A new accurate model for predicting mortality up to 12 months after ERCP

Kalaitzakis E. All-cause mortality after ERCP. Endoscopy 2016;48:987-94.

Endoscopic retrograde cholangiopancreatography (ERCP) is a specific and advanced endoscopic procedure for diagnosing and treating pancreaticobiliary diseases. However, complications can occur in 5%-12% of cases (1-3). The most common complications are pancreatitis (1%-15%), cholangitis (1%-5%), hemorrhage (1%-4%), and perforation (1%-2%) (3-5). A post-ERCP complication may cause mortality. The 30-day mortality rate after ERCP has been reported to be 2.2%-5.9% (3,6-10). It has been reported that half of the deaths are directly related to ERCP procedures (3). Due to the considerable risk of complications, retrospective and prospective studies have evaluated risk factors for post-ERCP complications, and morbidity and mortality were found to be related to a patient's age and comorbidity as well as the number of ERCP procedures performed in a hospital and the type of intervention (3,6-10).

Recent studies have focused on the development of models of predictors of mortality after ERCP. A national-scale, population-based study from England demonstrated that the overall 30-day mortality rate after the first ERCP procedure was 5.3% (9). The results of the study showed that increasing age, male sex, emergency admission status, and non-malignant comorbidity were related to 30-day mortality after the first ERCP procedure in non-cancer diseases. Only advanced age and emergency admission status were found to be associated with mortality in cancer diseases. The obvious effect on prognosis was the presence of cancer. A study by Kalaitzakis was published in the November issue of "Endoscopy" in 2016 (11). The author aimed to externally validate the previously published 30-day mortality post-ERCP risk model (9) and to develop a medium-term (3-12 months) prediction model for mortality up to 12 months after ERCP. Data were searched from the Swedish Hospital Discharge Registry (HDR) and Swedish Death Registry.

In the model in the English study, there were five variables that were found as independent predictors of 30-day mortality in the regression analysis: age, sex, emergency admission status, non-cancer comorbidity, and cancer. It was shown that the model predicted death after ERCP within 30 days with a 75.6% sensitivity and 77.9% specificity (9). In this current study, variables were assessed in two cohorts. Cohort 1 (n=16478) comprised patients who underwent their first ERCP procedure between 2005 and 2008. All variables that were used in the previous original English risk model were assessed in this cohort. The probability of the 30-day mortality of each patient according to the published model was calculated. Although the demographic data, type of admission, and presence of gallstone-related diseases were very similar between the previous English cohort and the current cohort (Swedish cohort 1), the presence of a cancer-related diseases and non-cancer comorbidity in Swedish cohort 1 was higher than that in the English cohort. Therefore, the original model was recalibrated and validated in a separate cohort (cohort 2, n=6213) who underwent their first ERCP procedure between 2008 and 2009. Similar to cohort 1, data were obtained from the Swedish HDR, and deaths were recorded from the Swedish Death Registry until the end of 2010. The recalibrated model was tested and showed very good discriminant validity.

Kalaitzakis reported that mortality ratio more than doubled from 5% at 30 days to 11.9% at 3 months, which was in accordance with the English study, and increased further to 24.5% at 12 months following the first ERCP procedure. Furthermore, the author emphasized that hepatobiliary and pancreatic cancers were the main causes of death throughout the first year after ERCP. Almost two-thirds of all deaths were due to hepatobiliary, pancreatic and other malignancies. Gallstone-related and other benign diseases were the main causes of death in 6.1% and 8.4% of patients at 30 days, respectively, and decreased to 2% and 4% at 12 months after ERCP, respectively. The current study showed that 15 deaths could be related to a specific post-ERCP complication (1.8% of all deaths or 0.09% of all first ERCP pro-

cedures at 30 days after the procedure), whereas 22 patients died because of acute cholangitis (with or without common bile duct stones) during the first 30 days after ERCP. The total number of ERCP-related deaths 30 days after the ERCP procedure was 35 in cohort 1 (4.3% of all deaths or 0.2% of all first ERCP procedures at 30 days after the procedure). No additional ERCP-related deaths were reported up to 12 months.

