Top dVP publications

Abboudi, H. K., M. S.; Aboumarzouk, O.; Guru, K. A.; Challacombe, B.; Dasgupta, P.; Ahmed, K. (2013). "Current status of validation for robotic surgery simulators a systematic review." BJU International **111**(2): 194-205.
http://www.ncbi.nlm.nih.gov/pubmed/22672340

What's known on the subject? and What does the study add? Little is known on how best to train the future generation of robotic surgeons. It has been postulated that virtual reality (VR) simulators may aid the progression along the learning curve for this rapidly developing surgical technique within a safe training environment. There are several simulators available on the market, the best known is that developed by Intuitive Surgical Inc. The present study provides the first systematic review of all the trails of the various VR robotic platforms. It explores the evidence supporting the effectiveness of the various platforms for feasibility, reliability, validity, acceptability, educational impact and cost-effectiveness. This article also highlights the deficiencies and future work required to advance robotic surgical training. To analyse studies validating the effectiveness of robotic surgery simulators. The MEDLINE ®, EMBASE® and PsycINFO® databases were systematically searched until September 2011. References from retrieved articles were reviewed to broaden the search. The simulator name, training tasks, participant level, training duration and evaluation scoring were extracted from each study. We also extracted data on feasibility, validity, cost-effectiveness, reliability and educational impact. We identified 19 studies investigating simulation options in robotic surgery. There are five different robotic surgery simulation platforms available on the market. In all, 11 studies sought opinion and compared performance between two different groups; 'expert' and 'novice'. Experts ranged in experience from 21-2200 robotic cases. The novice groups consisted of participants with no prior experience on a robotic platform and were often medical students or junior doctors. The Mimic dV-Trainer®, ProMIS®, SimSurgery Educational Platform® (SEP) and Intuitive systems have shown face, content and construct validity. The Robotic Surgical SimulatorTM system has only been face and content validated. All of the simulators except SEP have shown educational impact. Feasibility and cost-effectiveness of simulation systems was not evaluated in any trial. Virtual reality simulators were shown to be effective training tools for junior trainees. Simulation training holds the greatest potential to be used as an adjunct to traditional training methods to equip the next generation of robotic surgeons with the skills required to operate safely. However, current simulation models have only been validated in small studies. There is no evidence to suggest one type of simulator provides more effective training than any other. More research is needed to validate simulated environments further and investigate the effectiveness of animal and cadaveric training in robotic surgery. © 2012 BJU International.

Coelho, R. F. R., B.; Patel, M. B.; Orvieto, M. A.; Chauhan, S.; Ficarra, V.; Melegari, S.; Palmer, K. J.; Patel, V. R. (2010). "Retropubic, Laparoscopic, and Robot-Assisted Radical Prostatectomy: A Critical Review of Outcomes Reported by High-Volume Centers." Journal of Endourology.
http://www.ncbi.nlm.nih.gov/pubmed/20942686

Abstract Purpose: To critically review perioperative outcomes, positive surgical margin (PSM) rates, and functional outcomes of several large series of retropubic radical

prostatectomy (RRP), laparoscopic RP (LRP), and robot-assisted radical prostatectomy (RARP) currently available in the literature. Methods: A Medline database search was performed from November 1994 to May 2009, using medical subject heading search terms “prostatectomy” and “Outcome Assessment (Health Care)” and text words “retropubic,” “robotic,” and “laparoscopic.” Only studies with a sample size of 250 or more patients were considered. Weighted means were calculated for all outcomes using the number of patients included in each study as the weighing factor. Results: We identified 30 articles for RRP, 14 for LRP, and 14 for RARP. The mean intraoperative and postoperative RRP transfusion rates for RRP, LRP, and RARP were 20.1%, 3.5%, and 1.4%, respectively. The weighted mean postoperative complication rates for RRP, LRP, and RARP were 10.3% (4.8% to 26.9%), 10.98% (8.9 to 27.7%), and 10.3% (4.3% to 15.7%), respectively. RARP revealed a mean overall PSM rate of 13.6%, whereas LRP and RRP yielded a PSM of 21.3% and 24%, respectively. The weighted mean continence rates at 12 month follow-up for RRP, LRP, and RARP were 79%, 84.8%, and 92%, respectively. The weighted mean potency rates for patients who underwent unilateral or bilateral nerve sparing, at 12 month follow-up, were 43.1% and 60.6% for RRP, 31.1% and 54% for LRP, and 59.9% and 93.5% for RARP. Conclusion: RRP, LRP, and RARP performed in high-volume centers are safe options for treatment of patients with localized prostate cancer, presenting similar overall complication rates. LRP and RARP, however, are associated with decreased operative blood loss and decreased risk of transfusion when compared with RRP. Our analysis including high-volume centers also showed lower weighted mean PSM rates and higher continence and potency rates after RARP compared with RRP and LRP. However, the lack of randomized trials precludes definitive conclusions.

