Ventriculo-peritoneal shunt is not a risk factor for acute appendicitis in traumatic brain injury patients: a 14-year population-based study

Jinn-Rung Kuo

**Objective:** The association between preexisting ventriculo-peritoneal (VP) shunt and the risk of new-onset acute appendicitis in patients with traumatic brain injury (TBI) is not well established. This study investigated the contribution of VP shunt and central nervous system (CNS) infection to new-onset acute appendicitis after TBI using a longitudinal population database in Taiwan.

**Methods:** A longitudinal cohort study matched by a propensity score of 1:2 by age, gender, HTN, DM, Stroke, CAD, renal disease, and ICU stay in TBI patients with or without VP-shunt was conducted using data available in the National Health Insurance Research Database in Taiwan between January 1993 and December 2013. The main outcome studied was diagnosis of acute appendicitis.

**Results:** In total, 14343 subjects (4781 TBI patients with VP shunt and 9562 TBI patients without VP shunt) were enrolled in this study. The main findings were as follows: (1) the incidence of acute appendicitis in TBI patients with a shunt (0.42%) and those without a shunt (0.35%) was not significantly different ($p=.4958$); (2) the cumulative probability of acute appendicitis was not significantly different between TBI patients with a shunt and those without (3.27% vs 1.2%, $p=.0917$ at 1 year, 2.72% vs 1.26% ($p=0.0570$) at 3 years, 1.08% vs 0.93% ($p=0.7637$) at 10 years); (3) a Cox model showed CNS infection to be an independent predictor of acute appendicitis (adjust HR = 2.98; 95% CI, 1.42–6.24, $p=0.0038$); and (4) TBI patients with both a VP shunt and a CNS infection had a higher risk of developing new-onset acute appendicitis (HR = 4.25; 95% CI, 1.84-9.81) compared to TBI patients without a VP shunt or CNS infection.

**Conclusion:** This study demonstrated that VP shunt is not a risk factor in the development of appendicitis in patients with TBI. TBI patients with a shunt and a CNS infection may have a higher risk of developing acute appendicitis. Therefore, care in avoiding CNS infection is key for the prevention acute appendicitis in this patient population.

**Keywords:** Hydrocephalus; ventriculo-peritoneal shunt; traumatic brain injury; appendicitis; propensity score; National Health Insurance Research Database (NHIRD)