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ORIGINAL ARTICLE

Rating surgical skill in robotic prostatectomy as adherence to the surgical plan: proposal for a new tool (ScAPSA)

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ABSTRACT

BACKGROUND: The plethora of instruments (trifecta, pentafecta, etc.) used to evaluate the outcomes of robotic prostatectomy (RARP) has recently been subjected to criticism. In this paper, a novel approach called ScAPSA (Scoring Adherence to Prostatic Surgical Aims) is proposed to assess surgical proficiency, considering surgical success as perfect adherence to a correct surgical plan, and not related solely to clinical outcomes.

METHODS: In order to define (and quantify) such adherence, and to evaluate both learning curves and surgeons' skill, a 20-point scoring system has been developed. The specific surgical plan (improved with predictive tools) is compared with pathological findings to identify any surgical errors. Adding data on postoperative complications, a score from 0 (better) to 20 (worst surgical result) can easily be calculated. Considering the number of reported cases needed to complete the RARP learning curve, we decided to analyze the first 25 consecutive single-surgeon RARPs.

RESULTS: Testing ScAPSA on the first consecutive (initial learning curve) single-surgeon RARPs confirmed that this tool can faithfully describe and quantify both learning curves and surgical skill.

CONCLUSIONS: ScAPSA may represent a useful novel tool, not only for describing RARP learning curves objectively, but also for determining and quantifying success rates, allowing surgeons to check intra-operative errors and monitor their own surgical proficiency.

Further external validations are needed to confirm these results.

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Key words: Prostatic neoplasms - Computer-assisted surgery - Learning curve.

In the literature, the definition of successful radical prostatectomy (RP) (but this concept could be extended to all surgical fields) is often limited to good outcomes, such as low rates of biochemical recurrence, good urinary continence, perfect potency, and absence of major post-operative complications. Although several studies have validated the use of the trifecta [1] and pentafecta [2] approaches in evaluating RP outcomes, these systems have recently been subjected to criticism. Collins *et al*. wrote: "The trifecta and pentafecta terminology is a victim of its own success, becoming a definition without any real meaning".[3] Other approaches, such as the Survival, Continence and Potency (SCP) Classification,[4] have also been proposed, trying to quantify success, each with its own advantages and disadvantages.

We feel that these kinds of approaches are incorrect if the aim is to assess surgical pro-

ficiency: in our opinion, surgical success is perfect adherence to a correct surgical plan. For example, erectile dysfunction after robotic radical prostatectomy (RARP) may be considered a poor result in a pre-operatively potent young man with a cT1c Gleason 6 prostate cancer, but a good outcome in a 70-year-old man with an International Index of Erectile Function – 5 (IIEF-5) of 2 and a high-risk adenocarcinoma. And how can we define the outcome for a potent man (with a cT3b Gleason 8 cancer and bilaterally positive intraoperative frozen sections at the level of neurovascular bundles [NBs]), treated with a non-nerve-sparing approach, and postoperatively reporting normal erections, when the pathological slides demonstrate the absence of NBs in the definitive specimens? This was a success for the patient, but not for the disease.

Success depends on a surgical plan, surgical intent, surgical action and a pathological result. The concepts of "learning curve" and "surgical skill" also appear to be closely related to this idea of "surgical success".

The question is how to define (and quantify) adherence to a surgical plan, in order to evaluate a surgeon's acquired skills and learning curve, avoiding the analysis of functional outcomes such as potency/continence, and instead focusing the attention only on the pathological outcomes.

The development of the novel method called ScAPSA (Scoring Adherence to Prostatic Surgical Aims) involves complete deconstruction and analysis of the surgical plan and evaluation of specific skills and tasks involved in performing RARP.

