Objective preoperative parameters predict difficult pelvic dissections and clinical outcomes

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ABSTRACT

Background: Objective criteria to predict difficult pelvic dissection with prognostic significance are lacking. Previous studies have focused on predicting intraoperative conversion and not evaluated factors specific to pelvic surgery. We aimed to develop an objective, prognostic, preoperative assessment to predict difficult pelvic dissections and clinical outcomes. Such a model is much needed, may facilitate objective comparisons between rectal cancer centers, or may serve as a stratification variable in clinical trials.

Materials and methods: Patients who underwent low anterior resection or abdominoperineal resection for rectal cancer within 10 cm of the anal verge (2009-2014) were retrospectively analyzed. Procedures were categorized into "routine" or "difficult" based on predefined criteria. All patients underwent 14 measurements on preoperative imaging. Outcomes were compared between the two groups. Stepwise multivariate logistic regression was used to develop the prediction model, which was validated in an independent data set.

Results: Of the 280 patients analyzed, 80 fulfilled the inclusion criteria. Baseline characteristics were similar except for more males having a "difficult" pelvis. "Difficult" patients were significantly more likely to have a narrower pelvis, smaller pelvic volumes, a longer pelvis, more curved sacrum, and more acute anorectal angle. Difficult cases correlated significantly with higher blood loss, hospital costs, longer operative time, and length of stay. A practical model to predict difficult pelvic dissections was created and included male gender, previous radiation, and length from promontory to pelvic floor > 130 mm. Model validation was performed in 40 patients from an independent data set.

Conclusions: An objective, validated model that predicts a difficult pelvic dissection and associated worse clinical outcome is possible.

Introduction

Pelvic surgery is inherently more difficult than surgery within the abdominal cavity proper due to bony confines, depth, angulation, and poor visualization.[1,2] Furthermore, most low pelvic dissections are performed for rectal cancer requiring total mesorectal excision and low anastomosis when feasible. Finally, pelvic surgery–specific complications can include presacral venous bleeding and/or injuries to adjacent structures including the ureter, bladder, prostate, vagina, autonomic nerves, and iliac vessels.[1,2] Taken together, these factors lead to longer operative times with higher costs and complication rates when compared with colon surgery.[3,4] This can be somewhat mitigated by surgical training and hospital volume, as better long- and short-term outcomes for proctectomy are achieved at high-volume hospitals by high-volume surgeons with colorectal specialization.[5,6] Interestingly, even minimally invasive surgical techniques such as laparoscopy and robotic surgery that were forwarded as aids in surgical approaches to the deep pelvis have failed to yet demonstrate noninferiority to the open approach in randomized, clinical trials.[7-9] To potentially predict adverse clinical outcomes, a clinically applicable prediction model is necessary for difficult pelvic dissections.

The ability to preoperatively predict a difficult pelvic dissection is not straightforward. Gender, body mass index (BMI), pelvic diameter, and tumor size have all been previously identified as independent predictors for morbidity in pelvic surgery.[10-15] However, reproducibly objective, anatomic criteria with prognostic significance are lacking. Previous studies have not evaluated factors specific to pelvic surgery, which has its distinct challenges, and have mostly focused on predicting intraoperative conversion.[10-15] As outcomes are tied to surgical challenges, this deficiency in objective criteria for identification and preoperative prediction of the difficult pelvic dissection needs to be addressed but does not allow for full comparisons of surgical outcomes among surgeons and institutions. Such a tool is also needed for objective outcome comparisons between rectal cancer centers and to serve as a complexity-stratification variable in rectal cancer trials. Thus, this study aimed to develop a comprehensively objective, preoperative clinical and radiological assessment tool that is predictive of difficult pelvic dissection cases and associated worsened outcomes.

Materials and methods

Patient selection and categorization (routine versus difficult case)

Patients who underwent a low anterior resection (LAR) or abdominoperineal resection (APR) for a rectal cancer within 10 cm of the anal verge between January 2009 and January 2016 at the University of Florida were eligible for inclusion to this retrospective matched case–control study (Fig. 1). All procedures were done by one of the three high-volume, colorectal-trained, and board-certified surgeons. The decision to perform an LAR or APR was based on the tumor
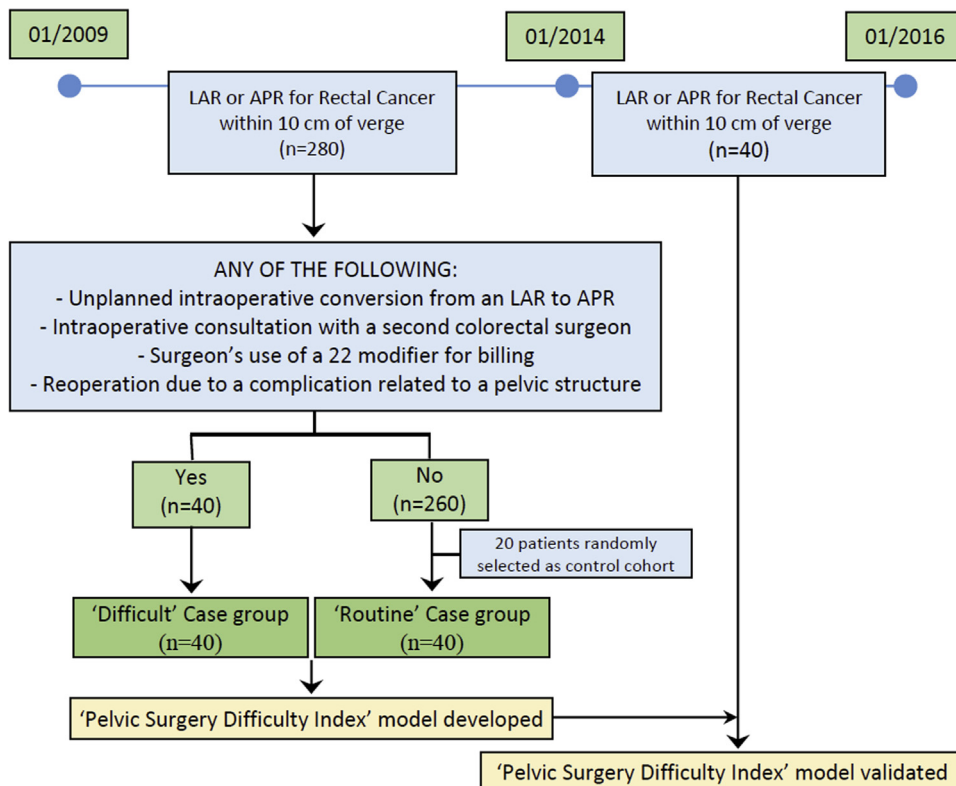

Fig. 1 — CONSORT diagram detailing patient inclusion in the study. (Color version of figure is available online.)