

Development and Validation of a Mental Practice Tool for Total Abdominal Hysterectomy

Said S. Saab, MD, MPhil,* Jamie Bastek, MD, MSCE,* Sandra Dayaratna, MD,†
Ellyn Hutton, BSN, RN,‡ and Catherine R. Salva, MD*

*Department of OBGYN, Hospital of the University of Pennsylvania, Philadelphia, Philadelphia; †Department of OBGYN, Thomas Jefferson University Hospital, Philadelphia, Philadelphia; and ‡Wellness Within LLC, Wilmington, Delaware

OBJECTIVE: Total abdominal hysterectomy (TAH) is a common operation performed by obstetrician-gynecologists. Training opportunities for this procedure are declining. Mental practice (MP), the use of mental imagery to rehearse a task symbolically before performance, has been used successfully in sports and music to enhance skill. This strategy demonstrates benefit in existing surgical education literature. We aimed to develop and validate a MP tool (MPT) for resident training in TAH.

DESIGN: A prospective survey study was performed in a large, urban, academic medical center in Philadelphia, Pennsylvania, USA. A MPT was developed by guiding expert surgeons through a cognitive walk-through of TAH to identify key procedural cues. For validation, a convenience sample of 22 residents and attendings ($N = 11$ per group) mentally rehearsed TAH. Motivation, confidence, quality of imagery, and utility of the activity were assessed with a previously validated Mental Imagery Questionnaire (MIQ) before and after exposure to the MPT.

RESULTS: Residents, but not attendings, found MP to be useful in preparation for surgery (residents, $p = 0.01$; attendings, $p = 0.34$) and had increased confidence following this exercise (residents, $p = 0.01$; attendings, $p = 0.08$). Significant improvement in global imagery score after use of the tool was shown by residents ($p = 0.01$) but not by the attendings ($p = 0.08$), with residents having lower imagery skills than attendings both pre-MP and post-MP. Reliability testing of the MIQ indicated internal consistency (pre-MPT, 0.91; post-MPT, 0.90).

CONCLUSIONS: MP may serve as a potentially effective, portable, and inexpensive resident surgical training tool in

preparation for TAH. Attendings may benefit from certain aspects of MP. The MIQ may serve as a measure of imagery skills in future experiments of MP in preparation for surgery. (J Surg Ed ■■■-■■■. ©2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: mental practice, imagery, abdominal hysterectomy, surgical education, gynecology

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INTRODUCTION

The provision of quality and high-volume surgical training across obstetrics and gynecology (OBGYN) programs remains a challenge. Work-hour restrictions and increasing availability of minimally invasive technologies have led, in part, to decreasing numbers of surgical training opportunities.¹ In the context of the current obesity epidemic and known morbidities associated with open surgery, the levonorgestrel intrauterine device and conservative surgery are welcome alternatives to hysterectomy.² In a review of hysterectomies in 156 US hospitals in the Premier Research Database, abdominal cases decreased (60%-33%) while minimally invasive approaches increased (40%-67%) from 2005 to 2010.³ The Accreditation Council for Graduate Medical Education requires that OBGYN residents complete a minimum of 35 abdominal hysterectomies during the course of their training; meanwhile, these procedures occur with diminishing frequency.^{1,4} With an increasing focus on institutional quality and safety initiatives, simulation centers have been developed as alternative training facilities. These have helped minimize the rehearsal of surgical procedures by junior residents in the operating room, but many barriers limit their widespread use.⁵

Correspondence: Inquiries to Catherine R. Salva, MD, Department of Obstetrics and Gynecology, Hospital of the University of Pennsylvania, 3400 Spruce St (Dulles 5), Philadelphia, PA 19104; e-mail: catherine.salva@uphs.upenn.edu

Mental practice (MP), the cognitive rehearsal of a task in the absence of overt physical movement, has demonstrated benefit in the training of professional athletes and musicians.⁶⁻⁸ Its success is underpinned by the shared neuronal pathways between mental rehearsal and physical performance.⁹ As such, MP may serve as a potentially effective, portable, and inexpensive surgical training tool. Proposed applications include (A) aiding in the early stages of learning by decreasing the learning curve associated with particular motor tasks, (B) preventing the loss of already acquired skills, and (C) facilitating the transference of already acquired skills to new tasks.¹⁰ Although mental practice has been studied extensively in sports as a means of performance optimization for the elite athlete, the domain that we are interested in is skills acquisition for the novice.¹¹

Over the past decade, general surgeons and gynecologists have developed a small body of literature highlighting the potential role of MP in resident surgical education.¹²⁻¹⁵ These studies remain limited in number but have provided important methodological frameworks for further studies on MP. To this end, our objective was to develop and validate an MP tool (MPT) to be used by OBGYN residents during preparation for performance of a common and fundamental surgical procedure in our specialty, total abdominal hysterectomy (TAH).