Materials and methods

ScAPSA is based on comparison of an accurate pre-operative step-by-step surgical plan with specific pathological findings. According to very accurate prognostic nomograms,[5] the

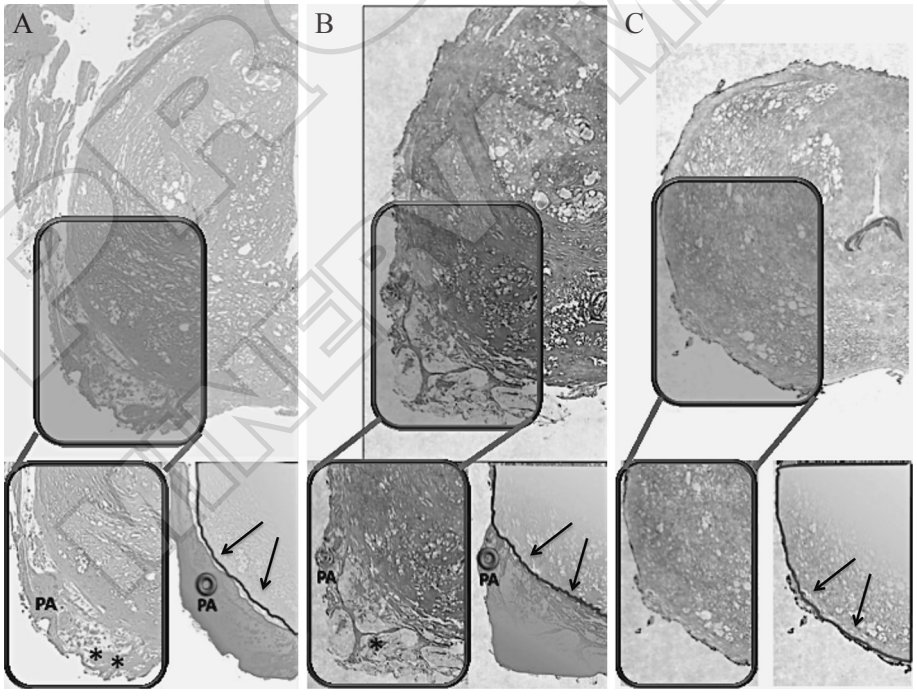

Figure 1.—Pathological gradation of nerve-sparing quality of the procedure (evaluating area of residual nerve tissue on postero-lateral aspect at mid-prostate level): A) non-nerve-sparing: when neurovascular bundle (orange area) is completely removed; microscope slide shows presence of extensive nerve tissue (*), lateral to prostatic artery (PA); B) partially nerve-sparing: incision is made immediately lateral to PA; PA occupies the most lateral margin of microscope slide (note pearly areolar tissue containing few neural elements (*); C) completely nerve-sparing: incision is made immediately lateral to prostatic fascia; microscope slide shows presence of prostatic fascia (arrow); note absence of neuro-vascular tissue.

surgeon pre-operatively defines the specific indication of completely or partially preserving each NB (using the Prostatic Artery as a landmark),[6] or not for each side; the pathologist then describes the state of NB preservation, specifying for each side if it is complete, partial or absent (Figure 1).

Only in the case of a change of plan due to a positive intra-operative frozen section of margins can the surgeon modify the pre-operative surgical strategy, reporting the new plan on the ScAPSA form.

Starting from these considerations, a specific score is assigned (Figure 2):

— 0 (green): target completely achieved;

— 1 (yellow): target partially achieved;

— 2 (red): errors (no preservation when it was indicated, or vice versa).

Pathological analysis also stresses the presence of positive surgical margins (PSM) in the context of NBs or other sites, and capsular incisions. Scoring for PSM is related to the gravity of error: PSM in the context of an NB spared when there was no indication to preserve it represents a grave error (score up to 4 points).

