

Risk of gastric cancer following percutaneous endoscopic gastrostomy: A nationwide population-based cohort study



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ABSTRACT

Objectives: To investigate whether percutaneous endoscopic gastrostomy (PEG) tube placement is associated with increased risk of gastric cancer.

Methods: We conducted a nationwide population-based retrospective study in Taiwan. Inpatient data from 1997 to 2010 were collected from Taiwan National Health Insurance Research Database. Patients with age less than 20 years; those with histories of PEG before 2000; those with histories of cancers; and those diagnosed with gastric cancer before or within 6 months of the first PEG procedure were excluded. Finally, 3505 patients who underwent PEG were included (PEG cohort), along with 7010 randomly-selected individuals, matched by age, sex, and year of index date, as the control cohort.

Results: After adjusting for age, sex, peptic ulcer, gastritis, hypertension, diabetes and coronary artery disease, risk of gastric cancer was significantly higher in the PEG cohort (adjusted hazard ratio, 5.31; 95% confidence interval, 4.12–6.00; $p = 0.011$). Patients with 2 or more PEG procedures were significantly associated with increasingly developing gastric cancer risk (adjusted hazard ratio, 2.73; 95% confidence interval, 1.91–3.85; $p < 0.001$). The possible hypothesis may be due to chronic inflammation caused by chemical and physical conditions of the tube.

Conclusions: Patients with PEG might be associated with a greater risk of subsequent gastric cancer in Taiwan. Physicians should be aware of the link when assessing patients with PEG.

Introduction

Percutaneous endoscopic gastrostomy (PEG) is a method of semi-permanent gastric feeding tube placement introduced in 1980 [1]. It is now a common procedure for establishing a feeding route for patients needing medium- and long-term enteral nutrition support. PEG tube placement is recommended for patients with neurologic diseases, psychomotor disorders, head and neck cancer, or esophageal cancer [2–4]. Common long-term complications include gastric ulcer, leakage, peristomal infection, and buried bumper syndrome [5,6]. Malignant cell seeding after PEG tube placement in patients with head, neck, and esophageal cancers is also reported [7,8].

Chronic inflammation is associated with increased cancer risk and associations between gastroesophageal reflux disease and esophageal cancer, chronic gastritis and gastric cancer, and inflammatory bowel

disease and colorectal cancer are well documented [9–13]. However, the subsequent risk of gastric cancer after long-term PEG implantation is unknown. Here, we conducted a large-scale nationwide retrospective cohort study to examine risk of gastric cancer after PEG tube placement.

Materials and Methods

Data collection

Data for this population-based retrospective cohort study were collected from the Taiwan National Health Insurance Research Database (NHIRD). The Taiwan National Health Insurance (NHI) program was instituted in 1996, and is a single-payer universal insurance plan; until 1998, nearly 99% of the 23 million citizens in Taiwan were enrolled. Data available from the NHIRD include sex, birth dates,

