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Outcomes After Nonobstetric Surgery in Pregnant Patients: A Nationwide Study

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Abstract

Objective: To evaluate outcomes after nonobstetric surgical procedures in pregnant patients.

Methods: We conducted a retrospective cohort study of 5591 pregnant women who underwent nonobstetric surgical procedures using Taiwan's National Health Insurance Research Database 2008-2012 claims data. Using a propensity score matching procedure, 22,364 nonpregnant women were selected for comparison. Logistic regression was used to calculate the odds ratios (ORs) and 95% CIs of postoperative complications and in-hospital mortality associated with pregnancy.

Results: Pregnant women had higher risks of postoperative septicemia (OR=1.75; 95% CI, 1.47-2.07), pneumonia (OR=1.47; 95% CI, 1.01-2.13), urinary tract infection (OR=1.29; 95% CI, 1.08-1.54), and in-hospital mortality (OR=3.94; 95% CI, 2.62-5.92) compared with nonpregnant women. Pregnant women also had longer hospital stays and higher medical expenditures after nonobstetric surgical procedures than controls. Higher rates of postoperative adverse events in pregnant women receiving nonobstetric surgery were noted in all age groups.

Conclusion: Surgical patients with pregnancy showed more adverse events, with a risk of in-hospital mortality approximately 4-fold higher after nonobstetric surgery compared with nonpregnant patients. These findings suggest the urgent need to revise the protocols for postoperative care for this population.

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For editorial comment, see page 1151; for related article, see page 1158

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Pregnancy is marked by major cardiovascular, respiratory, gastrointestinal, hematologic, endocrine, nervous, and renal system changes that affect preexisting medical conditions and make clinical assessments more complex and challenging.[1] Although pregnancy complicates disease status, whether pregnancy itself has protective or harmful effects is not well understood. Some studies have found protective effects of pregnancy, such as a decreased incidence of acute appendicitis and an improved critical illness condition prognosis.[2,3] Other studies have suggested that pregnant status is associated with worse breast cancer or traumatic brain injury outcomes.[4,5]

Pregnant women also experience diseases that require surgical interventions, with an estimated 2% needing nonobstetric surgical procedures during the antepartum period. Mortality from such surgical procedures has been estimated to be 0.006% to 0.25%.[6,7] Several recent studies have investigated perioperative outcomes after nonobstetric surgical procedures in pregnant women, but the association between pregnancy and postoperative outcomes remains controversial.[6-17] Some studies suggested that pregnancy is associated with higher rates of perioperative maternal complications,[8,9] and other studies reported no significant differences in postoperative complications and mortality rates between pregnant and nonpregnant women.[10-12] However, these previous investigations were limited by several factors, such as focusing on specific types of surgery,[8-14] analysis based on smaller samples of pregnant women,[11,13-17] studies conducted without matching procedure,[6,7,13-16] or inadequate adjustment for potential confounding factors.[8-11]

Using claims data from Taiwan's National Health Insurance Research Database, we conducted a nationwide cohort study to compare major complications and in-hospital mortality rates after nonobstetric surgical procedures in pregnant and nonpregnant women.

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METHODS

Source of Data

Taiwan's National Health Insurance program was implemented in March 1995 and covers more than 99% of Taiwan's 23 million residents. This study used reimbursement claims data from Taiwan's National Health Insurance Research Database. The National Health Research Institutes established this database to record all beneficiaries' medical services, including inpatient and outpatient demographic characteristics, physicians' primary and secondary diagnoses, treatment procedures, prescriptions, and medical expenditures. Research articles based on data from this database have been accepted in prominent scientific journals worldwide.[18-22]

Ethical Approval

To protect personal privacy, the electronic database was decoded, with patient identifications scrambled for further public access for research. According to National Health Research Institutes regulations, informed consent is not required because of the use of decoded and scrambled patient identifications. However, this study was evaluated and approved by Taiwan's National Health Research Institutes and the institutional review board of Taipei Medical University (TMU-JIRB-201505055; TMU-JIRB-201404070). This study was conducted in accordance with the Helsinki Declaration.

Study Design

We examined medical claims and identified 5591 pregnant patients 18 years and older from 591,445 patients who underwent major inpatient nonobstetric surgical procedures from January 1, 2008, through December 31, 2012. These procedures required general, epidural, or spinal anesthesia and hospitalization for more than 1 day. Each pregnant surgical patient was matched with 4 randomly selected nonpregnant female surgical patients. We conducted the analysis using a propensity score matched pair procedure and considered age, low income, whether the operation took place in a medical center, coexisting medical conditions, types of nonobstetric surgery, and types of anesthesia.

Measures and Definitions

We identified patient income status by defining low income as qualifying for waived medical copayment because this status is verified by the insurance bureau. Also recorded were whether the surgery was performed in a medical center and the types of nonobstetric surgery and anesthesia. Taiwan defines medical centers as hospitals that (1) provide research, teaching, and high-quality medical care; (2) have at least 500 acute inpatient care beds; and (3) have departments of family medicine, internal medicine, surgical medicine, obstetrics and gynecology, pediatrics, orthopedics, neurosurgery, plastic surgery, urology, otolaryngology, ophthalmology, dermatology, neurology, psychiatry, rehabilitation, anesthesiology, radiology, pathology, nuclear medicine, dentistry, emergency medicine, and occupational medicine. The *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) was used to define physicians' diagnoses in the National Health Insurance system. Based on previous surgical studies,[18-22] preexisting medical conditions that were determined from medical claims for the 24-month preoperative period included mental disorders (*ICD-9-CM* codes 290-319), chronic obstructive pulmonary disease (*ICD-9-CM* codes 490-496), hypertension (*ICD-9-CM* codes 401-405), diabetes (*ICD-9-CM* code 250), hyperlipidemia (*ICD-9-CM* codes 272.0, 272.1, and 272.2), ischemic heart disease (*ICD-9-CM* codes 410-414), epilepsy (*ICD-9-CM* code 345), liver cirrhosis (*ICD-9-CM* code 571), and congestive heart failure (*ICD-9-CM* code 428). Renal dialysis was defined by administration codes (D8 and D9). In-hospital mortality after the index surgery was considered the study's primary outcome. Nine major postoperative complications were considered secondary outcomes: septicemia (*ICD-9-CM* codes 038 and 998.5), pneumonia (*ICD-9-CM* codes 480-486), stroke (*ICD-9-CM* codes 430-438), urinary tract infection (*ICD-9-CM* code 599.0), acute renal failure (*ICD-9-CM* code 584), deep wound infection (*ICD-9-CM* code 958.3), pulmonary embolism (*ICD-9-CM* code 415), postoperative bleeding (*ICD-9-CM* codes 998.0, 998.1, and 998.2), and acute myocardial infarction (*ICD-9-CM* code 410).[18-22] Admission to the intensive care unit, length of hospital stay, and medical expenditures after the index surgery were also compared. Postoperative adverse events noted included septicemia, pneumonia, urinary tract infection, and in-hospital mortality.