The presence of a PSM with an intracapsular disease (pT2) is also a serious error, scored with 2 extra points. Another domain to be considered is the occurrence of major post-

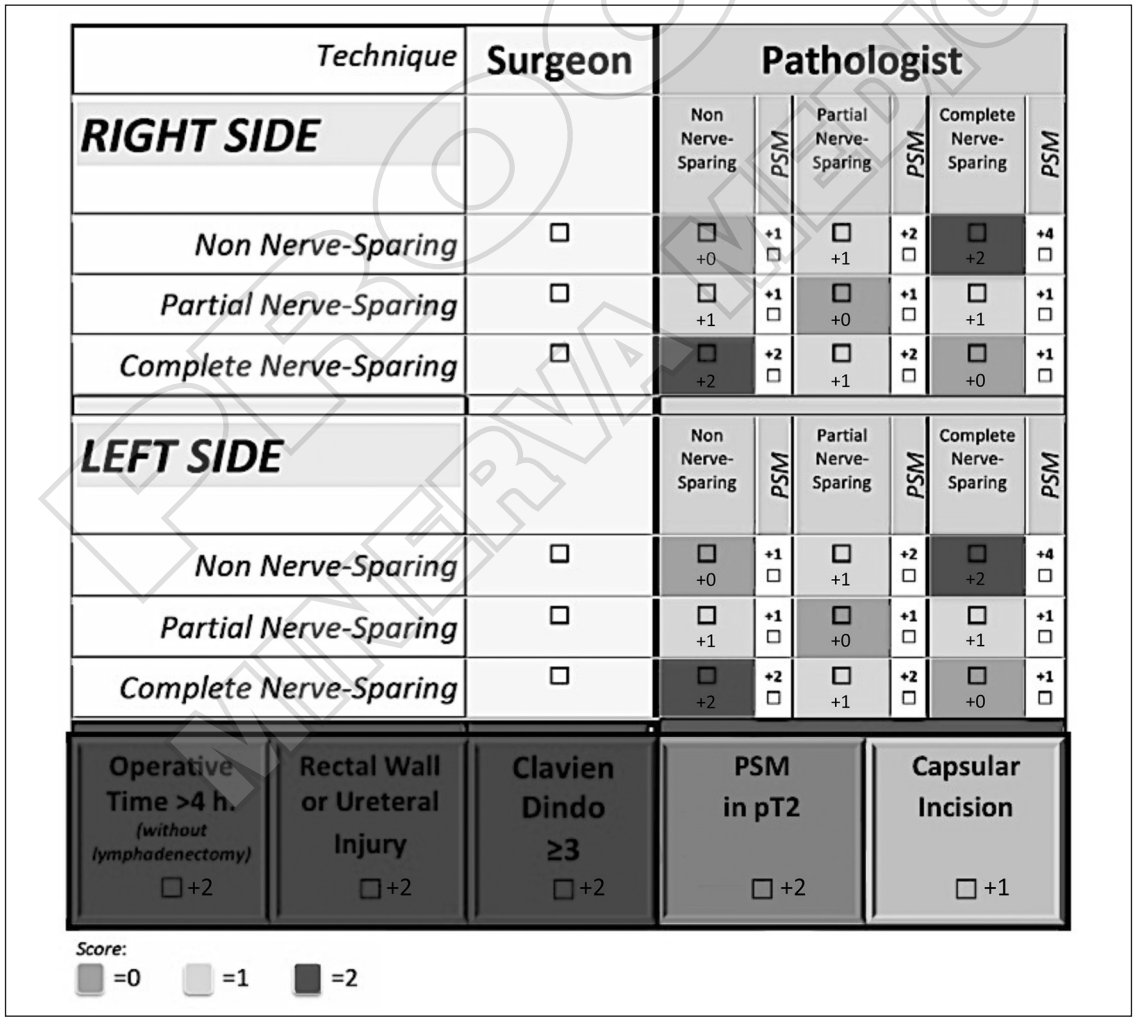

Figure 2.—ScAPSA Form and Scoring System.

operative complications (grades 3-4 according to the Dindo classification),[7] scored by adding 2 points. We decided to assess these degrees of complications according to previous similar experiences reported in the literature.[4] Other domains are a rectal wall or ureteral injury (2 points), an operative time (not considering pelvic lymphadenectomy) >4 hours (2 points) and a capsular incision (1 point).