MATERIALS AND METHODS

We performed a prospective survey study in a large, urban, academic hospital between July 1 and December 31, 2015. There were 27 OBGYN residents in training (6 in postgraduate year 4, and 7 in each preceding postgraduate year 1-3 class) during the timeframe of this study. The participating gynecology faculty had varying surgical backgrounds and included generalists ($n = 6$) and subspecialists in gynecologic oncology (1), urogynecology (2), reproductive endocrinology and infertility (1), and family planning (1). The study met eligibility criteria for exemption by the Institutional Review Board of the University of Pennsylvania.

A convenience sample of 22 residents and attendings ($N = 11$ per group) was enrolled and consented for participation by the principal investigator (C.S.) and first author (S.S.). Baseline demographic characteristics were collected including age, sex, handedness, background in sports or music, and number of TAHs performed up to the date of participation in the study. All residents had to have observed at least 1 TAH before the study. The number of reported procedures performed by residents was verified with those logged in the Accreditation Council for Graduate Medical Education Resident Case Log System.

A mental practice script was developed according to methodology described by Arora et al.¹² During separate interviews, the PI (C.S.) asked 3 expert gynecologic

surgeons to perform a verbal walk-through of a TAH. When not provided, the PI probed for visual, kinesthetic, and cognitive cues to ensure adequate description. Each interview was recorded, transcribed verbatim, and returned to the surgeons for verification. The interviews were then coded according to cue type, emphasizing kinesthetic (e.g., “gently, using the Yankauer suction in the left hand, medially retract the ovary and its blood supply”), visual (e.g., “you see the iliac vessels pulsating, and you transfer your gaze just medial and deep, to find the ureter peristalsing”), and cognitive (e.g., “the ureter courses retroperitoneally along the medial side of the broad ligament) cues. Cues were categorized under key procedural steps as listed in myTIPreport, an online evaluation tool used to provide procedure-specific feedback to trainees (produced by the Foundation for Excellence in Women’s Healthcare Inc., and built by Studio 46, LLC). There were multiple overlapping cues between interviews, suggesting content validity. The interviews were merged to create a final script (Fig. 1), and an audio recording was created by an investigator trained in Mind/Body Medicine (E.H.). The final MPT is a 27-minute audio file that participants access via email link. The file plays on any mobile device using a widely available phone application (SoundCloud Inc.). The MPT was reviewed by the expert gynecologic surgeons who reported that they could see and feel themselves taking a trainee through the surgical procedure, thus giving the tool face validity.

For validation, we assessed the quality of mental imagery in residents and attendings pre-exposure and post-exposure to the MPT. Administration of the MPT took place in a quiet setting. Residents and attendings were first asked to prepare for TAH in customary fashion. A maximum of 30 minutes was allotted. The quality of mental imagery was then assessed using a Mental Imagery Questionnaire (MIQ). Participants were then instructed to listen to the MPT using headphones while mentally engaging with the narrative. Following this exercise, investigators re-administered the MIQ.

The MIQ was adapted from Arora et al.’s¹² studies of MP in laparoscopic cholecystectomy to apply specifically to TAH (Fig. 2). The original, longer MIQ was developed by Hall and Pongrac¹⁶ and later abridged by Cumming et al.¹⁷ It consists of 8 Likert scale questions that address motivation, confidence, quality of imagery, and utility of the MP activity. Arora et al.¹³ demonstrated construct validity and reliability of the MIQ in their study population and later used this tool to assess mental imagery skills in a randomized controlled trial of MP in preparation for LC.

All statistical analyses were performed with IBM SPSS Statistics for Macintosh, Version 23 (SPSS Inc., Chicago, IL). Baseline demographic characteristics were compared using independent samples *t*-test and Fisher’s exact test. Within groups, pre- and post-MIQ scores were compared with the Wilcoxon signed rank test. Between groups, pre-

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