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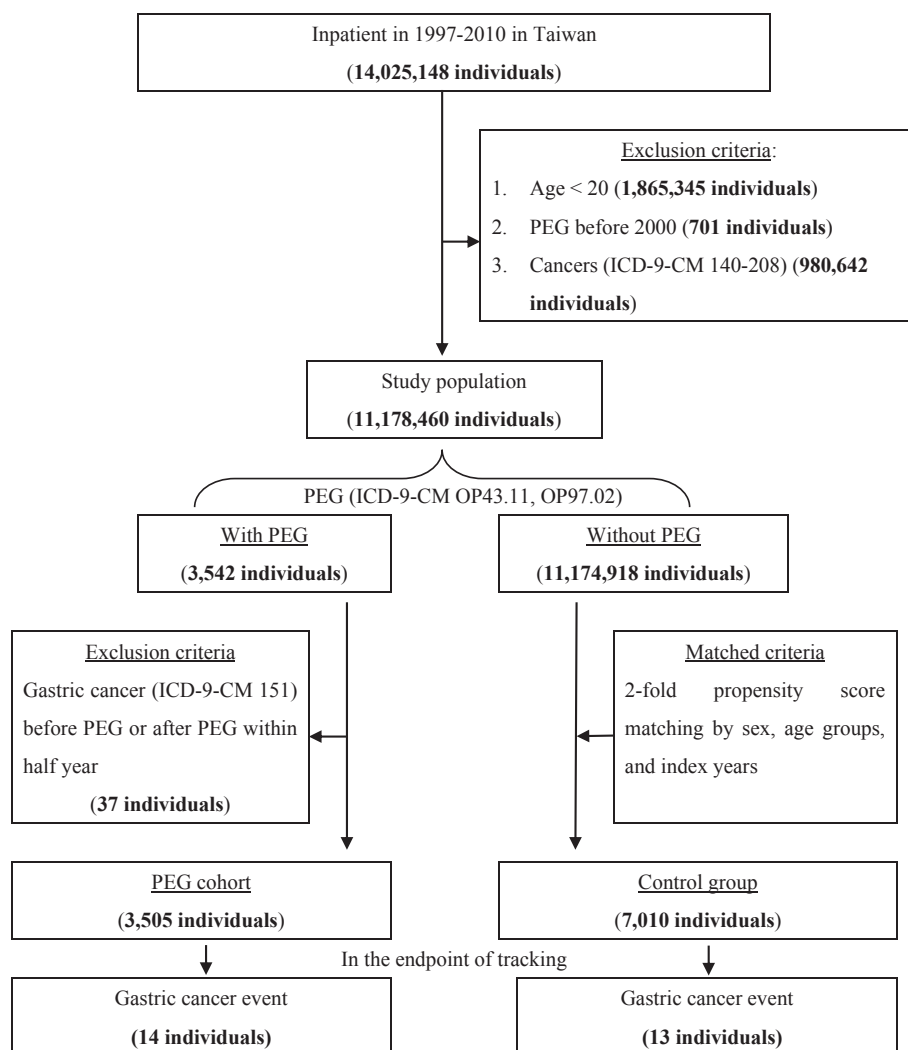


Fig. 1. Flowchart for the selection of the study sample from the National Health Insurance Research Database in Taiwan. PEG, percutaneous endoscopic gastrostomy.

diagnosis codes and dates, procedure codes and dates, etc. When a patient is diagnosed with cancer, the patient's International Classification of Diseases 9th edition Clinical Modification (ICD-9-CM) is coded in the Catastrophic Illness Registry File.

We linked to the Catastrophic Illness Registry data base and enrolled patients based on disease histories from inpatient data and according to ICD-9-CM diagnosis codes. This study was approved by the Institutional Review Board of the Tri-Service General Hospital (TSGHIRB 2-104-05-084) and informed consent for study inclusion was waived due to data anonymity.

Study population

We searched NHIRD records compiled between 1997 and 2010 for inpatients. We excluded patients with age less than 20 years; those with histories of PEG before 2000; those with histories of cancers (Fig. 1). Thus 11,178,460 individuals were enrolled in the study population. The PEG cohort included patients who underwent a PEG procedure (OP43.11 and OP97.02). Patients with diagnoses of gastric cancer before or within 6 months of the first PEG procedure were excluded. The index date was set as the PEG insertion date. The control cohort consisted of patients with no history of PEG who were randomly, 2-fold frequency-matched according to age, sex, and year of index date. The main event of this study was subsequent gastric cancer as indicated by ICD-9-CM 151. The follow-up evaluation was terminated when gastric

cancer occurred, upon withdrawal from the NHRI, or on December 31, 2010.

Age, sex, peptic ulcer (ICD-9-CM 531–534), gastritis (ICD-9-CM 535), *H. pylori* infection (ICD-9-CM 041.86), and pernicious anemia (ICD-9-CM 280.1) were noted as possible risk factors for gastric cancer. Hypertension (ICD-9-CM 401–405), diabetes (ICD-9-CM 250), and coronary artery disease (ICD-9-CM 410–414) were common comorbidities. However, there were no patients with diagnoses of *H. pylori* or pernicious anemia in either cohort. Dementia (ICD-9-CM 290–294), diseases of the nervous system and sense organs (ICD-9-CM 320–359), and cerebrovascular disease (ICD-9-CM 430–438) were indicated for PEG insertion [4]. The above diagnoses and the Charlson Comorbidity Index were listed as comorbidities and were adjusted for potential confounding effect.

Duration of PEG tube placement was also examined, but the procedure code for removal of PEG tube was not recorded in the NHIRD. Thus, we estimated duration of PEG placement by time lag and replacement times. Because a patient who needed a PEG tube usually had a chronic disease, time lag between PEG tube insertion and diagnosis of gastric cancer might indicate placement duration. Because some PEG tubes are replaced due to occlusion or breakage, the timing of the replacement procedures could also reflect placement duration.

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