In order to test the ScAPSA tool, we performed a prospective analysis on the first consecutive RARP performed by a naïve surgeon. According to the experiences reported in the literature, the number of RARPs needed to complete the specific learning curve is about 20.[8] As a result, we calculated that at least 20 cases evaluated with ScAPSA were required to determine the test significance.

Results

Summing all points, we can describe the success of RARP with scores ranging from 0 (the best possible performance) to 20 (the worst). These scores can also be used to provide summary feedback on overall performance and to indicate the skill levels attained.

To test the ScAPSA tool, 25 initial consecutive cases of RARP performed by the same naïve robotic surgeon were prospectively analyzed (time period: 4 months), comparing pre-operative surgical plan strategy and pathological findings evaluated by the same pathologist (MG). The graphic depiction of ScAPSA (Figure 3) demonstrates a downward trend in scores, quantifying the learning curve and the progressive acquisition of surgical proficiency. The subdivision of scores into specific items also confirms an upward trend increase in the adherence to the surgical plan.

Discussion

We decided not to include postoperative potency and continence in the parameters assessed, because several components involved in these problems do not depend on surgical skill. Indeed, the aim of this novel tool is not to analyze clinical outcomes, but only to assess surgical proficiency, evaluating adherence to the pre-operative surgical plan and using pathological findings to confirm it.

Although learning curves are commonly assessed with operative time as a surrogate, assuming that these times improve as the surgeon becomes more skillful, variations in patient anatomy, operative conditions, and many other factors (partly also due to the surgeon's per-

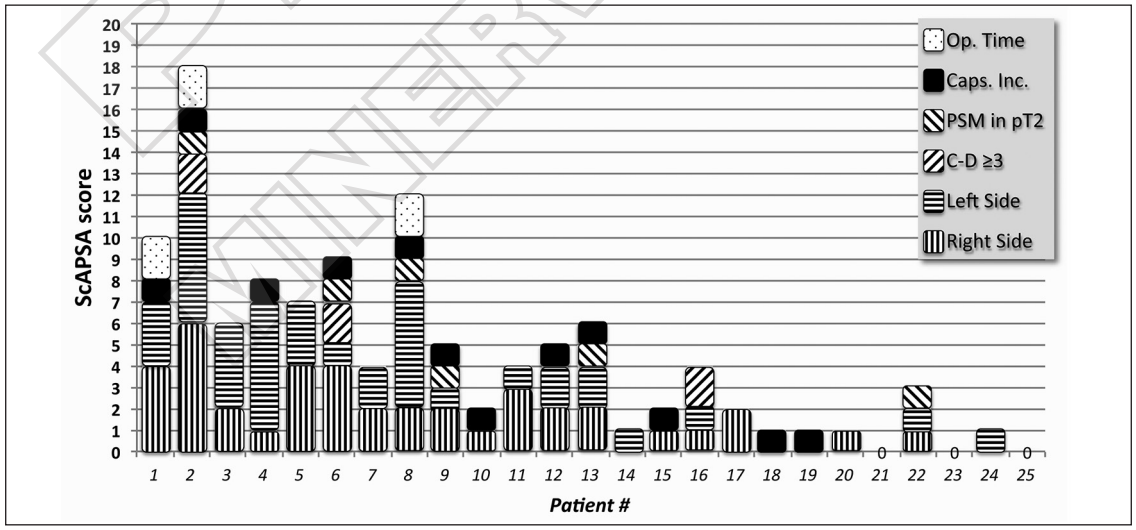

Figure 3.—Graphic depiction of ScAPSA scores (with subdivision into specific items) in the first 25 consecutive RARPs performed by a single surgeon.
Op. Time: operative time; Caps. Inc.: capsular incision; PSM: positive surgical margins; C-D: Clavien-Dindo score.

sonality) make each clinical situation different from the next and introduce inherent variability into the evaluation of operative time. It was for this reason that only an operative time >4 hours (considered without lymphadenectomy) was scored in the assessment tool by adding 2 points.