Liu, J. J., et al. (2013). "Perioperative Outcomes for Laparoscopic and Robotic Compared With Open Prostatectomy Using the National Surgical Quality Improvement Program (NSQIP) Database." Urology **82**(3): 579-583.
http://www.ncbi.nlm.nih.gov/pubmed/23876584

OBJECTIVE: To examine contemporary outcomes of minimally invasive radical prostatectomy (MIRP) compared with open prostatectomy, using a national, prospective perioperative database reflecting diverse practice settings. METHODS: The National Surgical Quality Improvement Program database was queried from 2005 to 2010 for laparoscopic or robotic prostatectomy (Current Procedural Terminology code 55866) and open retropubic prostatectomy (Current Procedural Terminology codes 55840, 55842, 55845). Perioperative outcomes examined were surgical and total operation duration, transfusion rates, length of stay, major morbidity (cardiovascular, pulmonary, renal, and infectious), and mortality. RESULTS: The study identified 5319 radical prostatectomies: 4036 MIRP and 1283 open. Although operative time was significantly longer in the MIRP group, there were significantly fewer perioperative blood transfusions and shorter mean length of stay. Major postoperative morbidity and mortality were 5% in the MIRP group and 9% in the open group (P <.001). Age, body mass index, presence of medical comorbidities, and open surgical technique were all independently predictive of major complications and mortality on multivariate analysis. CONCLUSION: In a nationwide database of diverse medical centers, MIRP was associated with longer operative time, but a significantly decreased rate of blood transfusions, length of stay, perioperative complication rate, and mortality compared with open prostatectomy. The minimally

invasive surgical approach was independently associated with significantly fewer complications and deaths on multivariate analysis. Compared with other administrative databases that capture only inpatient events, the National Surgical Quality Improvement Program identifies complications up to 30 days postoperatively, providing more detailed characterization of complications after prostatectomy. These data reflect contemporary practice patterns and suggest that MIRP can be performed with low perioperative morbidity.

Ploussard, G. d. l. T., A.; Moulin, M.; Vordos, D.; Hoznek, A.; Abbou, C. C.; Salomon, L. (2012). "Comparisons of the Perioperative, Functional, and Oncologic Outcomes After Robot-Assisted Versus Pure Extraperitoneal Laparoscopic Radical Prostatectomy." European Urology.
www.ncbi.nlm.nih.gov/pubmed/23245815

Background: In spite of the increasing use of robot-assisted radical prostatectomy (RALP) worldwide, no level 1 evidence-based benefit favouring RALP versus pure laparoscopic approaches has been demonstrated in extraperitoneal laparoscopic procedures. Objective: To compare the operative, functional, and oncologic outcomes between pure laparoscopic radical prostatectomy (LRP) and RALP. Design, setting, and participants: From 2001 to 2011, 2386 extraperitoneal LRPs were performed consecutively in cases of localised prostate cancers. Intervention: A total of 1377 LRPs and 1009 RALPs were performed using an extraperitoneal approach. Outcome measurements and statistical analysis: Patient demographics, surgical parameters, pathologic features, and functional outcomes were collected into a prospective database and compared between LRP and RALP. Biochemical recurrence-free survival was tested using the Kaplan-Meier method. Mean follow-up was 39 and 15.4 mo in the LRP and RALP groups, respectively. Results and limitations: Shorter durations of operative time and of hospital stay were reported in the RALP group compared with the LRP group ($p < 0.001$) even beyond the 100 first cases. Mean blood loss was significantly lower in the RALP group ($p < 0.001$). The overall rate and the severity of the complications did not differ between the two groups. In pT2 disease, lower rates of positive margins were reported in the RALP group ($p = 0.030$; odds ratio [OR]: 0.396) in multivariable analyses. The surgical approach did not affect the continence recovery. Robot assistance was independently predictive for potency recovery ($p = 0.045$; OR: 5.9). Survival analyses showed an equal oncologic control between the two groups. Limitations were the lack of randomisation and the short-term follow-up. Conclusions: Robotic assistance using an extraperitoneal approach offers better results than pure laparoscopy in terms of operative time, blood loss, and hospital stay. The robotic approach independently improves the potency recovery but not the continence recovery. When strict indications of nerve-sparing techniques are respected, RALP gives better results than LRP in terms of surgical margins in pathologically organ-confined disease. Longer follow-up is justified to reach conclusions on oncologic outcomes. © 2012 European Association of Urology.

