



Original Article

The characterization of trachelectomy for benign and precancerous indications in Taiwan: A population-based study, 1998–2013



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ABSTRACT

Objective: The study aimed to update the utilization trend and characterize the trachelectomy for benign and precancerous indications in Taiwanese women by comparing associated women, surgeon, and hospital-related characteristics.

Materials and methods: We conducted a population-based trend study using inpatient admission claims data from Taiwan's National Health Insurance program from 1998 to 2013. After excluding those who had prior subtotal hysterectomy, women who underwent trachelectomy for benign and precancerous indications were compared by age at surgery (younger than 40 years, $n = 130$; 40 and 59 years, $n = 429$; and 60 years or older, $n = 439$). Trend analysis by age groups and indication was performed for the utilization of trachelectomy. A separate descriptive analysis was also performed to evaluate the surgeon's total trachelectomy case volume during the study period.

Results: A total of 998 women who underwent trachelectomy for benign and precancerous indications were included in the study cohort. The overall utilization increased considerably by 100% over the study period. The most common indications for trachelectomy were genital prolapse (75.2%) and precancerous cervical lesion (21.0%). The majority of trachelectomies were performed with concomitant colporrhaphy for genital prolapse among older women without comorbid illness or any prior catastrophic illness. Most women (62.9%) were operated by a relatively small number of surgeons with high case volume (12.6%) during the study period. Compared to women older than 40 years, younger women had less comorbidities, more likely to be treated at private medical institution by surgeons of high case volume, and were less likely to undergo concomitant anterior and posterior colporrhaphy.

Conclusions: The overall utilization of trachelectomy for benign and precancerous indications has increased over the past 16-years from 1998 to 2013, particularly among older Taiwanese women without comorbid illness or any prior catastrophic illness.

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Introduction

Over the past years, trachelectomy has been performed for many indications, including prolapse, pelvic mass, and abnormal cervical cytology [1]. Ever since 1990, there has been a consistent increasing trend towards delayed childbearing after age 30 in the United States [2]. As more women are having their first child in their late thirties and early forties, there has been a renewed

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interest in performing trachelectomy when these young women are confronted with severe benign diseases (including extensive lower uterine segment myoma and cervical myoma) that would otherwise require hysterectomy [3–5]. Trachelectomy is considered a fertility-preserving alternative to conventional hysterectomy when these women desire to preserve child-bearing capacity. However, most published studies were case reports and various small retrospective case series [1,6–8], which provided limited information on the trends of the utilization of the procedure. Other studies focused on the neonatal outcome of women with cervical cancer [9–14]. Our current understanding of the common indications came mainly from the largest retrospectively reviewed single-institution case series study conducted more than 10 years ago by Hilger et al. [1] on 310 trachelectomies at a tertiary-care medical clinics between 1974 and 2003. Since there are important differences between utilization trends based on a single-institution experience and a well-defined population, population-based data may more accurately represent the changes in clinical practices and indications over a long period of time in the general female population. Our objectives were to update the utilization trend and characterize the trachelectomy for benign and precancerous indications in Taiwanese women by comparing associated women, surgeon, and hospital-related characteristics.

Materials and methods

Study design

We conducted a population-based trend study of all women who underwent trachelectomy for benign and precancerous indications in Taiwan from 1998 through 2013, using the National Health Insurance Research Database (NHIRD). The study was approved by the Institutional Review Board of National Yang-Ming University in Taiwan (No. YM103085E-1).

Data source

NHIRD is a population-based dataset containing registration files and medical benefit claims filed for reimbursement by all beneficiaries covered under Taiwan's National Health Insurance (NHI) program [15]. The NHI is a single-payer social insurance program for Taiwan's civilian residents with a coverage of 99% in 2010. In this study, analyses were based on the 1997–2013 enrollment data, registry for catastrophic illness, registry for contracted medical facilities, and medical claims for inpatient admissions as previously described [16]. The International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes are available for one primary and up to four secondary diagnoses and procedure per inpatient admission. The dataset was received as de-identified data, and various data files were linked using unique encrypted patient, surgeon, and hospital identifiers across all registries.