ScAPSA could really represent a novel tool, useful not only to describe each single RARP learning curve objectively, but also to determine and quantify success rates, allowing each surgeon to know whether intraoperative technique was good or bad. This is the main innovative point of ScAPSA in comparison with the other instruments (such as Trifecta, Pentafecta, SCP, etc.) used to evaluate skill in terms of outcomes.[9-12] According to the critical problems recently reported by Vickers, ScAPSA could be the ideal tool to quantify surgical proficiency and "to improve the performance of surgeons who have poor outcomes either because they are early in the learning curve or because of persistent errors in technique or judgment" in RARP.[13]

Conclusions

Further external validations by multiple surgeons with various levels of skill are needed to confirm these results and perhaps to rebalance the weights/scores of single items, avoiding bias related to testing on a small number of RARPs performed by a single surgeon.

References

1. Bianco Jr FJ, Scardino PT, Eastham JA. Radical prostatectomy: long-term cancer control and recovery of sexual and urinary function ("trifecta"). Urology 2005;66:83-94.
2. Patel VR, Sivaraman A, Coelho RF, Chauhan S, Palmer KJ, Orvieto MA, *et al*. Pentafecta: a new concept for reporting outcomes of robot-assisted laparoscopic radical prostatectomy. Eur Urol 2011;59:702-7.
3. Collins JW, Hosseini A, Wiklund PN. Validated comprehensive outcome measures will aid regulation. Eur Urol 2014;66:398-400.
4. Ficarra V, Sooriakumaran P, Novara G, Schatloff O, Briganti A, Van der Poel H, *et al*. Systematic review of methods for reporting combined outcomes after radical prostatectomy and proposal of a novel system: the Survival, Continence, and Potency (SCP) Classification. Eur Urol 2012;61:541-8.
5. Cooperberg MR, Pasta DJ, Elkin EP, Litwin MS, Latini DM, Du Chane J, *et al*. The University of California, San Francisco Cancer of the Prostate Risk Assessment score: a straightforward and reliable preoperative predictor of disease recurrence after radical prostatectomy. J Urol 2005;173:1938-42.
6. Patel VR, Schatloff O, Chauhan S, Sivaraman A, Valero R, Coelho RF, *et al*. The role of the prostatic vasculature as a landmark for nerve sparing during robot-assisted radical prostatectomy. Eur Urol 2012;61:571-6.
7. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205-13.
8. Artibani W, Fracalanza S, Cavalleri S, Iafrate M, Aragona M, Novara G, *et al*. Learning curve and preliminary experience with da Vinci-Assisted Laparoscopic Radical Prostatectomy. Urol Int 2008;80:237-44.
9. Klein EA, Bianco FJ, Serio AM, Eastham JA, Kattan MW, Pontes JE. Surgeon experience is strongly associated with biochemical recurrence after radical prostatectomy for all preoperative risk categories. J Urol 2008;179:2212-7.
10. Vickers AJ, Bianco FJ, Serio AM, Eastham JA, Schrag D, Klein EA, *et al*. The surgical learning curve for prostate cancer control after radical prostatectomy. J Natl Cancer Inst 2007;99:1171-7.
11. Leroy TJ, Thiel DD, Duchene DA, Parker AS, Igel TC, Wehle MJ, *et al*. Safety and peri-operative outcomes during learning curve of robot-assisted laparoscopic prostatectomy: a multi-institutional study of fellowship-trained robotic surgeons versus experienced open radical prostatectomy surgeons incorporating robot-assisted laparoscopic prostatectomy. J Endourol 2010;24:1665-9.
12. Thompson JE, Egger S, Böhm M, Haynes AM, Matthews J, Rasiah K, *et al*. Superior quality of life and improved surgical margins are achievable with robotic radical prostatectomy after a long learning curve: a prospective single-surgeon study of 1552 consecutive cases. Eur Urol 2014;65:521-31.
13. Vickers AJ. What are the implications of the surgical learning curve? Eur Urol 2014;65:532-3.

Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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