Porpiglia, F. M., I.; Lucci Chiarissi, M.; Manfredi, M.; Mele, F.; Grande, S.; Ragni, F.; Poggio, M.; Fiori, C. (2012). "Randomised Controlled Trial Comparing Laparoscopic and Robot-assisted Radical Prostatectomy." European Urology.
http://www.ncbi.nlm.nih.gov/pubmed/22840353

Background: The advantages of robot-assisted radical prostatectomy (RARP) over laparoscopic radical prostatectomy (LRP) have rarely been investigated in randomised controlled trials. Objective: To compare RARP and LRP in terms of the functional,

perioperative, and oncologic outcomes. The main end point of the study was changes in continence 3 mo after surgery. Design, setting, and participants: From January 2010 to January 2011, 120 patients with organ-confined prostate cancer were enrolled and randomly assigned (using a randomisation plan) to one of two groups based on surgical approach: the RARP group and the LRP group. Intervention: All RARP and LRP interventions were performed with the same technique by the same single surgeon. Outcome measurements and statistical analysis: The demographic, perioperative, and pathologic results, such as the complications and prostate-specific antigen (PSA) measurements, were recorded and compared. Continence was evaluated at the time of catheter removal and 48 h later, and continence and potency were evaluated after 1, 3, 6, and 12 mo. The student t test, Mann-Whitney test, χ 2 test, Pearson χ 2 test, and multiple regression analysis were used for statistics. Results and limitations: The two groups (RARP: n = 60; LRP: n = 60) were comparable in terms of demographic data. No differences were recorded in terms of perioperative and pathologic results, complication rate, or PSA measurements. The continence rate was higher in the RARP group at every time point: Continence after 3 mo was 80% in the RARP group and 61.6% in the LRP group (p = 0.044), and after 1 yr, the continence rate was 95.0% and 83.3%, respectively (p = 0.042). Among preoperative potent patients treated with nerve-sparing techniques, the rate of erection recovery was 80.0% and 54.2%, respectively (p = 0.020). The limitations included the small number of patients. Conclusions: RARP provided better functional results in terms of the recovery of continence and potency. Further studies are needed to confirm our results. © 2012.

Robertson, C., et al. (2013). "Relative effectiveness of robot-assisted and standard laparoscopic prostatectomy as alternatives to open radical prostatectomy for treatment of localised prostate cancer: a systematic review and mixed treatment comparison meta-analysis." BJU International **112**(6): 798-812.
http://www.ncbi.nlm.nih.gov/pubmed/23890416

OBJECTIVE: To compare the effectiveness of robot-assisted and standard laparoscopic prostatectomy. METHODS: A care pathway was described. We performed a systematic literature review based on a search of Medline, Medline in Process, Embase, Biosis, Science Citation Index, Cochrane Controlled Trials Register, Current Controlled Trials, Clinical Trials, WHO International Clinical Trials Registry and NIH Reporter, the Health Technology Assessment databases, the Database of Abstracts of Reviews of Effects, and relevant conference abstracts up to 31st October 2010). Additionally, reference lists were scanned, an expert panel consulted, and websites of manufacturers, professional organisations, and regulatory bodies were checked. We selected randomised controlled trials (RCTs) and non-randomised comparative studies, published after 1st January 1995, including men with localised prostate cancer undergoing robot-assisted or laparoscopic prostatectomy compared with the other procedure or with open prostatectomy. Studies where at least 90% of included men had clinical tumour stages T1 to T2 and which reported at least one of our specified outcomes were eligible for inclusion. A mixed-treatment comparison meta-analysis was performed to generate comparative statistics on specified outcomes. RESULTS: We included data from 19 064 men across one RCT and 57 non-randomised comparative reports. Robotic prostatectomy had a lower risk of major intra-operative harms such as organ injury [0.4% robotic vs 2.9% laparoscopic], odds ratio ([OR] {95% credible interval [CrI]} 0.16 [0.03 to 0.76]), and a lower rate of surgical margins positive for cancer [17.6% robotic vs 23.6% laparoscopic], OR [95% CrI] 0.69 [0.51 to 0.96]).

There was no evidence of a difference in the proportion of men with urinary incontinence at 12 months (OR [95% CrI] 0.55 [0.09 to 2.84]). There were insufficient data on sexual dysfunction. Surgeon learning rates for the procedures did not differ, although data were limited. CONCLUSIONS: Men undergoing robotic prostatectomy appear to have reduced surgical morbidity, and a lower risk of a positive surgical margin, which may reduce rates of cancer recurrence and the need for further treatment, but considerable uncertainty surrounds these results. We found no evidence that men undergoing robotic prostatectomy are disadvantaged in terms of early outcomes. We were unable to determine longer-term relative effectiveness.