Subsequently, to develop a prediction model for all-cause mortality up to 12 months after ERCP, variables used in the 30-day mortality risk model were evaluated in cohort 1. The additional potential predictors for 3-12 month mortality such as the presence of gallstone-related diseases, the teaching hospital status, and the number of ERCP procedures performed were included in the analysis. After the calculation of a prognostic score for each patient, the medium-term mortality model was retested in cohort 2. The validation and calibration of the new model were reported as "very good." As expected, older age, emergency admission status, cancer diagnosis, and non-cancer comorbidity were related to worse survival, but interestingly, gallstone-related diseases were related to better survival.

The previously published English model predicting 30-day mortality after ERCP was validated in the current study. Furthermore, a new accurate model predicting mortality up to 12 months after the first ERCP procedure was developed, and both of them tested were in two cohorts. The retrospective nature and lack of clinical details and technical procedures were the main limitations of the study. Kalaitzakis concluded that the two mortality-predicting models after ERCP may be helpful for selecting patients for close follow-up after the procedure and for obtaining informed consent. In addition, the presented models may be used by researchers in future studies.

Nalan Gülşen Ünal, Fatih Tekin

Department of Gastroenterology, Ege University School of Medicine, İzmir, Turkey

REFERENCES

1. Freeman ML. Adverse outcomes of ERCP. Gastrointest Endosc 2002; 56(Suppl 6): S273-82. [CrossRef]
2. Loperfido S, Angelini G, Benedetti G, et al. Major early complications from diagnostic and therapeutic ERCP: a prospective multicenter study. Gastrointest Endosc 1998; 48: 1-10. [CrossRef]
3. Glomsaker T, Hoff G, Kvaloy JT, et al. Patterns and predictive factors of complications after endoscopic retrograde cholangiopancreatography. Br J Surg 2013; 100: 373-80. [CrossRef]
4. Freeman ML, Nelson DB, Sherman S, et al. Complications of endoscopic biliary sphincterotomy. N Engl J Med 1996; 335: 909-18. [CrossRef]
5. Andriulli A, Loperfido S, Napolitano G, et al. Incidence rates of post-ERCP complications: a systematic survey of prospective studies. Am J Gastroenterol 2007; 102: 1781-8. [CrossRef]
6. Enochsson L, Swahn F, Arnelo U, Nilsson M, Löhr M, Persson G. Nationwide, population-based data from 11,074 ERCP procedures from the Swedish Registry for Gallstone Surgery and ERCP. Gastrointest Endosc 2010; 72: 1175-84. [CrossRef]
7. Christensen M, Matzen P, Schulze S, Rosenberg J. Complications of ERCP: a prospective study. Gastrointest Endosc 2004; 60: 721-31. [CrossRef]
8. Cotton PB, Garrow DA, Gallagher J, et al. Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years. Gastrointest Endosc 2009; 70: 80-8. [CrossRef]
9. Bodger K, Bowering K, Sarkar S, et al. All-cause mortality after first ERCP in England: clinically guided analysis of hospital episode statistics with linkage to registry of death. Gastrointest Endosc 2011; 74: 825-33. [CrossRef]
10. Kalaitzakis E, Toth E. Hospital volume status is related to technical failure and all-cause mortality following ERCP for benign disease. Dig Dis Sci 2015; 60: 1793-800. [CrossRef]
11. Kalaitzakis E. All-cause mortality after ERCP. Endoscopy 2016; 48: 987-94. [CrossRef]

Correspondence: Fatih Tekin
E-mail: drtekinfatih@gmail.com
Received: March 6, 2017 **Accepted:** March 10, 2017
Available Online Date: March 23, 2017
DOI: 10.5152/tjg.2017.13031