Study population

We retrospectively identified incident cases of trachelectomy from the inpatient admission claims between January 1, 1998 and December 31, 2013 using the ICD-9-CM procedure code for trachelectomy (67.4; $n = 1554$). The index admission was defined as the date of trachelectomy on the inpatient admission claims. Women with the code 54.21 within the same inpatient admission claims of trachelectomy were classified as having had a laparoscopic-assisted trachelectomy. To ensure that all women received trachelectomy only for benign and precancerous diseases, we excluded primary/secondary ICD-9-CM disease codes for

malignant neoplasm of the female genitourinary organs (179–184) ($n = 262$) and primary/secondary ICD-9-CM procedure codes for lymph node dissection (40.3–40.5) within the same inpatient admission claims ($n = 4$). To ensure all women had an intact uterus before undergoing trachelectomy, we also excluded primary/secondary ICD-9-CM procedure codes for total abdominal hysterectomy (68.4), vaginal hysterectomy (68.5), radical abdominal hysterectomy (68.6), radical vaginal hysterectomy (68.7), unspecified hysterectomy (68.9), or subtotal abdominal hysterectomy (68.3), prior or within the same inpatient admission claims ($n = 145$). We further excluded primary diagnoses not relevant to trachelectomy ($n = 145$). In aggregate, a total of 998 women who underwent trachelectomy between 1998 and 2013 were included in the study cohort.

Covariates

Baseline women (age, residential urbanicity, Charlson comorbidity index, status of any prior catastrophic illness, surgical indication, laparoscopic status, concomitant procedures and index year of trachelectomy), surgeon (age, sex, and total trachelectomy case volume), and hospital characteristics (accreditation level and institution ownership) were defined as the values at the index year. Women's residential urbanicity was classified into urban, suburban, and rural-classification as defined by Liu et al. [17]. Comorbidity was assessed using the Charlson comorbidity index based on at least one inpatient claims filed within a year to a month prior to inpatient admission for trachelectomy [18,19]. Surgical indications for inpatient trachelectomy admission claims were identified using the following ICD-9-CM disease codes: uterine leiomyoma (218), precancerous cervical lesion (233.1, 233.2, 622.1), genital prolapse (618), and non-inflammatory disorders of cervix (622.6, 622.7, 622.8). Concomitant procedures were identified using the following ICD-9-CM procedure codes: lysis of peritoneal adhesions (54.5), partial oophorectomy (65.2), unilateral oophorectomy (65.3, 65.4), bilateral oophorectomy (65.5, 65.6), anterior and posterior colporrhaphy (70.50), anterior colporrhaphy (70.51), and posterior colporrhaphy (70.52). Total case volume was used as a proxy measure of surgeon's surgical experience in trachelectomy. The total case volume treated by each surgeon during the entire study period was calculated and assigned to each woman who underwent trachelectomy. Low-volume surgeons were defined as those performed only one trachelectomy during the study period of 16 years, middle-volume surgeons performed between two and four trachelectomies, and high-volume surgeons as those performing five or more trachelectomies. All medical institutions were classified according to the Taiwan Joint Commission on Hospital Accreditation (medical center, regional hospital, district hospital, or clinics) [20] and as private or public (government-owned) ownership.

Statistical analysis

The mean (standard deviations, SD) and frequency (%) were presented with continuous and categorical variable, respectively. The dissimilarities in baseline characteristics based on women's age at trachelectomy were compared using one-way analysis of variance test for continuous variables and Pearson's chi-square test for categorical variables. The national trends in the utilization of trachelectomy, mean age at surgery, indications and surgeon's total trachelectomy case volume were illustrated descriptively. The mean age at trachelectomy was compared between five calendar periods (1998–2000, 2001–2003, 2004–2006, 2007–2009, and 2010–2013). Analyses were conducted using the software package SAS for Windows® (release 9.4) (SAS Institute Inc., Cary, NC). All

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