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Original Article

Trends of Bilateral Salpingectomy During Vaginal Hysterectomy With and Without Laparoscopic Assistance Performed for Benign Indications in the United States

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ABSTRACT **Study Objective:** To estimate the recent temporal trends of concurrent bilateral salpingectomy (BS) during vaginal hysterectomy (total vaginal hysterectomy [TVH] and laparoscopic-assisted vaginal hysterectomy [LAVH]) in the United States.
Design: A cross-sectional analysis was conducted using data from the Healthcare Cost and Utilization Project Nationwide Inpatient Sample, including all female patients 18 years and older whose inpatient discharge record indicated a TVH or LAVH performed for benign indications between January 1, 1998, and December 31, 2011. Joinpoint regression was used to identify statistically significant changes in overall and subgroup temporal trends of TVH and LAVH as well as concomitant BS during the 14-year study period (Canadian Task Force Classification II).
Setting: Not applicable.
Patients: All patients who underwent TVH and LAVH from 1998 to 2011 registered in the Healthcare Cost and Utilization Project Nationwide Inpatient Sample database.
Interventions: Not applicable.
Measurements and Main Results: Regarding TVH, between 1998 and 2001, there was a steep negative trend with an annual percentage change of −5.2 (95% confidence interval [CI], −8.8 to −2.2). From 2001 to 2011, the negative trend was still observed but with a more gradual 2% annual decrease (95% CI, −2.4 to −1.3). Conversely, the rate of LAVH increased at a rate of 4.4% each year (95% CI, 3.7–5.0). From 1998 to 2004, the national rate of BS during TVH increased sharply with an annual increase of 42.8% (95% CI, 22.7–66.3). Beginning in 2004, the BS rate during TVH decreased and remained stable. During LAVH, the rate of concomitant BS increased an estimated 15% each year during the entire study period (95% CI, 11.9–17.8).
Conclusion: The proportion of annual LAVH with concomitant BS procedures performed across the nation is on the rise while TVH is declining with a stable rate of concomitant BS. Journal of Minimally Invasive Gynecology (2016) ■, ■–■ © 2016 AAGL. All rights reserved.

Keywords: Laparoscopic-assisted vaginal hysterectomy; Salpingectomy; Temporal trends; Vaginal hysterectomy

Bilateral salpingectomy (BS) at the time of hysterectomy performed for benign indications should be an important component of preoperative patient counseling. Recently, it became generally accepted that most pelvic serous carcinomas originate from the distal fallopian tube [1–3]. It is worth noting that recently 2 large population-based retrospective studies have shown a decreased risk for ovarian cancer for women who underwent salpingectomy or tubal ligation [4,5]. This belief has warranted gynecologic surgeons to begin counseling patients about the potential benefits of the removal of the fallopian tubes during hysterectomy, particularly in women at a population risk of ovarian cancer who are not undergoing a concomitant oophorectomy [6]. Recent studies have shown that the rate of BS during hysterectomy performed for benign

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indications, regardless of the route of hysterectomy, quadrupled between 1998 and 2011 [7].

Although vaginal hysterectomy remains the preferred and the recommended route of hysterectomy for benign disease [8,9], the use of a vaginal approach for hysterectomy performed for benign indication decreased from 22% in 2003 to 2005 to 18% in 2009 [10]. Researchers have attributed this decrease in the rate of vaginal hysterectomy to various reasons [11], but it remains unknown how this decline could impact the recommended uptake of concomitant BS during benign hysterectomy. It is possible that the performance of fewer vaginal hysterectomies will negatively impact the uptake of concomitant BS during vaginal hysterectomy, and, thus, laparoscopic use might be needed to facilitate the performance of BS as part of the hysterectomy. Therefore, to fill this gap in knowledge, we sought to estimate the temporal trends of gynecologic surgeons' performance of concomitant bilateral salpingectomy during vaginal hysterectomy (total vaginal hysterectomy [TVH] and laparoscopic-assisted vaginal hysterectomy [LAVH]) in the United States. Our study will add to the existing body of evidence that attempts to identify and explain changing practice patterns among gynecologists in the United States.

Material and Methods

A cross-sectional analysis was conducted using data from the Healthcare Cost and Utilization Project Nationwide Inpatient Sample (NIS), the largest publicly available all-payer inpatient database in the United States [12]. Each year, the NIS stratifies all nonfederal community hospitals from participating states (1049 hospitals in 46 states in 2011) into groups based on 5 major hospital characteristics: rural/urban location, number of beds, geographic region, teaching status, and ownership. Within each stratum, a 20% sample of hospitals is drawn using a systematic random sampling technique [13]. All discharges are retained for each sampled hospital. The NIS is generated annually and, in 2011, included over 1000 hospitals and approximately 7 million discharge records [14].

The study population includes all female patients aged 18 years and older whose inpatient discharge record indicated a vaginal hysterectomy that was performed for benign indications between January 1, 1998, and December 31, 2011. Hysterectomies for nonbenign indications were excluded. Discharges with diagnoses or procedures indicative of ovarian disease, tubal disease, pelvic adhesions, and endometriosis were also excluded. Please review Appendix 1 for details of the inclusion and exclusion criteria. We then classified vaginal hysterectomies into 2 groups based on whether laparoscopic assistance was included (LAVH) or not (TVH). We only included LAVH and TVH because these are the routes in question; analyses including other routes (e.g., total laparoscopic hysterectomy or robotic-assisted total laparoscopic hysterectomy) or supracervical hysterectomy are beyond the scope of this study. We subclassified LAVH and TVH discharges by the type of adnexal surgery performed at the time of hysterectomy, specifically BS (Fig. 1). All clinical diagnoses and surgical procedures were identified using *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis and procedure codes.

Fig. 1

A flow diagram representing the final determination of all inpatient discharges in which a hysterectomy was performed because of benign indications and subsequent classification by hysterectomy route and adnexal surgery (Healthcare Cost and Utilization Project NIS, 1998–2011).ICD-9 = International Clasification of Diseases, Ninth Edition; LAVH = laparoscopically-assisted vaginal hysterectomy TVH = total vaginal hysterectomy. [a] Excludes rehabilitation and long-term acute care hospital. [b] See Appendix 1 for specific diagnosis and procedure code lists.