Tewari, A. S., P.; Bloch, D. A.; Seshadri-Kreaden, U.; Hebert, A. E.; Wiklund, P. (2012). "Positive Surgical Margin and Perioperative Complication Rates of Primary Surgical Treatments for Prostate Cancer: A Systematic Review and Meta-Analysis Comparing Retropubic, Laparoscopic, and Robotic Prostatectomy." European Urology **62**(1): 1-15.
http://www.ncbi.nlm.nih.gov/pubmed/22405509

Context: Radical prostatectomy (RP) approaches have rarely been compared adequately with regard to margin and perioperative complication rates. Objective: Review the literature from 2002 to 2010 and compare margin and perioperative complication rates for open retropubic RP (ORP), laparoscopic RP (LRP), and robot-assisted LRP (RALP). Evidence acquisition: Summary data were abstracted from 400 original research articles representing 167 184 ORP, 57 303 LRP, and 62 389 RALP patients (total: 286 876). Articles were found through PubMed and Scopus searches and met a priori inclusion criteria (eg, surgery after 1990, reporting margin rates and/or perioperative complications, study size >25 cases). The primary outcomes were positive surgical margin (PSM) rates, as well as total intra- and perioperative complication rates. Secondary outcomes included blood loss, transfusions, conversions, length of hospital stay, and rates for specific individual complications. Weighted averages were compared for each outcome using propensity adjustment. Evidence synthesis: After propensity adjustment, the LRP group had higher positive surgical margin rates than the RALP group but similar rates to the ORP group. LRP and RALP showed significantly lower blood loss and transfusions, and a shorter length of hospital stay than the ORP group. Total perioperative complication rates were higher for ORP and LRP than for RALP. Total intraoperative complication rates were low for all modalities but lowest for RALP. Rates for readmission, reoperation, nerve, ureteral, and rectal injury, deep vein thrombosis, pneumonia, hematoma, lymphocele, anastomotic leak, fistula, and wound infection showed significant differences between groups, generally favoring RALP. The lack of randomized controlled trials, use of margin status as an indicator of oncologic control, and inability to perform cost comparisons are limitations of this study. Conclusions: This meta-analysis demonstrates that RALP is at least equivalent to ORP or LRP in terms of margin rates and suggests that RALP provides certain advantages, especially regarding decreased adverse events. © 2012 European Association of Urology.

Trinh, Q. D. S., J.; Sun, M.; Ravi, P.; Ghani, K. R.; Bianchi, M.; Jeong, W.; Shariat, S. F.; Hansen, J.; Schmitges, J.; Jeldres, C.; Rogers, C. G.; Peabody, J. O.; Montorsi, F.; Menon, M.; Karakiewicz, P. I. (2012). "Perioperative Outcomes of Robot-Assisted Prostatectomy Compared With Open Radical Prostatectomy: Results From the Nationwide Inpatient Sample." European Urology **61**(4): 679-685.
http://www.ncbi.nlm.nih.gov/pubmed/22206800

Background: Prior to the introduction and dissemination of robot-assisted radical prostatectomy (RARP), population-based studies comparing open radical prostatectomy (ORP) and minimally invasive radical prostatectomy (MIRP) found no clinically significant difference in perioperative complication rates. Objective: Assess the rate of RARP utilization and reexamine the difference in perioperative complication rates between RARP and ORP in light of RARP's supplanting laparoscopic radical prostatectomy (LRP) as the most common MIRP technique. Design, setting, and participants: As of October 2008, a robot-assisted modifier was introduced to denote robot-assisted procedures. Relying on the Nationwide Inpatient Sample between October 2008 and December 2009, patients treated with radical prostatectomy (RP) were identified. The robot-assisted modifier (17.4x) was used to identify RARP (n = 11 889). Patients with the minimally invasive modifier code (54.21) without the robot-assisted modifier were classified as having undergone LRP and were removed from further analyses. The remainder were classified as ORP patients (n = 7389). Intervention: All patients underwent RARP or ORP. Measurements: We compared the rates of blood transfusions, intraoperative and postoperative complications, prolonged length of stay (pLOS), and in-hospital mortality. Multivariable logistic regression analyses of propensity score-matched populations, fitted with general estimation equations for clustering among hospitals, further adjusted for confounding factors. Results and limitations: Of 19 462 RPs, 61.1% were RARPs, 38.0% were ORPs, and 0.9% were LRPs. In multivariable analyses of propensity score-matched populations, patients undergoing RARP were less likely to receive a blood transfusion (odds ratio [OR]: 0.34; 95% confidence interval [CI], 0.28-0.40), to experience an intraoperative complication (OR: 0.47; 95% CI, 0.31-0.71) or a postoperative complication (OR: 0.86; 95% CI, 0.77-0.96), and to experience a pLOS (OR: 0.28; 95% CI, 0.26-0.30). Limitations of this study include lack of adjustment for tumor characteristics, surgeon volume, learning curve effect, and longitudinal follow-up. Conclusions: RARP has supplanted ORP as the most common surgical approach for RP. Moreover, we demonstrate superior adjusted perioperative outcomes after RARP in virtually all examined outcomes.