and recurrent inguinal hernia who underwent R-TAPP ($n=35$) or laparoscopic ($n=68$) approach at a single institution [2]. The two unmatched cohorts were similar regarding age, body mass index, history of abdominal operation, and prevalence of recurrent hernia. There were 19 and 16 patients who underwent bilateral R-TAPP and laparoscopic IHR, respectively. Of those who underwent laparoscopic IHR, 47.1% ($n=32$) were TAPP repairs with synthetic mesh secured by permanent tacks. In most (97.3%) R-TAPP cases, self-gripping synthetic mesh was used without tack fixation. There was no statistical difference in mean Carolinas Comfort Scale scores between groups at baseline, immediately postoperatively, and at 3–4 months and 12 months postoperatively. Total time to follow-up differed between R-TAPP and laparoscopic groups (15.5 vs. 14.1 months, $P=0.019$). Mean operative time for unilateral/bilateral R-TAPP IHR (67 min) decreased by approximately 30 min during 18 months of the study. Mean operative time for laparoscopic IHR was 58 min with no decrease over the period [2].

This investigation of fellowship-trained surgeons early in the learning curve for R-TAPP IHR presented limited data that do not establish the operative experience necessary to achieve competency and/or proficiency with R-TAPP IHR, but it is a good start [2]. The authors concluded that R-TAPP

The article is part of the Topical Collection "Forum on primary monolateral uncomplicated inguinal hernia".

✉ James G. Bittner
james.bittner@stfranciscare.org

[1] Department of Surgery, University of Connecticut School of Medicine, Farmington, CT, USA

[2] Quinnipiac University Frank H. Netter MD School of Medicine, North Haven, CT, USA

[3] Department of Surgery, Saint Francis Hospital, 114 Woodland Street, Hartford, CT 06105, USA

and laparoscopic IHR yield similar patient-reported outcomes at 12 months postoperatively [2].

A recent survey study demonstrated differences in outcomes after R-TAPP, laparoscopic, and open IHR [3]. From eligible patients, propensity-matched cohorts were created to compare outcomes after robotic-assisted ($n=85$), laparoscopic ($n=83$), and open ($n=85$) IHR. Patient respondents recalled less acute postoperative groin pain after R-TAPP compared to open IHR but similar levels of acute postoperative groin pain compared to laparoscopic IHR. The same findings held true for levels of daily activity disruption postoperatively. Patients without prior IHR reported significantly less pain at 1 week postoperatively, shorter duration of acute postoperative groin pain, and fewer days of hernia-related pain medications following R-TAPP compared to open IHR. Within the same subset, significantly more patients recounted a shorter duration of acute postoperative groin pain after R-TAPP compared to laparoscopic IHR. Patients who did not take prescription analgesia medications preoperatively recalled significantly less acute postoperative groin pain and shorter disruption of physical activity 1 week after R-TAPP compared to laparoscopic and open IHR. The authors concluded that patient perception of pain and activity disruption differ by operative approach, suggesting advantages to a minimally invasive approach to IHR [3].

Reports on the efficacy of R-TAPP IHR, with its low prevalence of intraoperative complications and surgical site infections, are increasing but study heterogeneity remains an issue. Studies reporting of intraoperative complication and surgical site infection rates seem to have the lowest heterogeneity, while postoperative groin pain, same-day discharge, and overall complication rates have the highest heterogeneity [1]. This heterogeneity among studies represents another opportunity for authors, reviewers, and editors to improve standardized reporting of basic, necessary definitions and outcomes.

Constraints of heterogeneity among published reports of R-TAPP IHR suggest the need for standardized definitions of hernia-specific outcome metrics and requirements for reporting. It is the opinion of this author that studies reporting on the outcomes of IHR should define metrics clearly and according to convention, include pertinent patient characteristics, detail hernia-specific characteristics (hernia type, location, primary/recurrent, reducible/incarcerated, and defect size when applicable), mention critical operative elements (approach, mesh type, location, and size, as well as mesh fixation strategy, inclusion/exclusion of transversalis fascia plication, and adjuncts such as fibrin sealant or local anesthetics), and classify complications according to a valid classification system. When key criteria are not met sufficient to allow comparative analysis and interpretation of data, further modification of outcome reporting should occur prior to publication.

As more robotic surgical platforms enter the marketplace, there is likely to be a greater adoption of robotic-assisted IHR. It is imperative that surgeons who perform R-TAPP IHR (1) understand the relevant anatomy, (2) experience laparoscopic TAPP IHR, (3) establish competence with the robotic surgical platform, (4) achieve the Critical View of the Myopectineal Orifice, (5) appreciate biomechanical and physicodynamic properties of mesh implants, (6) ensure adequate mesh coverage of the myopectineal orifice as appropriate, (7) monitor clinical outcomes, and (8) compare individual outcomes for quality assurance. While the robotic surgical platform is an enabling technology, it is not a substitute for sound clinical judgement, meticulous operative technique, and diligent follow-up and outcomes reporting.

Compliance with ethical standards

Conflict of interest Dr. Bittner receives speaking/teaching honoraria from Intuitive Surgical, Inc. and BD, Inc. as well as consulting fees from Intuitive Surgical, Inc., BD, Inc., Cook Biotech, Inc., and CMR Surgical Ltd unrelated to this work.

Ethical approval This article does not contain any studies with human participants or animals performed by the author.

Human and animal rights This article does not contain any study with animals performed by the author.

Informed consent For this type of article informed consent is not required.

References

1. Aiolfi, A, Cavalli M, Micheletto G, et al (2019) Robotic inguinal hernia repair: is technology taking over? Systematic review and meta-analysis. Hernia. https://doi.org/10.1007/s10029-019-01965-1
2. Zayan NE, Meara MP, Schwartz JS, Narula VK (2019) A direct comparison of robotic and laparoscopic hernia repair: patient-reported outcomes and cost analysis. Hernia. https://doi.org/10.1007/s10029-019-01943-7
3. Bittner JG, Cesnik LW, Kirwan T, Wolf L, Guo D (2018) Patient perceptions of acute pain and activity disruption following inguinal hernia repair: a propensity-matched comparison of robotic-assisted, laparoscopic, and open approaches. J Robot Surg 12:625–632