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ORIGINAL ARTICLE

Impact of diabetes mellitus on cholecystectomy rate: A population-based follow-up study

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cholecystectomy;
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Summary *Background/Introduction:* Some reports suggest early cholecystectomy for diabetic patients with asymptomatic gallstone disease (GSD) to prevent subsequent serious infection. However, only a few studies have examined the incidence of cholecystectomy in response to GSD in diabetic patients. Our study attempts to elucidate the relationship between GSD and diabetes using the high coverage rate health insurance system of Taiwan and thus evaluate the validity of early cholecystectomy in diabetic patients.
Purpose(s)/Aim(s): To investigate the rate of cholecystectomy in diabetic patients with GSD.
Methods: Diabetic patients without prior treatment for GSD on hospitalization or ambulatory visits were identified and compared with age- and sex-matched controls and were followed up for 8 years. Cholecystectomy incidence density rates were estimated according to the patients' diabetic status. Cox proportional hazards regression models were used to analyze the age- and sex-specific effects of diabetes on the risk of surgery for GSD.
Results: The incidence rates of patients who developed GSD and underwent cholecystectomy were 18.65% and 17.15% in the diabetic and control groups, respectively; thus, the rate of cholecystectomy was higher in the diabetic group than in the control group. Male sex and old age were associated with a high rate of cholecystectomy, irrespective of the diabetic status. Hypertension, cholangitis, and Caroli disease were associated with an increased risk of cholecystectomy in patients with GSD. Overall, diabetic patients exhibited a higher incidence of cholecystectomy than nondiabetic patients did over an 8-year follow-up period.

Conflicts of interest: All authors have no conflicts of interest to declare.

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Conclusion: Men with GSD are more likely to undergo cholecystectomy than women, irrespective of the diabetic status; therefore, an aggressive GSD management approach for men must be considered for early identification of these patients before the need for emergency surgery.

1. Introduction

Gallstone disease (GSD) is a prevalent medical condition causing considerable economic and social burdens. Epidemiological evidence indicates that the prevalence of GSD ranges from 10% to 15%.[1] Major risk factors for GSD are old age, obesity, and female sex. Other factors associated with an increased risk of GSD are ethnicity, a high-fat or high-carbohydrate diet, estrogen use, and Gilbert's syndrome. By contrast, alcohol and coffee consumption,[1] a high-fiber diet, and statin use seem to lower the risk of GSD. Furthermore, studies have reported a higher hospital admission rate among the diabetic population. The estimated age-standardized hospital admission rate for GSD was 0.6 per 1000 persons.[2] However, since the 1990s, an increasing trend has been observed in the hospital admission rates for gallstones, which is probably caused in part by the use of improved technology, notably the use of laparoscopic cholecystectomy (LC) as a treatment option. Approximately 70—80% of all types of cholecystectomy in western countries are the LC type. Few studies have evaluated the outcome of LC in diabetic patients or the effect of diabetes-associated comorbidities on the surgical risk in these patients. Some studies have reported that diabetes predisposes patients to a high risk of conversion from LC to open cholecystectomy.

3Evidence reveals that diabetes is a risk factor for GSD, and the prevalence of GSD is higher in diabetic patients than in nondiabetic patients. In clinical settings, cholecystectomy-related decisions regarding patients diagnosed with diabetes remain controversial, particularly in patients with asymptomatic GSD.[3] Several studies have suggested that more attention should be paid to operative and postoperative complications, GSD-associated morbidities, or both of these factors in diabetic patients, resulting in superior management and favorable outcomes in these patients.[4] Currently, little is known about the rate of cholecystectomy for GSD in diabetic patients compared with that in nondiabetic patients in the general population. An understanding of this situation in the general population may enable public health authorities to provide appropriate health care services and resources in a cost-effective manner.

Therefore, in the present study, we evaluated and compared the incidence of cholecystectomy in diabetic and nondiabetic patients with GSD.

2. Materials and methods

2.1. Data source

The Taiwan Department of Health incorporated health insurance programs into the Taiwan National Health Insurance (NHI) system in 1995, and the Bureau of NHI (BNHI) is contracted with 97% of hospitals as well as 90% of clinics in Taiwan. This retrospective and population-based study was conducted using data from the BNHI and National Health Research Institutes (NHRI) databases through data mining. The BNHI is the NHRI provider of Taiwan and covers approximately 98—99% of its 23 million residents. To assess the accuracy of the claims data, the BNHI performs expert quarterly reviews on a random sample of every 50—100 ambulatory and inpatient claims at each hospital and clinic and imposes severe penalties on health care providers in cases of false diagnostic reports. We analyzed the ambulatory care and inpatient claims data between 2000 and 2008 of the BNHI as well as obtained an updated registry of beneficiaries. All of the NHI datasets can be interlinked using individual personal identification numbers.

2.2. Study cohorts and comorbidities

Patients were identified on the basis of the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnostic codes in the ambulatory care claims records. Patients who received a diabetes-related diagnosis (ICD-9-CM 250) were selected for the diabetic group. A person was classified as diabetic if they had received an initial diabetes-related diagnosis at any time in the year 2000 and received subsequent diagnoses (one or more) within 12 months. The first and last outpatient visits within 1 year were more than 30 days apart to avoid the accidental inclusion of miscoded patients. To detect newly diagnosed GSD cases, patients who sought treatment at a hospital or an ambulatory care facility for gallstones (ICD-9-CM 574) between 1997 and 1999 were excluded from our diabetic group. We identified and enrolled 60,734 patients diagnosed with diabetes in 2000.

Control group participants were selected from the list of beneficiaries in 2000 and evaluated to ensure that they were free of diabetes and GSD between 1997 and 2000. The control group comprised 48,116 randomly selected individuals who were age- and sex-matched with the patients in the diabetic group. Cholecystectomy procedures performed between 2000 and 2008 were considered GSD events.

Furthermore, we searched the ambulatory care visit and hospitalization claims information for selected specific comorbidities of hypertension (ICD-9-CM 401, 405), gout (ICD-9-CM 274), hyperlipidemia (ICD-9-CM 272.0—272.9), cystic fibrosis (ICD-9-CM 277.0), sickle-cell disease (ICD-9-CM 282.6), cirrhosis (ICD-9-CM 571.2, 571.5, 571.6), cholangitis (ICD-9-CM 576.1), Caroli disease (ICD-9-CM 576.2), Crohn disease (ICD-9-CM 555.9), and hemolytic anemia (ICD-9-CM 282, 283). The comorbidities were included only when the index date during the study period (2000—2008)